ESTABLISHED 1991

STEALTH VALVE & CONTROLS LTD.

The "Application Solution" Company®

Industry Standard Suggested Specifications

For Consulting Engineers, Cities and Municipalities

Municipal Division

- AWWA Mounting and Actuation
- AWWA Butterfly Valves
- Aeration Valves
- Automatic Strainers
- Backflow Preventers
- Resilient Seated/Lug Butterfly Valves
- Damper Valves
- Automatic Control Valves
- AWWA Slide Gate Valves
- IBC High Energy Dissipating Valves
- Knifegate Valves
- Torque Tube and Shaft Extensions
- Ball Valves
- Air and Vacuum Valves
- AWWA/Industrial butterfly valve comparison guide

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ONTARIO – 1273 North Service Road East, Unit F7, Oakville ON L6H 1A7 – TEL 905 845 4500 • FAX 905 845 4505
BRITISH COLUMBIA – 100 Park Royal, Suite 200, West Vancouver BC V7T 1A2 – TEL 604 922 1855 • FAX 604 922 1355

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APPLICATION	PRODUCT	MANUFACTURER	SECTION	PAGE	SPECIFICATION AVAILABLE
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	Butterfly Valve, AWWA C504	Pratt	C	2, 4	*Yes – WEB
	Couplings	Romac			Yes
	Dismantling Joints	Pratt			Yes
	Pedestals/Torque Tubes/ Rod Extensions	Stealth	N	2, 3, 4	*Yes – WEB
	Vacuum/Air Relief	Crispin	P	2	*Yes – WEB
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	Cone Valve	Pratt			Yes
	Sleeve Valve	Pratt			Yes
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	Butterfly Valve, Resilient Seated	Bray	D	2	*Yes – WEB
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Buried Service	Butterfly Valve, AWWA C504	Pratt	C	2, 4	*Yes – WEB
	Couplings	Romac			Yes
	Dismantling Joint	Pratt			Yes
	Flanged/Indicating (Non-indicating)	Pratt			Yes
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	Vacuum/Air Relief	Crispin	P	2	Yes

APPLICATION INDEX – WASTEWATER

APPLICATION	PRODUCT	MANUFACTURER	SECTION	PAGE	SPECIFICATION AVAILABLE
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	Butterfly Valve, High Performance	Bray			Yes
	Butterfly Valve	Pratt	C	2, 4	*Yes – WEB
	AWWA C504 Ball Valve	Pratt			Yes
	Check Valve	HDL			
	Butterfly Valve, Resilient Seated	Bray			*Yes – WEB
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	Check Valve, Rubber Flapper, Silent	Milliken/Crispin			
	Couplings	Romac			Yes
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	Dismantling Joints	Pratt			Yes
	Foot Valve	Crispin			Yes
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	Float Valve	Ross			Yes
	Flow Control Valve	Ross			Yes
	Pressure Reducing Valve	Ross			Yes
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	Strainers, 'Y', Basket	Sureflow			Yes

SECTION B

Actuator Brackets and Adapters

SUGGESTED SPECIFICATION

Actuator Brackets and Adapters for Butterfly Valves

Brackets
All brackets shall be designed to suit the existing valve trunnion bolt circle while maintaining the specified pre-load to the packing if applicable. All brackets shall be designed for field assembly to existing valves while under pressure or flowing conditions. Brackets and adapters shall be carbon steel powder coated with Byers Bush grade 101BK to minimum 3 mil dry film thickness (DFT). All adapters shall be designed to withstand the maximum output torque of the actuator with zero torsional deflection to the bracket or adapter. All brackets and adapters shall be manufactured in a steady rest with milled mating surfaces to eliminate premature wear to the packing, seals and bearings. All mounting holes on twin plate designs shall incorporate anti-rotational devices, two per unit Stealth part # 35987–01 to prevent rotation between plates. All double plate brackets as required shall be designed for clog and corrosion-free operation and to prevent actuator pressurization from possible valve packing failure for the life of the valve. All mounting hardware shall be stainless steel per ASTM F593, or carbon steel per SAE J429 Grade 8. All brackets and adapters shall carry a lifetime warranty from the manufacturer. Deflection calculations of the bracket and adapter shall be supplied with the bid.

Shaft Adapters
All shaft adapters shall be carbon steel powder coated with Byers Bush grade 101BK to minimum 3 mil thick (no exception) and designed for zero deflection at the maximum output torque of the actuator. Both the male and female ends shall fully engage the existing valve shaft and actuator bore for maximum engagement and zero hysteresis. A set screw shall engage the valve shaft on the flat or keyway. The adapter shall be single piece designed to eliminate pre-load to the disc and shaft assembly at both the valve shaft and actuator bore and designed to prevent preload on the valve shaft in the design. All bores and male drives shall be double keyed to accommodate varying orientation. All adapters and keys shall be designed and manufactured as one piece. Deflection calculations shall be supplied with the bid.

Actuators (Pneumatic – Rack and Pinion)
All actuators shall be designed to direct mount to the brackets and single piece adapters. All actuators shall be sized for the maximum valve torque based on 415 KPA (60 PSIG) maximum supply pressure to the actuator. Valve torque calculations shall be based on maximum dynamic plus bearing friction torque or seating/unseating plus hydrostatic plus bearing friction torque, whichever is greater. A 40 percent safety factor shall be applied to all valve torques for actuator sizing. All actuators shall incorporate mini filters at the inlet. All actuators shall incorporate two keyways to incorporate installation orientations as required without field modifications.
All actuators shall be designed for thermal fluctuations from -40° C to 66° C (40° F to 150° F) without adverse effects to the actuator or performance of the operation. The successful bidder shall warranty the assembly and performance of the actuator for a period of three full years from the commissioning date. An actuator user list will be supplied based on the design criteria and shall be submitted with the tender. All actuators shall incorporate internal bi-directional adjustable travel stops for the open and closed positions. All actuators shall be pre-drilled in the appropriate location to facilitate mounting of limit switches and accessories.
No field modifications will be required. Any requirements will be at the supplier's expense. A detailed assembly drawing shall be supplied with the submission.

Actuator Design Criteria
All actuators shall be sized for 552 KPA (80 PSIG) supply and capable of operating at 1034 KPA (150 PSIG). Actuators containing brass or bronze components are unacceptable over 20337 N–m (15,000 lb/in). All actuators shall be of the scotch yoke double piston design with tie rod construction and cast aluminum drive case for maintenance free operation. All actuator cylinders shall be of spiral filament capable of operating with air or water hydraulics. All dynamic seals shall be nitrile. All actuators shall be lubricated for life and require no further lubrication. All actuators shall be capable of -40° C to 66° C (-40° F to 150° F). All top and bottom mounting holes shall incorporate the same mounting pattern. All actuators shall be coated with all colour 03–2010 minimum thickness 3–4 mil.

Any exceptions to this specification must be indicated in the submission and drawing. All custom brackets and adapters shall be manufactured by Stealth International Inc. or reviewed equivalent. All actuators shall be SVIP 60D–60 or reviewed equivalent.

SECTION C

AWWA Butterfly Valves

AWWA C504 LATEST REVISION

Rubber Seated Butterfly Valve Specification
600 mm (24 inch) – 4200 mm (168 inch)

Standard Specification
The butterfly valves shall conform to the latest edition of AWWA C504 Standard for Rubber Seated Butterfly Valves.

Valves

GENERAL: The valves shall be bubble-tight at rated pressures for bi-directional flow conditions, and shall be satisfactory for applications involving throttling service and valve operation after long periods of inactivity. The manufacturer shall have previously manufactured rubber seated AWWA butterfly valves of the same design for a minimum period of five years. All valve manufacturers shall be in compliance with ANSI/NSF Standard 61 (Section 8) and state their approval file numbers for components in contact with potable water.

CLASS: The valves shall be designed for the velocities and pressure set out in these specifications and shall have Class B velocity designation.

VALVE BODY: The valve body shall be cast iron ASTM A 126 Class B, narrow body design. Body thickness shall be in strict accordance with AWWA C504 latest revision where applicable. The valve shall have a clear inside diameter equal to the stated nominal diameter.

VALVE DISC: The valve disc shall be constructed of cast iron or ductile iron ASTM A 536 with 316 stainless steel disc edge. The disc shall be free of hollow chambers. All surfaces shall be capable of visual inspection. Disc and shaft connections shall be made with stainless steel pins. Head loss analysis and Cv values shall be provided with the tender submission and will be taken into consideration by the Corporation during any tender analysis. All valves shall be shipped with valve discs 3–4 degrees open.

VALVE SEATS: All seats shall be of a natural or synthetic rubber. Rubber seats shall be recessed in the valve body. Valves under 500 mm (20 inch) shall have the seats recessed in the body and supported on three sides. Valve seats applied to the disc will not be accepted. Valves 600 mm (24 inch) and larger shall have seats bi-directionally field adjustable around the full 360 degree circumference, under full pressure from the perimeter without removal of the valve. Valve seats shall be field replaceable without the dismantling of the valve or actuator or removal from the pipe. Valve seats shall be field replaceable without the requirements of pressure to the disc. Valve seats shall not project more than 6 mm (.25 inch) beyond the valve inside diameter.

SHAFT SEALS: All shaft seals shall be of the self-adjusting chevron "V" type shaft seals.

STUFFING BOX: The stuffing box depth shall be sufficient to accept at least four rings of packing.

VALVE SHAFT: All valve shafts shall be solid two-piece stub-shaft type 304 or 316 ground and polished stainless steel. The shaft diameter shall meet the latest requirements of AWWA C504 for the pressure class as specified. Carbon steel shafts with stainless steel journals are not acceptable. The lower valve shaft shall incorporate a dual thrust bearing to permit valve positioning in a 360 degree circumference. The valve shaft shall be capable of horizontal mounting.

VALVE BEARINGS: All valves shall be fitted with sleeve type non-metallic, non-corrosive, self-lubricating bearings. Bearing loads shall not exceed one fifth of the compressive strength of the bearing or shaft material.

Manual Actuators
Manual actuators selected by the supplier shall conform to the latest edition of AWWA C504 Section 3.8 Valve Actuators.

The actuators shall be sized to operate with a maximum rim pull of 356 N (80 lbs.) on handwheels and a maximum input torque of 109 N–m (80 ft–lbs.) on 50 mm (2 inch) AWWA nuts. All chambered actuators shall incorporate non-metallic bearings isolating the rotating segment from the actuator housing and suitable for submerged service. In-plant actuators shall be indicating.

The actuators shall be designed to produce the torque which is necessary for seating and unseating of the valve based on bi-directional flow with a differential pressure equal to the specified working pressure applied to either face of the disc.

The actuators shall be designed to produce sufficient torque exceeding the maximum dynamic valve torque requirements based on bi-directional flow on differential pressures equal to the maximum specified working pressure and velocities.
The customer may give preference to those actuators meeting these specifications.

The maximum number of turns to fully close or fully open the valve shall be as follows:

NOMINAL VALVE SIZE	NO. OF TURNS
600 mm (24 inch) or less	50 or less
900 mm (36 inch)	150 or less
1050 mm (42 inch)	150 or less

Note: the rim pull and input torque requirements specified under manual actuators may govern the number of turns.

The actuators shall be provided with a diviner indicator that shall indicate directly the position of the disc from fully open to fully closed, with markings at least at the quarter points of travel and number of turns to open or close. The diviner shall incorporate the direction to open or close the valve for use in chambers with the yard or plant.

The actuators shall turn clockwise to close the valve.

Valve shall be as manufactured by Henry Pratt Company or approved equal.

AWWA C504 Butterfly Valves, 500 mm (20 inch) and smaller, for pressures up to 1034 KPA (150 PSIG)

BUTTERFLY VALVES shall be manufactured in accordance with the latest revision of AWWA C504, Class 150B, and conform to NSF Standard 61. All manufacturers shall state their NSF approval number.

VALVE BODY shall be constructed of cast iron to ASTM A126 Class B. Body shall be of flanged configuration. Flanges shall be fully faced and drilled in accordance with ANSI B16.1, Class 125.

SEAT shall be of one-piece construction, simultaneously molded and retained into a recessed cavity in the valve body. Valves with seats located on the disc, or retained by screws and segments, are not allowed. Seat material shall be food-grade Buna N and NSF certified.

BEARING shall be of self-lubricating, non-metallic material. Metal-to-metal thrust bearings, in the flow stream, are not allowed.

DISC shall be of symmetrical, lens shaped design. Disc material shall be Cast Iron to ASTM A126 Class B, with a 316 stainless steel sealing edge incorporating a di-electric link to prevent galvanic corrosion.

SHAFT shall be of one-piece, through-shaft configuration. Shaft material shall be 304 stainless steel.

DISC TO SHAFT CONNECTION shall be via solid stainless steel taper pins. Pins shall be designed to withstand the maximum line pressure 1034 KPA (150 PSIG) and the associated operating torque. Disc stops located within the valve body are not allowed.

SHAFT packing shall be of the gland type, utilizing "V" type self-adjusting chevron packing. O-ring and U-cup packings are not allowed.

All surfaces of the valve interior shall be clean, dry and free from grease, prior to painting. Valve surfaces, except for disc edge, rubber seat and finished surfaces shall be evenly coated with asphalt varnish, in accordance with Federal Specification TT–C–494 and AWWA C504. Exterior valve surfaces shall be evenly coated with a suitable primer to match field coating.

Hydrostatic and seat leakage tests shall be conducted in strict accordance with AWWA C504.

Manufacturers furnishing valves under this specification shall provide Proof of Design Test reports to illustrate that valves supplied meet the requirements of AWWA C504.

Manual actuators shall be of the travelling nut, self-locking type. Actuators shall be equipped with mechanical travel stops to prevent disc over-travel in the open and closed positions. Manual actuators shall conform to AWWA C504, latest edition.

Pneumatic and electric actuators shall conform to the requirements of the Conventional Butterfly Specification. Actuator safety factor shall be 1.5.

All manual actuators shall be non-indicating from rotating indicators or pins affecting the integrity of the actuator housing. All actuators shall be grease packed with food grade, edible grease. All valves shall be provided with external diviner indicators at the chamber lid or valve input shaft.

SECTION D

Aeration Butterfly Valves

SERIES 30/31 AERATION VALVES FOR BLOWER INLET AND OUTLET

Body
ASTM A126 Class B cast iron polyester powder coated, with wafer or lug style bodies, suitable for mounting between ANSI 125/150 weld neck or slip-on flanges. Shut-off capabilities 50–300 mm (2–12 inch) 1207 KPA (175 PSI) irrespective of flange style.


STEALTH VALVE & CONTROLS LTD.
THE "APPLICATION" SOLUTION COMPANY
PRESENTING BRAY AERATION VALVES
SEWAGE TREATMENT APPLICATIONS - BLOWER INLET AND OUTLET
SUPERIOR PERFORMANCE ADVANTAGES
SPECIFY PEROXIDE CURED SEATS
STEALTH VALVE & CONTROLS LTD.

Seat
Peroxide cured E.P.D.M. (ethylene propylene diene monomer) with extended temperature range from -40° C to 121° C (-40° F to 250° F) at full valve working pressure. All seats shall be NSF 61 certified for potable water and plant standardization.

Note: (Peroxide curing will prevent post heat curing, which is the cause of premature failure in sulphur-cured elastomers. Post heat curing creates seat hardening, brittleness and high torques. Bray Controls Canada guarantees a minimum of 3 times the life expectancy of conventional butterfly valves on aeration systems.)

Disc
Spherically machined and hand polished to provide bubble-tight shut-off and provide minimum torque on opening and closing in dry, hot service from full vacuum to the maximum valve pressure rating. Discs may be under cut to reduce torque on automated control valves which in turn will extend the valve life. Discs will be nylon coated to further reduce valve torque and prevent premature valve seat wear.

Shaft
416 stainless steel with double "D" shaft end connection. *(This design eliminates the need for disc screws, taper pins or torque plugs which can shake or vibrate loose or shear in service in high torque applications.)*

*All valves shall be pressure tested to 110 percent of their pressure rating.
Test certificates to be provided on request.

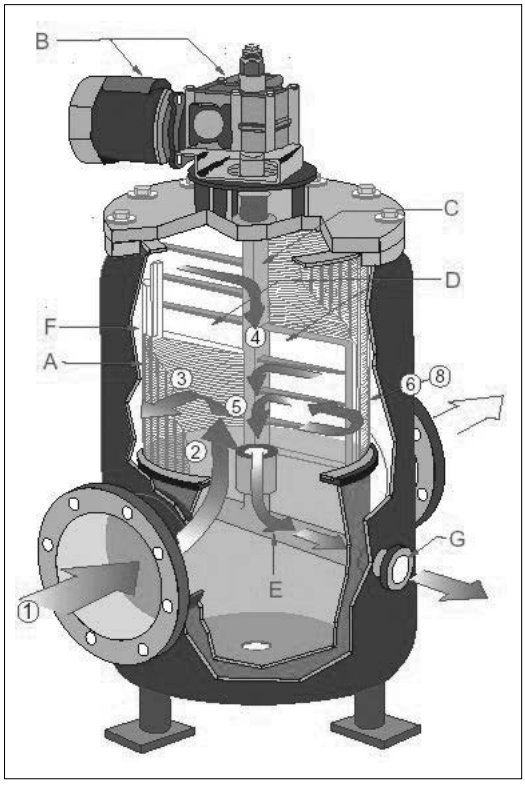
*All valves must have CRN (Canadian Registration Numbers). Bray Controls Canada registration number for the Province of Ontario is OC 3173.5 ADD1.

SECTION E

Automatic Strainers

AUTOMATIC STRAINER SPECIFICATIONS

General
All bodies and covers shall be fabricated carbon steel designed, manufactured and tested to ASME Section VIII standards using qualified ASME Section IX welders.



Construction
Housings and covers shall be rated for a design pressure of 1034 KPA (150 PSIG). The inlet and outlet connections shall be manufactured on the same horizontal axis and conform to ANSI B16.5 flange standards. A single backwash connection and large backwash connections located in the vessel bottom with PMP full port isolation valves. Four adjustable and removable support legs will be supplied for concrete or floor mounting. The strainer elements shall be 304 stainless steel reverse rolled slotted wedge wire screen designed with ___ inch openings. Designs with pockets, tubes, collector bars or components that could permanently trap debris are unacceptable.
All internal parts shall be 304 stainless steel with hollow port drive assemblies and incorporate bearings and seals. Size 25 mm (1 inch) through 500 mm (20 inch) shall incorporate (1) backwash hollow port and 600 mm (24 inch) and larger shall have (2) backwash hollow ports. The port assembly shall be factory tested and field adjustable with a 2–RPM running speed with the drive arm and hollow port assembly not in contact with the screen surface. The drive shaft shall be supported at the top with permanently sealed enclosed stainless steel roller bearings in a double reduction gear reducer and water lubricated guide bearings at the bottom. Drive motors shall be 120/1/60 ___ HP, Nema 4, TEFC motor.

Coating
All strainers shall be coated internally and externally with NSF approved epoxy paint, minimum 3 mil thickness.

All strainers shall be Series S723/S793 self cleaning motorized type designed and manufactured by Fluid Engineering as supplied by Stealth Valve & Controls Ltd. Phone 905.845.4500 or Fax 905.845.4505, contact Al Gilpin.

SECTION F

Backflow Preventers

BACKFLOW PREVENTERS SHALL BE SERIES 40200 REDUCED PRESSURE PRINCIPAL

The Backflow Preventer shall comply with the following specification and technical data:

All Backflow Preventers shall incorporate resilient seated gate valves (OS&Y) at each end of the main line body. The unit shall incorporate a reduced pressure device. The unit shall consist of two mechanically independent spring loaded, poppet type check valves and a hydraulically dependent differential pressure relief valve.

Components shall be capable of continuous operation and working pressures of 1207 KPA (175 PSIG) working pressure. All valves shall conform to ASSE 1013, AWWA, IAPMO, CSA B64.4, FM, UL. Classified and USC's FCCC & HR. All fasteners shall be stainless steel.

Bodies
All bodies shall be ductile iron epoxy coated externally. Complete body length shall be 2240 mm (88.25 inch) on 10 inch valves, excluding the Strainer.

Check Valves
All check valves shall incorporate an internal sensing passage, removable bronze seats and replaceable discs. The RP device will be designed to operate and maintain a pressure of 14 KPA (2 PSIG) lower than the supply pressure between the two checks (Zone) under fouled conditions of the second check. All springs shall be stainless steel.

Gate Valves
All isolation gate valves as part of the assembly shall be compatible with the check valves.

Test Cocks
All test cocks shall be Apollo ball valves with lever handles and tamper proof caps.

All flow data and head loss data shall be submitted as determined by USC's FCCC & HR and ASSA design performance standards.

The contractor shall submit discharge rates of the RP with a drawing indicating the drain size for the RP as approved and sized by the manufacturer.

Fixed and temporary strainers shall be SF–SV–YF–125–MWI25 (PERF) style and be identified on the submittal as supplied by Stealth Valve & Controls Ltd.

All Backflow Preventers shall be Conbraco Series (40 x 21 x 03) 150 mm (6 inch), 200 mm (8 inch) to 250 mm (10 inch) Reduced Pressure Principals as supplied by Stealth Valve & Controls Ltd. Phone 905.845.4500 or Fax 905.845.4505.

Local Standards and specifications apply.

SECTION G

Resilient Seated Butterfly Valves and Actuators

SECTION 15100

General Information and Specifications for Bray Butterfly Valves and Actuators

Bray Butterfly Valves
Standard of acceptance shall be: Bray Series 30/31 wafer or lug style butterfly valves.

Pressure – 1207 KPA (175 PSI) maximum; 50–300 mm (2–12 inch), 1034 KPA (150 PSI) maximum – 355–1525 mm (14–60 inch)

Temperature range -40° C to 121° C (-40° F to 250° F).

Body
Factory powder coated polyester, cast iron ASTM A126, Class B, suitable for potable water immersion. Drilling shall be as per ANSI B16.1, Class 125–150. All valves shall have CRN numbers for each province in Canada.

Disc
Nylon II coated ductile iron (NDI) to ASTM A536 GR.65–45–12, suitable for potable water.

Shaft
High-strength 304 stainless steel to ASTM A276.

Seat
Elastomer seats shall be of the tongue and groove style. Seat shall be EPDM and field replaceable without special tools. Elastomer thickness shall be a minimum of 13 mm (.50 inch). All seats must be peroxide cured. All manufacturers internal components must be USDA, FDA and NSF 61 approved for potable water applications. All seats shall incorporate molded in O-rings to accommodate all flange type connections.

Bearings
All shaft bearings shall be of the self-lubricating, corrosion resistant, sleeve type. Standard of acceptance shall be heavy-duty acetal.

Packing
All valves shall have self-adjusting packing. Packing shall be suitable for the temperature and service conditions.

BRAY ACTUATORS

Valves 50–150 mm (2–6 inch)
Equipped with a ten-position throttling notch plate and a lever handle.

Pneumatic Actuators
Standard of acceptance shall be Bray Series 92/93, S92 double acting, or complete with Spring Return (S93 power failure close) on valves, solenoid valves with manual override for power failure and open /close speed controls with filter/muffler as standard. Actuators shall have open or close travel stops as standard. Provide limit switches for valve position indication (one at each end of valve travel – SPDT) for all pneumatically actuated butterfly valves.

Use S52 inductive style proximity switches for wet or submerged applications. All switches shall include adjustable open and close SPDT switches and be CSA approved.

Gear Operator
Provide and install on all manually operated valves over 150 mm (6 inch) diameter a geared, self-lubricated, totally enclosed, weatherproof with position indicator, handwheel and adjustable travel stops. Input shafts shall be sealed with non-metallic bearings.

Electric Actuators
Standard of acceptance shall be Bray Series 70. Motor shall be single-phase split – capacitor reversible with voltages of 120 and 220 VAC 50/60 Hz, single phase. All motors shall be rated for continuous duty for 100 percent modulating operation. Temperature range -40° C to 66° C (-40° F to 150° F). Manual handwheel override to operate the valve without power, visual position indicator visible from 15 m (50 feet), manual adjustable travel stops.

SPDT–DB form Z travel switches, infinitely adjustable cams, thermal overload protection, and Nema 4, 4X and IP 65 enclosures shall be available as standard.

Torque limiting switches, heaters, servo amplifier cards with speed control, and local control stations are optional.

Suggested Specifications as follows:

Body
ASTM A126 Class B cast iron polyester powder coated, available with wafer or lug style bodies, suitable for mounting between ANSI 125/150 weld neck, slip-on or Vanstone flange style and suitable for bi-directional shut-off.

Seats
Peroxide cured E.P.D.M. (ethylene propylene diene monomer) with extended temperature range from -40° C to 121° C (-40° F to 250° F) at full valve working pressure.

Disc
Spherically machined and hand polished to provide bubble-tight shut-off and provide minimum torque on opening and closing in dry, hot service from full vacuum to the maximum valve pressure rating. Discs shall be food grade nylon #11 coated ductile iron or 316 stainless steel.

Shaft
Stainless steel with internal double "D" shaft end connection. Disc screws, taper pins or torque plugs are unacceptable when connecting the disc to the shaft when exposed to the flow.

*All valves must have CRN (Canadian Registration Numbers). Bray Controls Canada registration number for the Province of Ontario is OC 3173.5 ADD 1.
All valve seats to be food grade and NSF approved for contact with potable water.
*All valves shall be pressure tested to 110 percent of their pressure rating.
Test certificates to be provided on request.
*All valves to be Bray Series 31 (lug) or Series 30 (wafer) as indicated as supplied by Stealth Valve & Controls Ltd. or reviewed equivalent.

Conventional Resilient Seated Butterfly Valves, 50–900 mm (2–36 inch), for pressures up to 1207 KPA (175 PSIG)

All butterfly valves shall be manufactured in accordance with MSS–SP67. All butterfly valves shall be registered with the Government of Canada's Boiler and Pressure Vessels Branch for use as a pressure vessel in all provinces and territories. Copies of the Canadian Registration Numbers shall be available upon request.

Valve body shall be wafer or lug style as specified on the individual valve data sheet. Wafer style valves shall be Bray Series 30 500 mm (20 inch) and below or Bray Series 32/33 600 mm (24 inch) and larger. Lug style valves shall be Bray Series 31 500 mm (20 inch) and below or Bray Series 35/36 600 mm (24 inch) and larger. Valves bodies shall be cast iron to ASTM A126 Class B. Valve bodies shall be red polyester powder coated to provide maximum external corrosion resistance. Flange dimensions, facing and drilling shall comply with ANSI B16.1 Class 125.

Valve Disc
Material shall be specific to the application, as detailed in Table 1 (page G–6). Where specified on the individual data sheet, valve disc diameter shall be reduced (under-cut) to a 345 KPA (50 PSIG) pressure rating to allow for lower operating torque and the use of smaller power actuators.

Valve Shaft
416 Stainless Steel to ASTM A582 and mechanically retained at the valve neck. Valve disc to shaft connection shall be via direct disc to shaft interface. Valves utilizing disc screws, pins, or torque plugs shall not be acceptable.

Valve Seat
Material shall be specific to the application, as detailed in Table1. All seats shall be peroxide cured, capable of continuous duty at the rated temperature without post-cure hardening and subsequent operating torque increase.

Table 1

Media	Condition	Disk Material	Seat Material	Actuator Safety Margin
Alum, De-min Water	200° F = 93° C	NDI*	EPDM	1.30
	250° F = 121° C	316	EPDM	1.30
Water (except De-min)	200° F = 93° C	NDI*	EPDM**	1.15
	250° F = 121° C	316	EPDM**	1.15
Caustic (NaOH)	200° F = 93° C	NDI	EPDM	1.15
	250° F = 121° C	316	EPDM	1.15
Air	200° F = 93° C	NDI	EPDM***	1.30
	250° F = 121° C	316	EPDM***	1.30
Sulfuric Acid (H2SO4)	200° F = 93° C	316	Viton***	1.30
	250° F = 121° C	Teflon	Teflon	1.30

*NSF Approved **Food Grade ***Peroxide cured

All Valves
Capable of bubble-tight, bi-directional, shut-off at their maximum rated pressure 1207 KPA (175 PSIG) – 50 to 300 mm (2 to 12 inch), 1034 KPA (150 PSIG) – 350 mm (14 inch) and larger, 345 KPA (50 PSIG) when undercut) between slip-on and weld-neck, steel flanges, or PVC socket-weld flanges. All valves shall be factory tested to 110 percent of their pressure rating. When called for in the valve data sheet, a Factory Test Certificate shall be provided for each valve. All valves shall be of North American manufacture, to a minimum of ISO 9002 quality standards.

All valves must be field repairable without the use of special tools or equipment.

Manual Actuators
Unless otherwise specified actuators shall be levers with ten position notch-plates for valve sizes 150 mm (6 inch) and smaller; and worm gear actuators with adjustable travel stops, position indicator and hand-wheel for valves 200 mm (8 inch) and larger. Where specified on the individual specification sheet, chainwheels complete with 6 m (20 feet) of chain shall be provided on gear actuators.

Pneumatic Actuators
Quad-acting, aluminum, rack and pinion type. Piston sliding surfaces shall have acetyl wear pads. Piston O-rings shall be protected by acetyl thrust rings on the piston circumference. Drive shaft shall be one-piece, blowout resistant, riding in acetyl bearings. Actuators shall be air-to-air or spring-return, as specified on the individual valve specification sheets. Actuators shall be Bray Series 92 (air-to-air) or Series 93 (spring-return). Actuator shall be manufactured with mounting pads for modular mounting of solenoids, limit switches and positioners. Mounting pads shall be to NAMUR standards. Unless otherwise specified, actuators shall be sized for 552 KPA (80 PSIG) air supply. Actuator output torque (air torque and/or spring torque) shall be higher than the valve manufacturer's published, normal, seating and un-seating torque, by the application specific safety margin, as detailed in Table 1 (page G–6).

Where called for on the individual specification sheets, actuator assemblies shall include modular mounted accessories such as:

Solenoids
Unless otherwise specified on the individual data sheet, solenoid valves shall be NAMUR mount, 5/2, single coil, solenoid-controlled-air-pilot operating spool valve, with spring reset. Coils shall be 120/1/60, and carry CSA Enclosure 4 approval. Solenoid coil shall have "lock-on" style manual over-ride. Wiring connection shall be of the DIN Plug configuration. Valve shall be fitted with two brass, individually adjustable, exhaust-restrictor type speed controls. Solenoid valve shall be Stealth Model SV10001.

Limit Switches
Unless otherwise specified on the individual valve data sheet, switches shall be SPDT micro-switches enclosed in a NAMUR mount switch box. Switch-box shall carry CSA Enclosure 4 approval. A total of two switches shall be provided, set to indicate valve open and closed positions. Switches shall be hard wired to a terminal strip inside the switch-box. Additional terminal connections shall be available for wiring the solenoid to the terminal strip. (Where specified on the valve data sheet, solenoid shall be prewired to terminal strip, using flexible, CSA approved, cable and strain relief conduit connector). Switchbox shall have dual 13 mm (.50 inch) conduit connections. Switch-box shall be complete with high-visibility, beacon-style, black/yellow, local position indicator. Switch-box mounting bracket and coupling (where required) shall be of stainless steel. Limit switch shall be Moniteur FSYB–520.

Positioners
Unless otherwise specified on the individual data sheet, positioners shall be capable of accepting a 4–20mA control signal and via an integral I/P transducer, modulate the valve position in proportion to the control signal. Positioner shall be of the single acting type for spring-return actuators, or double acting type for air-to-air actuators. Positioners shall be factory mounted and calibrated for direct acting, 0–90 degree rotation. Positioner shall be NAMUR mount. Mounting bracket and coupler (where required) shall be of stainless steel. All valves with positioners shall be fitted with a de-clutchable, worm and segment, manual over-ride; mounted between the valve and actuator. Tubing and fittings to connect actuator and positioner shall be of 316 stainless steel. Positioner shall be Stealth YT–1000(R).

Travel-Stops
Where called for on the individual valve data sheet, actuator shall be fitted with either:
a) 100 percent adjustable open travel stop, to limit valve opening position anywhere between 0 degrees and 90 degrees;
b) 100 percent adjustable open and close travel stop, to limit both valve opening and closing. Travel stops shall be factory set at the 0 degree, or 0 and 90 degree, positions.

Electric Actuators
Single-phase, permanent split-capacitor, reversing motor configuration. Actuator shall carry CSA Enclosure 4 approval. Actuator motor shall be 110/1/60 (or 220/1/50 if specified in the individual data sheet), with Class F insulation and shall be thermal-overload protected via a built-in bimetallic strip. Motor shall be continuous duty rated. Actuator shall be complete with DPDT–DB (FormZZ) travel switches. Actuator shall be capable of sustained operation in ambient temperatures from -40° C to 66° C (-40° F to 150° F). Where ambient temperature is to be below 0° C (32° F), a heater and thermostat shall be included. Actuator shall incorporate manual over-ride via a de-clutching handwheel. Over-rides requiring sustained pull for motor disengagement and/or wrench operation shall not be allowed. Actuator shall be Bray Series S70.

Where specified on the data sheet, electric actuators shall include the following accessories:

Interposing Relay Pack
For on/off control of actuator via 24VDC, PLC outputs.

Servo-amplifier
For modulating control of actuator. Servo shall require power supply as specified for actuator (110 or 220VAC). Servo shall accept a 4–20mA control signal and modulate the valve in proportion to the magnitude of the control signal. Servo shall be factory installed, for direct acting, 0 to 90 degree rotation. Servo shall include potentiometer adjustments for zero, span, dead-band, opening speed and closing speed. When servo is fitted, a heater and thermostat shall also be included.

Series 70 Local Control Station
For local control. Station shall provide facility for selection of local or remote control, via a lockable rotary selector switch. Station shall provide local open/stop/close control via a lockable rotary selector switch. Station shall include red (open) and green (close) local position indication lights. Local control station shall be modular mounted to actuator.

SECTION H

AWWA BFVs vs. RSBFVs Elastomer Technology

AWWA VALVES VS RESILIENT SEATED VALVES

No.	Category	AWWA CL-150B BFVs		Comments	Resilient Seated Valves		Comments
	Size Range	75-1800 mm (3-72 inch)			40-1800 mm (1.5-72 inch)		
1	Sizes 75-500 mm (3-20 inch)	Class 150B only		1034 KPA (150 PSIG)	75-300 mm (3-12 inch) 1207 KPA (175 PSIG)		
					355-500 mm (14-20 inch) 1034 KPA (150 PSIG)		
2	Sizes 600-1800 mm (24-72 inch)	Class 25/75/150B only		172/517/1034 KPA 25/75/150 PSIG			
3	**Shaft Diameters**	**Class 150B**	**Class 75B**		**1207 KPA (175 PSIG)**	**517/345 KPA 75/50 PSIG**	
	100 mm (4 inch)	15.9 mm (0.625 inch)	15.9 mm (0.625 inch)		15.9 mm (0.625 inch)	15.9 mm (0.625 inch)	
	150 mm (6 inch)	25.4 mm (1.00 inch)	19.1 mm (0.75 inch)		19.1 mm (0.75 inch)	19.1 mm (0.75 inch)	
	200 mm (8 inch)	28.6 mm (1.125 inch)	22.2 mm (0.875 inch)		22.2 mm (0.875 inch)	22.2 mm (0.875 inch)	
	250 mm (10 inch)	34.9 mm (1.375 inch)	28.6 mm (1.125 inch)		30.2 mm (1.1875 inch)	30.2 mm (1.1875 inch)	
	300 mm (12 inch)	38.1 mm (1.5 inch)	31.8 mm (1.25 inch)		30.2 mm (1.1875 inch)	30.2 mm (1.1875 inch)	
	350 mm (14 inch)	44.4 mm (1.75 inch)	38.1 mm (1.5 inch)		34.9 mm (1.375 inch)	34.9 mm (1.375 inch)	
	400 mm (16 inch)	50.8 mm (2.00 inch)	41.3 mm (1.625 inch)		34.9 mm (1.375 inch)	34.9 mm (1.375 inch)	
	450 mm (18 inch)	57.2 mm (2.25 inch)	47.6 mm (1.875 inch)		50.5 mm (1.9867 inch)	50.5 mm (1.9867 inch)	
	500 mm (20 inch)	63.5 mm (2.5 inch)	54.0 mm (2.125 inch)		50.5 mm (1.9867 inch)	50.5 mm (1.9867 inch)	
	AWWA for transient conditions and pump discharge						
4	Pressure Ratings	1034 KPA (150 PSIG)	172/517/1034 KPA (25/75/150 PSIG)		345/517/1034/1207 KPA (50/75/150/175 PSIG)		
5	Maximum Delta P	1034 KPA (150 PSIG)	517 KPA (75 PSIG)		1207 KPA (175 PSIG)	345 KPA (50 PSIG)	
6	Maximum Hydrostatic	2068 KPA (300 PSIG)	1034 KPA (150 PSIG)		2413 KPA (350 PSIG)		
7	Seat Adjustability	600 mm/larger 24 inch/larger	600 mm/larger 24 inch/larger		Not required ANY SIZE		
8	Maximum Velocity Class 150A	2.5 M/S (8 FPS)	2.5 M/S (8 FPS)		10.7 M/S (35 FPS)		
9	Maximum Velocity Class 150B	4.9 M/S (16 FPS)	4.9 M/S (16 FPS)		10.7 M/S (35 FPS)		
10	Body Wall Thickness	AWWA	AWWA		MSS		
11	Seat Replacement Capability 75-500 mm (3-20 inch)	No	No		Yes		
12	Seat Replacement Capability 600-1800 mm (24-72 inch)	Yes	Yes		Yes		

AWWA VALVES VS RESILIENT SEATED VALVES

No.	Category	AWWA CL-150B BFVs		Comments	Resilient Seated Valves		Comments
13	Seat Adjustability 75-500 mm (3-20 inch)	No	No		No		
14	Seat Adjustability 600-1800 mm (24-72 inch)	Yes	Yes		Not Required		
15	**Seating Unseating Torques**	N-m (in-lbs)			N-m (in-lbs)	N-m (in-lbs)	
	100 mm (4 inch)	46 N-m (410 in-lbs)	NA		53 N-m (465 in-lbs)	30 N-m (267 in-lbs)	*Bray has Huge Cost Reduction*
	150 mm (6 inch)	114 N-m (1007 in-lbs)	NA		118 N-m (1045 in-lbs)	61 N-m (537 in-lbs)	*Advantage on Actuation*
	200 mm (8 inch)	238 N-m (2107 in-lbs)	NA		216 N-m (1915 in-lbs)	111 N-m (983 in-lbs)	
	250 mm (10 inch)	436 N-m (3862 in-lbs)	NA		332 N-m (2940 in-lbs)	169 N-m (1493 in-lbs)	
	300 mm (12 inch)	652 N-m (5777 in-lbs)	NA		513 N-m (4545 in-lbs)	258 N-m (2280 in-lbs)	
	350 mm (14 inch)	571 N-m (5054 in-lbs)	NA		729 N-m (6450 in-lbs)	373 N-m (3300 in-lbs)	
	400 mm (16 inch)	802 N-m (7100 in-lbs)	NA		1017 N-m (9000 in-lbs)	482 N-m (4267 in-lbs)	
	450 mm (18 inch)	1256 N-m (11118 in-lbs)	NA		1344 N-m (11900 in-lbs)	595 N-m (5267 in-lbs)	
	500 mm (20 inch)	1641 N-m (14528 in-lbs)	NA		1751 N-m (15500 in-lbs)	776 N-m (6867 in-lbs)	
16	**Trim Options**						
	AWWA Limited	SS	SS		NDI/SS/BRZ/Teflon		
17	**Various Ratings**						
	150B/75B	Not Below 600 mm (24 inch)			Yes All Sizes		
18	**Body Styles Cast Iron**						
	Flanged A 126 CI-B	Yes			600 mm (24 inch) and Larger		
	Wafer A 126 CL-B	Yes 75-500 mm (3-20 inch) Pratt Only			All Sizes		
	Lug A 126 CL-B	No	No		50-500 mm (2-20 inch)		
19	**Shaft Material**						
	AWWA 18-8 STD	304/316	304/316		416/304/316/17-4PH		
20	**Disc Material**						
	AWWA-CI STD.	CI/DI - SS Edge or 316 SS			NDI/SS/BRZ		
21	**Seat Material**						
	AWWA-One	Buna-N (NBR)	Buna-N (NBR)		EPDM/BUNA/VITON		
	Seat Temperature Rating	121° C (250° F)	121° C (250° F)		121° C (250° F)	121° C (250° F)	
	Seat Curing Process	Sulphur	Sulphur		Peroxide	Peroxide	
	ASTM-429 Pull Test	75-500 mm (3-20 inch)	600 mm 24 Plus – No		No	No	
22	FDA Approval	No	No		Yes	Yes	
23	NSF Approval	Yes	Yes		Yes	Yes	

AWWA VALVES VS BRAY RESILIENT SEATED VALVES

No.	Category	AWWA CL-150B BFVs		Comments	Bray Valves		Comments
24	ID of Valve Body Exposed to Media	Yes	Yes		No	No	
25	Internal Coating Required	Yes	Yes		No	No	
26	Standard Adjustable Packing	No	No		No	No	
27	Subject to Internal Tuberculation	Yes	Yes		No	No	
28	Body-Journal Shaft Isolation	Yes	Yes		Optional	Optional	
29	Ministry of Environment non-object letter	No	No		Yes	Yes	
30	**CVs - Valve Capacities**						
	50 mm (3 inch)	323	N/A		461	461	
	150 mm (4 inch)	575	N/A		841	841	
	150 mm (6 inch)	1294	N/A		1850	1850	
	200 mm (8 inch)	2300	N/A		3316	3316	
	250 mm (10 inch)	4458	N/A		5430	5430	
	300 mm (12 inch)	6420	N/A		8077	8077	
	350 mm (14 inch)	8738	N/A		10538	10538	
	400 mm (16 inch)	11413	N/A		13966	13966	
	450 mm (18 inch)	14444	N/A		17214	17214	
	500 mm (20 inch)	17832	N/A		22339	22339	
31	Direct Bury Actuation	Yes	Yes		No	No	
32	Face to Face	AWWA	AWWA		MSS-SP-67		

ELASTOMER TERMINOLOGY

Common Elastomers Used In Butterfly Valves

EPDM is an abbreviation for ethylene propylene diene monomer, and is a combination of ethylene (C2H4), propylene (C3H6) and butadiene (C4H6). The ASTM D1418 designation for EPDM is EPDM, and it is used in a wide range of services where hydrocarbons are not present.

Buna–N is a copolymer of butadiene (C4H6) and acrylonitrile (C3H3N). The butadiene is processed with natrium, which is an old pharmaceutical term for sodium. (In fact, the elemental symbol for sodium is still "Na".) The name Buna is a combination of the first two letters of butadiene and natrium, and the –N suffix indicates the addition of nitrile. The ASTM D1418 designation for Buna–N is NBR, and it is commonly used for hydrocarbon service.

Fluorocarbon Elastomers are usually referred to by manufacturers' trade names such as Viton (Du Pont) or Fluorel (3M). These are copolymers of vinylidene fluoride (CF2–CH2), hezafluoropropylene (CF2–CF), and tetrafluoroethylene (CF2–CF2). The high fluorine content enhances the chemical resistance of these elastomers similar to the manner fluorine helps the chemical resistance of fluoroplastic materials such as Teflon (Du Pont). The ASTM D1418 designation for fluorocarbon elastomers is FKM, and they are commonly used in high temperature or corrosive chemical service.

In general, the materials used by the rubber compounders can be classified into nine major categories:

Elastomers
Processing Aids
Vulcanizing Agents
Accelerators
Accelerator Activators
Age Resistors
Fillers
Softeners
Miscellaneous Ingredients

Curing EPDM with Sulphur

Sulphur is the most common curing agent, and creates both cross links and cyclical structures of the following type:

The Sx represents a single sulphur molecule that is cross linked, or connected to two different rubber molecular chains. This type of cross link gives the rubber its elastic cured properties. The Sy represents a single sulphur molecule that is cyclic, or connected to different parts of the same rubber molecule. The Sz represents multiple sulphur molecules that are cross linked, or connected both to rubber molecules and other sulphur molecules. The amounts of cyclic and multiple sulphur in the cross links do not contribute to elastic cured properties, and in most cases produce poor aging properties.

For most rubbers, one cross link for about each 200 monomer units is sufficient to produce a suitably cured product. In an efficient curing system, there are large numbers of single cross linked (Sx) groups, with little or no cyclic (Sy) or multiple cross linked (Sz) groups, and the final product is fully cured. In inefficient systems, there are many cyclic groups and the multiple cross linked groups can be up to 8 sulphur molecules long, and the final product is undercured.

If an undercured rubber is exposed to heat in actual field service, the sulphur in the cyclic groups and multiple cross linked groups can move to form new single cross links. This is basically a continuation of the curing process called post curing, and can cause substantial changes in the properties of the final product. Important factors (such as temperature and time), which are so carefully controlled when the product is molded, are left to random chance during a post cure in the field. The uncontrolled changes that occur during a post cure are almost always detrimental to product performance.

Curing EPDM with Peroxide (Bray method)

Organic peroxides are also used to vulcanize rubber. Eliminating the use of sulphur as a curing agent can provide several important advantages, such as lower compression set and less risk of post curing when exposed to heat.

The heat of vulcanization causes the peroxide to decompose, forming free radicals on the sides of long rubber molecule chains. The free radicals on one rubber chain will combine with the free radicals on another rubber chain, forming a direct cross link with no intermediate molecule.

Direct cross links of this type involve only carbon-to-carbon bonds and are quite stable.

Since the peroxide decomposes in the curing process, there will be no peroxide left in the final rubber product to support post curing. In other words, heat may be added to a peroxide cured rubber part once the part is in field service, but since there is no uncured peroxide to form free radicals, additional cross links will not be formed.

Although all EPDM compounds absorb hydrocarbons and swell, peroxide cured EPDM has tighter molecular bonds than sulphur cured EPDM, and will consequently absorb hydrocarbons at a much slower rate. This decrease in absorption will not allow peroxide cured EPDM to be used in direct hydrocarbon service, but it will extend service life significantly in applications where only small amounts of hydrocarbons are present. A significant example exists in the brewing industry, where wort and mash contain small amounts of vegetable oils that will eventually swell EPDM seats no matter how they are cured, but where peroxide cured EPDM will last 2–4 times longer than sulphur cured EPDM.

The main disadvantage of using peroxide instead of sulfur as a curing agent is cost related. Organic peroxide material is 20–30 times more expensive than the rhombic yellow sulphur commonly used for vulcanizing. Even though only a relatively small amount of curing agent is used in each batch, a significant cost difference is still added to the final rubber product. However, the increase in seat life and quality make the addition of peroxide a sound investment.

SECTION I

Control Valves

SUGGESTED SPECIFICATIONS

ROSS MODEL 40WR FIGURE 2/8
PRESSURE REDUCING VALVE WITH DUAL HYDRAULIC PILOTS

OPERATION
The Pressure Reducing Valve with Dual Hydraulic Pilots shall reduce a high incoming pressure to a lower, constant discharge pressure regardless of variations in flow rate or changes in upstream pressure. The two pilots are piped in parallel to allow one to be removed for servicing without interruption of service, or to change operation from one controlled pressure to a higher or lower pre-selected setting. The manual pilot (19) shall be mechanically adjustable, and the electric motor operated pilot (30) shall be remotely adjustable. The manual pilot (19) shall typically be isolated with ball valves.

DESIGN
The Pressure Reducing Valve shall be flanged body, fully mounted, external pilot operated, with free floating piston (operated without springs, diaphragm or levers), single seat with seat bore equal to size of valve. The minimum travel of the piston shall be equal to 25 percent of the diameter of the seat. For true alignment (to correct lateral thrust and stem binding), the piston shall be guided above and below the seat a distance equal to no less than 75 percent of the diameter of the seat. Piston shall be cushioned and so designed as to ensure positive closure.

The main valve shall be packed with leather (or other soft material) to insure tight closure and prevent metal-to-metal friction and seating.

Furnished with indicator rod, to show position of piston opening, and pet-cocks for attachment to valve body for receiving gauges for testing purposes.

The pilot valves, controlling operation of main valve, shall have a range for adjustment, be easily accessible and so arranged to allow for its removal from the main valve while the main valve is under pressure.

The motorized pilot valve shall be designed with a one-piece double bell style spring chamber and mounting flange to assure accurate alignment of the motor assembly. The spring chamber shall also be equipped with a grease fitting, transparent dust cover to allow visual inspection of the adjusting screw and a stainless steel adjusting screw.

The motor for the pilot valve shall be an industrial grade rotary actuator, housed in a NEMA 4 enclosure, with a minimum of 100 inch pounds, 1.2 rpm, and supplied with two SPDT (single pole, double throw) adjustable limit switches geared to the output shaft to limit travel in both directions, a feedback potentiometer (shall) (shall not) be incorporated in the drive unit to indicate actuator position, 120 volt anticondensation heater and face style mounting. The mounting shall be true and secured with both fasteners and with pins. The motor unit will be so arranged for easy removal from the pressure reducing pilot. After removal, it will be possible to adjust the pilot valve manually. Operation of the motorized pilot shall be by clockwise and counterclockwise motion from the motor and driven by contact closure.

The external controls and associated rigid brass piping/fittings necessary for proper operation (except the separate static pressure sensing line, if required) shall be factory assembled and furnished with the Pressure Reducing Valve. An external strainer with blow-off will be provided in the control circuit to protect the pilot and speed control valves. Isolation valves shall be full ported bronze body ball valves with stainless steel handle, shaft and nut.

The design shall be such that repairs and dismantling internally of main valve may be made without its removal from the line.

PHYSICAL AND CHEMICAL PROPERTIES
Valve shall be constructed of gray iron castings that conform to ASTM Specification A126 Class B. Bronze parts shall conform to ASTM Specification B–62, and stainless parts shall conform to ASTM Specification A743 Grade CF–8 or CF–8M.

The flanged assemblies shall conform to ANSI standards for wall thickness of body and caps, and flange thickness and drilling, subject to other specified standards.

TEST
The test before shipment may be witnessed by a representative of the engineers for simulated field conditions and a cold hydrostatic test of at least 100 percent above the maximum pressure under which the valve is to operate.

PAINTING
Ferrous surfaces of valve shall be coated with NSF Certified Epoxy (Tnemec Series FC20) in accordance with ANSI/NSF Standard 61, and conforms to AWWA D102 Inside System No. I.

Valve shall be equal in all respects to the Model 40WR Figure 2/8, as manufactured by the Ross Valve Mfg. Co., Inc.

NOTE: The Ross Valve Mfg. Co., Inc. reserves the right to modify valve construction which will result in equal or superior performance to existing designs. These modifications may be made at any time and at the sole discretion of the manufacturer.

VALVE CONSTRUCTION

Standard Design

1. Differential piston style construction permits valve operation without inducing undue stress on moving parts.

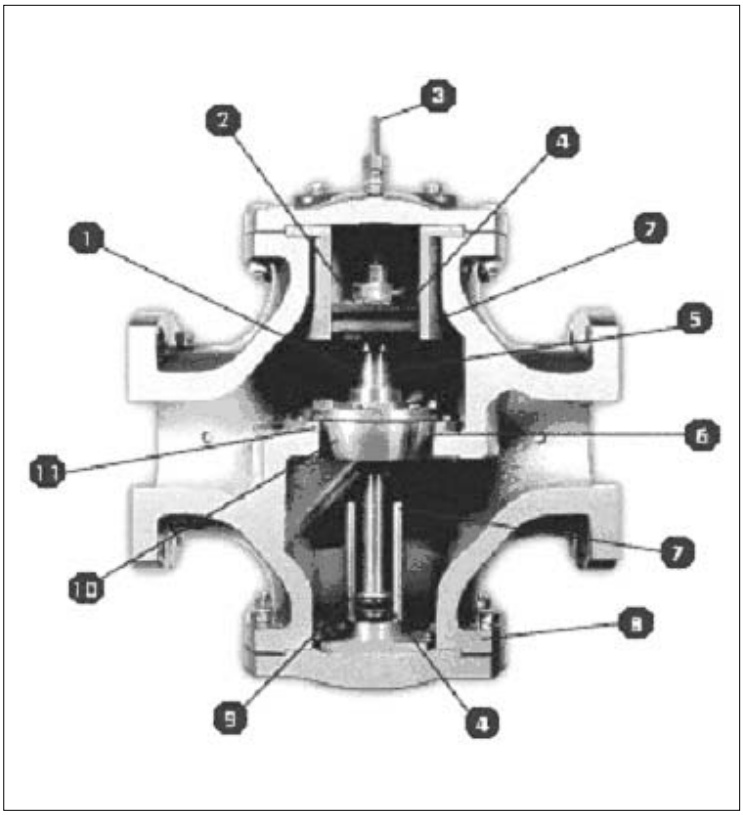
2. Supported cup design provides superior longevity, even under severe pressure conditions.

3. Indicator rod shows position of valve piston at a glance.

4. No metal to metal bearing surfaces to wear or foul.

5. One moving piston positioned entirely by internal hydraulic forces — requires no motor, operating cylinder, diaphragm, cams, levers, gear trains, or springs.

6. Fully-ported seat ensures that the valve allows maximum flow, for greater capacity and lower head loss.



Superior Features
Main valve is not subject to sudden failure. Piston movement is gradual and positive, preventing water hammer.

7. Piston guided above and below seat to ensure perfect alignment and overcome lateral thrust.

8. Extra heavy construction with quality materials used throughout.

9. Lower cylinder acts as a guide and hydraulically ensures positive closure of the valve.

10. Variety of seat styles are available to provide the best flow characteristics for each application. "Flat Parabolic" design shown.

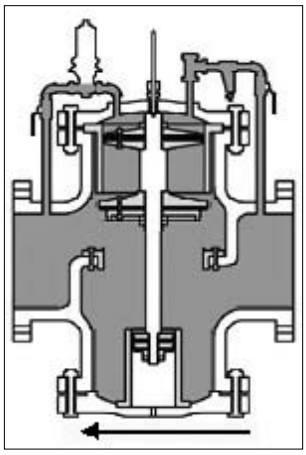
11. "Drip-tight" shut-off.

Note:
Globe style valve shown.
Angle style also available (inlet and outlet ports separated by 90 degrees)

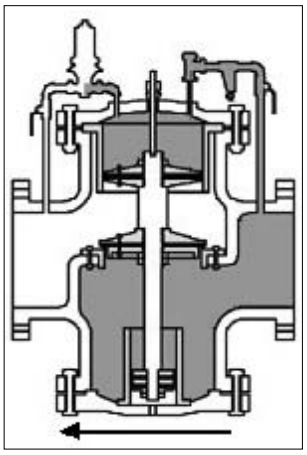
STANDARD OPERATING PRINCIPLES

All Ross Valves operate with the same basic hydraulic principles and are composed of two essential parts: the main valve (through which the main flow of water passes), and the externally piped control device.

The fundamental design of the main valve consists of a shaft, which carries a seat disc located between a large piston above, and a smaller piston below. These pistons ride along the axis in replaceable cylinders to act as guides to absorb and counteract the lateral thrust generated by the flow through the valve. The versatility of the piston unit, along with the variety of seat disc options, allows Ross Valve to build a product that precisely meets your control requirements.



Valve Open



Valve Closed

The control device is piped externally and may be varied to suit the various applications. In practice, it can either be electrically or hydraulically actuated, throttling or non-throttling, but its basic function is to control pressure in the chamber above the main valve piston, to dictate when the main valve opens and closes.

Variety of Seat Types

To provide the best flow characteristics for each intended application, Ross Valve provides a variety of seat styles and cushion plugs. Eight basic designs are currently available: flat plain, flat parabolic, flat sawtooth, clifton, anti-cavitation, slide plain, slide sawtooth, and slide parabolic.

The different seat types vary in shape, length, open area, and pattern in order to accommodate particular needs.

If operating conditions drastically change (if a valve is moved to a different location or required for a different application), other style seat skirts are interchangeable with the original.

SECTION J

Damper Valves and Deflector Check Valves

SUGGESTED SPECIFICATIONS

Stealth STJ Damper Valves

Body
All bodies shall be of fabricated steel, double flanged construction per ANSI B16.5 Class 125/150, machine faced to 125 RMS. All flanged bodies shall be sufficiently ribbed to prevent body deflection. Body journals shall be designed to incorporate sufficient clearance and shall not incorporate internal shaft bearings when noted. Upper and lower body journals shall be drilled, tapped and plugged to accommodate purge lines as required.

Disc
Discs shall be fabricated thru-shaft removable construction and ribbed for maximum flow and minimal deflection. All discs shall be connected by means of tangential taper pins securely fastened with retaining nuts and tack welded. All discs shall incorporate a machined body seat ring for minimum class leakage. Ratings, for leakage class per FCI 70–2, as specified for the application.

Seat
All seats shall be located on the disc. The seating surface will be stepped to maximize the sealing surface and incorporate the specified material. The seat material will be designed to withstand continuous service conditions and not require field adjustment, or replacement. Fiber tape replaceable seats will be incorporated as required on high temp and minimum leakage. Resilient seated valves shall be field replaceable and field adjustable in 600 mm (24 inch) and larger.

Shaft
All shafts shall be stub or one-piece design, 316 stainless steel and machined to accommodate actuators for direct mount. Shaft diameters shall be to AWWA C504 CL–25B. All stub shaft high capacity designs shall incorporate square drives and disc hubs for direct ISO mounting to actuators. All shafts shall incorporate shaft-retaining collars and dual external bearings with bi-directional thrust bearings.

Packing
Valves shall incorporate replaceable adjustable packing without removal or disassembly of the valve from the piping. Packing shall consist of three rings minimum of 6 mm (.25 inch) grafoil in each body journal. Dual packing as required with external bearings. Packing journals shall incorporate disc and shaft crush ring and maintain a minimum journal clearance of 6 mm (.25 inch) on the radius.

External Roller Bearings
All valve bodies shall incorporate upper and lower roller bearings to support the shaft and disc assembly. External bearings shall be permanently lubricated and field replaceable without the removal of the valve from the piping. Bearings shall be suitable for indoor/outdoor applications 649° C (1200° F)/-40° C (-40° F) specific to valve service.

All actuators shall direct mount to the shaft and valve mounting plate. All valves shall be capable of mounting in any orientation in the pipe including the inverted position. Actuators shall be capable of mounting fail open or fail close in the field without changing actuator orientation as supplied by Stealth Valve & Controls Ltd.

MATERIALS OF CONSTRUCTION

Component	Material Selection Guide
Body	Carbon Steel, 316 SS, Titanium, Aluminum, Special
Disc	Carbon Steel, 316 SS, Titanium, Aluminum, Special
Shaft	316 SS, 17–4PH, Titanium, Hastalloy, Special
Seat	Metal-Carbon or 316 SS, Titanium, Aluminum, EPDM, Viton, TFE, Ceramic Fibre, Special
Packing	Single Teflon, Single Grafoil, Dual Teflon, Dual Grafoil, Single Adjustable, Dual Adjustable, Special
Bearings	Delrin, Acetal, Duralon, Internal, External Roller, Internal Dual, Special

Note: Material must be selected based on individual applications.
Leakage classifications must be specified for each application.

STEALTH DEFLECTOR CHECK VALVE

General
All valves shall incorporate locking pins for the open and closed position with intermediate locking positions for rate of flow control. Counter weight arms shall incorporate two keyways with adjustable arms for counterweights on either side of the valve. All valves shall be manufactured in Canada and be of the same design for the last five years.

Bodies
All bodies shall be manufactured of A–36 carbon steel, double flanged design, per ANSI B16.1 class 125/150 and suitable for ANSI 150# flanges or AWWA class E flanges as required. All bodies shall incorporate flow arrows and traceability tags. All bodies shall be coated internally with NSF 61 approved coatings for potable water service. All bodies shall incorporate lifting lugs.

Discs
All discs shall be A–36 carbon steel with double solid block hubs. Support ribs in line with the flow. Discs shall be NSF 61 coated with minimum 3 mil dry film thickness. All discs shall be tangentially pinned to the shaft, bolted in place and field replaceable by means of solid stainless steel taper pins.

Shafts
All shafts shall be one piece, 316 stainless steel, and supported by dual external replaceable roller bearings. Shafts shall be designed for zero deflection under full delta–P and velocity. Shafts shall incorporate one keyway in line with the disc at both ends of the shaft. Valve body shaft journals shall not guide or support the shaft more than 6 mm (.25 inch) in the body and contain material suitable to prevent galvanic corrosion. Dual thrust bearings for shaft location shall be incorporated. Shafts shall be designed for counterweight interchangeability on either side of the valve.

Packing and Seals
Retained live loaded dual packing shall be incorporated in each body journal. The chevron packing will not require adjustment and shall be live loaded and mechanically retained under full pressure with the back-up O-ring plate removed. Two dynamic and two static O-ring seals shall be incorporated using non-metallic, non-corrosive sleeves. Both hubs containing the O-ring seals shall not require adjustment and be replaceable without removing the valve from service.

Bearings
Permanently lubricated dual external roller bearings shall be incorporated and field replaceable without dewatering the system or removing the valve from service. Internal bearings are not acceptable. All bearings shall be suitable for a corrosive environment.

Seats
All valves shall incorporate seats made of the same material as the body and disc unless optional resilient seats are specified.

SECTION K

Slide Gate Valves
Cast Iron and Stainless Steel

CAST IRON SLIDE GATES

Cast iron slide gates shall be designed, manufactured and tested per AWWA C–560 specification. These slide gates are suitable for unbalanced seating as well as unseating head applications.

Design Criteria
Design for both seating and unseating head, measured from the maximum water level to the invert of the gate opening as stated in the gate list. Gate lift mechanisms must be designed to operate under a maximum differential head at least equal to the higher value of the seating or unseating head, but not less than 4 m (13 feet).

Watertightness
All gates, seating and unseating heads to comply with (or exceed) AWWA C501–latest revision.

Stem, Lifting Mechanism and Accessories
Provide solid stainless steel rising spindles (or stems) complete with appropriate intermediate guides to give the spindle a maximum slenderness ratio of 200. Minimum spindle diameter is 25 mm (1 inch). Spindle threads equal to double start tapered 'ACME' type. Spindle covers: heavy duty, clear, rigid plastic pipe tube. Weatherproof, sealed top/cap 150 mm (6 inches) higher than spindle top position, bottom flange connection complete with extra double thickness exterior reinforcing for minimum 150 mm (6 inch) height, graduated to show degree of gate position from closed to open in 10 percent increments. Size and thickness of cover designed for a maximum deflection of h/200.

Operators
Manual operation if required: maximum 40 lbs force required to operate any type operator. Totally enclosed gear type, complete with removable hand crank, if required.

Operator Supports
Support operators 900 mm (36 inch) minimum above operating deck. Provide 13 mm (.50 inch) thick 304L or 316L stainless steel material floor stands (or pedestals) where required. Complete with stainless steel wall support bracket(s) where required. Extend side frames to form self-supporting horizontal yokes, where required.

Frame
The gate frames have full length extension guides with yoke at the top. The length of extension guides is sufficient to engage the overall vertical height of the gate when in the fully open position. The gates are provided with flange back type frame and the frame construction is of type OPC–FL. In case of frame construction type OPC–FL, the entire gate frame is of one-piece construction, the gate aperture frame having integrally cast extension guides. The gate guides are fitted with guide strips to form gate guide grooves for vertical travel of gate. This type of frame construction is adopted for small and medium size gates, for maximum opening height of 2540 mm (100 inches) and maximum width of 2030 mm (80 inches). Back flange of the gate aperture frame is precisely machined flat and is drilled to engage with the studs to be mounted on the face of wall thimble. A rubber gasket is provided for placement between face of wall thimble and back face of gate frame. The frame is so designed that it is possible to tighten or unscrew the nuts of anchor fasteners from the front of frame using a box spanner. Hence, even if sufficient clearance at side of frame is not available, it is possible to mount the frame on wall and tighten the securing nuts on frame.

The frame will be provided with non-corroding seating faces along the periphery of gate opening. In case of slide gates having frame construction in type OPC–FL, the front faces of extension guides, which come in contact with the seating faces of slide while opening, are also fitted with seating faces of the same material as that of the seating faces on shutter. This offers non-corroding smooth sliding surfaces to the seating faces of door/shutter during its vertical travel for opening. This enhances the water tightness of the gate and thus the effective life of gate.

Wall Thimble

Wall thimble is a one-piece grey iron casting which is to be placed in the concrete wall, surrounding the waterway opening in the wall, with its front flange flush with the face of wall. Its front flange is machined, drilled and tapped to match with the machined and drilled back flange of gate frame. After first erecting the thimble in the concrete wall, gate is mounted on the thimble flange with a natural rubber gasket in between the flanges and is secured in position with the help of studs fitted on thimble flange. The opening or aperture of the gate and the thimble may either be circular, square or rectangular matching with the shape and size of waterway opening. In case of circular waterway opening, a gate with square aperture may be adopted provided wall thimble has a circular aperture to suit the waterway opening and a square flange to suit the square flange of gate frame. This arrangement makes the thimble studs easily accessible. The cross section of the thimble may have the shape of the letter 'F' or 'E' or of a flange and suitable end for attaching to the connecting pipe. The most frequently used thimble is 'F' type. 'E' type thimble is employed for gates meant for very high unseating heads. 'E' type thimble is also used when the back flange is to be attached to another flange of a pipe.

The average length/depth of thimble running parallel to the direction of flow depend upon the gate size and thickness of wall. Unless specifically stated otherwise the thimble furnished is F–Shaped and maximum 300 mm (12 inches) long or lesser in case wall thickness is less than 300 mm (12 inches). To permit entrapped air to escape as the thimble is being encased in concrete, cast holes of approximately 35 mm (1.50 inches) diameter are provided at the bottom of the wall thimble in each entrapment zone formed by the reinforcing ribs and the flange and water stop or anchor ring. The mounting flange of thimble is kept slightly larger than the gate frame flange, to prevent interference of frame flange with the concrete adjacent to the thimble. On gates with circular back flanges, if the gate is to be mounted directly on the flange of a cast iron pipe, details about pipe flange dimensions, hole and tap drilling sizes and spacings are essential to be furnished by the buyer, then spacing of holes and tap size should be provided for our reference. All the studs/bolts and their nuts furnished for mounting the gate on wall thimble are of stainless steel unless otherwise specified by the buyer or agreed to by us.

Shutter

The gate shutter is of one-piece construction and is provided with sufficient horizontal and vertical ribs to withstand the maximum water head. The shutter will be provided with pads on sides, top and bottom (as may be required) to mount the wedges. The pads are machined and provided with a machined slot to guide the wedge in it. The horizontal clearance between the gate shutter and gate frame will be maintained within 1.5 mm (.0625 inch).

The shutter will be provided with non-corroding seat facings along the periphery of gate opening to match with the seat facings provided on the frame. The rising type stem is connected to the shutter through a stem block/thrust nut housed in a ribbed pocket cast integral to the shutter. The bottom end of stem, threads into the stem block and is locked in place by a set screw to prevent the stem from loosening. The stem block will be of phosphor bronze.

Seating Faces
The seating faces will be of phosphor bronze. Facings are fitted in dovetailed grooves machined on gate frame and shutter. The mating seating faces on the gate frame and door are precisely finished for proper contact. They are so finished that the clearance or gap, if any, between the mating seating faces, in gate closed position, does not exceed .10 mm (.004 inch).

Wedging Devices
The slide gates are provided with adjustable wedging devices to ensure forced contact between frame and shutter seat facings, when the gate is in closed position. The gates meant for seating head are provided only with side wedging devices. Gates meant for unseating head of sizes larger than 600 mm (24 inch), are provided with side, top and bottom wedging devices for conventional bottom closing arrangement or with side and top wedging devices for flush bottom closing arrangement.

The wedging devices are comprised of wedge blocks fitted on gate aperture frame and shutter/door. The wedge blocks on frame remain in fixed position and those on door are adjustable. A sort of slot and tennon arrangement is provided on base of wedge blocks to prevent any tendency to shift. Provision is made to clamp the adjustable wedge blocks firmly in adjusted position. The wedge blocks are usually made of cast iron and are provided with wedges having contacting faces of bronze/gunmetal.

Conventional or Flush Bottom Closing
Unless otherwise specified by the buyer or stated in our offer, the slide gates are provided with conventional bottom closing arrangement involving corrosion resistant metallic contacting sealing faces at the bottom sill of gate. In such cases, the invert of the gate is required to be kept above the floor of the channel/chamber by at least 100 mm to 150 mm (4 to 6 inches) depending upon the size and type of gate. In case of conventional closing gate, if the invert of the gate is kept at the same level as that of the channel/chamber floor, there remains a slot or a groove at the invert of the gate. Debris, dirt, etc. which may settle in this slot may not allow the gate to close properly and thus may give rise to heavy leakage. With a view to avoiding problems like above, in the situations where the invert of the gate is to remain at the same level as that of the channel/floor, it becomes necessary to provide flush bottom closing instead of conventional bottom closing. Flush bottom closing involves a flexible rubber seal at the bottom of the gate. The rubber seal closes against a machined cast iron bar fitted at the bottom of frame with its machined face flush with the floor. The cast iron bar fitted at the bottom of the frame is required to be embedded in the channel/chamber floor. It therefore becomes necessary to provide a cut out/recess of ample dimensions, beneath the waterway opening along the gate invert, while constructing the floor. This cut out/recess is later on filled with removable asphalt or loose concrete mixed with sand dust or vermiculite after putting the gate in position. The dimensions of the cut out to be provided depend upon the size of gate and are furnished upon request.

The rubber seal employed is usually of EPDM rubber and the rubber seal retainer bar as well as the fasteners for fitting the rubber seal and the retainer bar are of stainless steel. In case of flush bottom closing gates, bottom wedges are not provided even for gates meant for unseating head. Flush bottom closing being a non-standard feature, involves extra cost. Flush bottom closing has applications in sewage treatment settling tanks, aeration tanks, water treatment sedimentation and flocculation basins or anywhere a tight seal is needed with no obstructions to impede the flow of solids, or when complete flushing of the chamber is needed. Flush bottom closing gates are also required to be adopted in case of slide gates having a large width of opening or high heads.

Manual Gate Operating Mechanism/Lift Mechanism
The headstock may be either ungeared or geared type and the geared headstock may be either single speed or double speed, as necessary, to permit the gate operation by a single person under the specified maximum operating head.

Ungeared headstock is supplied with handwheel having diameter not exceeding 760 mm (30 inch). Geared headstock is supplied with easily removable crank handle with a radius not exceeding 380 mm (15 inches). All the gears of geared headstock are kept completely encased in cast iron housing to protect them from damage, dirt, dust, etc. and other atmospheric effects and thus ensure their smooth operation. Grease nipples are provided at appropriate locations for lubrication. Headstock meant for mounting on operating platform is supplied with a pedestal/floor stand to provide a convenient operating height of approximately 910 mm (36 inches). The pedestal of the headstock is provided with a covered window opening to enable cleaning and greasing of stem threads.

Spindle/Stem
Unless specifically stated otherwise in our offer, the slide gates are supplied with rising type lifting spindles/stems. The stem is provided with square threading, length of threaded portion being about 400 mm (16 inches) more than the height of waterway opening. This much extra length allows for a minor variation of approximately 100 mm (4 inches) on either side of the specified height of operating platform.

Stem/Spindle Couplings
For ease in transportation and handling, maximum length of one-piece stem is restricted to within 4.5 to 5 metre (15 to 16.5 feet) length. Where the stem is furnished in more than one piece, threaded stem couplings are furnished to interconnect different sections of the stem. Any individual piece of stem may have a welded joint, if necessary.

Stem Guide Brackets
Longer stems are provided with sufficient number of stem guides to prevent buckling of stem. The stem guides have machine bored split journals to facilitate erection. The journal will be lined with brass/gunmetal bush.

Pipe Hood for Stem
A Pipehood is provided on the top of gate operating mechanism for rising spindle gates to cover the spindle threads for protection against damage, dirt, dust, etc. It is made out of galvanized iron pipe or transparent plastic pipe of suitable material.

MATERIALS OF CONSTRUCTION

The materials of construction for various components of the slide gates offered shall be as under:

a) Gate frame, door/shutter, wedging devices, headstock body, stem guide bracket, wall thimble.	: Plain cast iron to ASTM A126, Class B,
b) Seat facings/Sealing faces	: Phosphor bronze, ASTM B139, CA 510
c) Lifting nut/stem nut	: Bronze, ASTM B584, CA 872
d) Adjusting bolt and locknut	: Stainless steel, ASTM A276 Type 304
e) Slide tongue and guide groove liners	: Silicon bronze, ASTM B98, CA 651 or CA 655
f) Bottom closure seal retainer bar	: Stainless steel, ASTM A276 Type 304
g) Stem block/thrust nut	: Bronze, ASTM B584, CA 865
h) Wedges	: Silicon bronze, ASTM B584, CA 872 or CA 878
i) Spindle/stem	: Stainless steel ASTM A276 Type 304
j) Coupling	: Stainless steel ASTM A276 Type 304
k) Assembly bolts and nuts for gate frame, wedges and yoke	: Stainless steel ASTM A276 Type 304
l) Anchor bolts for extension guides	: Stainless steel ASTM A276 Type 304
o) Assembly bolts and nuts and anchor bolts for headstock	: Stainless steel ASTM A276 Type 304
p) Pipehood	: Steel galvanized
q) Anchor fasteners	: Stainless steel ASTM A276 Type 316
r) Flush bottom seal	: EPDM or Neoprene, ASTM A2000 (NSF certified)
s) Yoke	: Carbon steel, ASTM A36

Painting

Surface Preparation: Blast clean or ground to near white metal finish.
Priming: Two coats of epoxy red oxide primer before and after shop testing.
Finishing: Two coats of coal tar epoxy paint for gate assembly, stem guide brackets and peripheral surface of wall thimble in the waterway opening. The headstock will be applied with two coats of gray epoxy paint. The total paint thickness after finish painting will be minimum 8 mil for gate assembly.

SHOP TESTING AND INSPECTION PARAMETERS

Materials Testing

C.I. castings of major components of gates:
Tensile Test shall be the guiding test for determining the grade of castings. Test pieces shall be cast separately from the castings. For identification, the test pieces and the castings shall be marked by integrally cast melt number representing the melt in which the subject castings are poured. Melt numbers shall not be cast integrally on very small size castings on which it may not be possible to cast melt numbers integrally.
Ultimate tensile strength of the test piece bearing a particular melt number shall be considered as representing the tensile strength of all the castings poured in that particular melt. Tensile Test Certificates issued by an approved laboratory shall be submitted for review of the inspecting authority at the time of final inspection of slide gates, at our works.

Materials of Sealing Faces/Seat Facings and Non-ferrous Castings

Copy of test certificates, if received from the manufacturer/supplier of the material/ ingots will be furnished at the time of final inspection of gates at our works. If no certificate is received from the manufacturer/supplier of such materials, we will get the materials tested for chemical composition for the important elements of the metal. One chemical analysis certificate will be furnished for each lot purchased.

Material of Stem/Spindle

Copy of test certificates, as received from the manufacturer/supplier of the material will be furnished. If no certificate is received from the manufacturer/supplier then we will take a sample at random from the bars supplied in one lot and test the same for conformance to material specifications.

In case of rolled mild steel stems, a Tensile Test Certificate will be furnished.
In case of carbon steel EN8 or stainless steel stems, a Tensile Test Certificate as well as Chemical Analysis Certificate will be furnished. Chemical analysis will be furnished only for the important elements of metal.

Dimensional Verification

Actual dimensions of the gates will be verified with reference to the important dimensions given in our general arrangement drawings. Variations in dimensions, if any, shall be within the permissible limits as per following standards:

Deviations for untoleranced dimensions of grey iron castings within “Class III” as per IS:5519–1979.
Allowable deviations for dimensions without specified tolerances within “Extra Coarse” limits as per IS:2102 (Part–I) 1980.

Seat Clearance Check

Clearance, if any, between the mating sealing faces of the gate frame and shutter, in gate fully closed position, will be checked to ensure that the clearance or gap, if any, between the mating sealing faces in gate closed position, does not allow 0.1 mm (0.003 inch) thick feeler gauge to pass through. This check will be carried out for each gate.

Movement Test
The gate will be mounted horizontally on a bed plate along with its stem and headstock and will be checked for correct length of stem as well as interference free movement. The gate will be fully opened and closed once.

This test will be carried out for only one gate selected at random out of a lot of similar size gates.

Shop Leakage
Wherever specifically so agreed to by us, Shop Leakage Test shall be carried out by us by applying the specified maximum unseating hydraulic pressure, as follows:

The gate shall be mounted on a test bench. A hydraulic pressure equal to the specified maximum unseating operating head above gate centre line shall be applied from the back i.e. unseating side of the gate, in closed position. Water leaked through the gate under above maximum unseating pressure shall be collected and its volume measured. The test shall not show leakage in excess of that specified in AWWA C560.

After carrying out the test above satisfactorily, the gate shall be opened slightly and then closed. Leakage test (as above) shall be carried out once again.

This test will be carried out for each gate.

Notes:

Adjustment of wedges shall be permissible in case the leakage exceeds the permissible limits. But after the wedges are adjusted, the gate shall be opened slightly and then closed again before carrying out the leakage test.

While testing of gates for the specified maximum operating seating head, use of suitable clamps, to restrict the deflection of the top and bottom edges of the shutter under unseating test head, shall be permitted. Such clamps shall be removed after carrying out the hydraulic pressure tests.

In case of circular gates having circular openings, the seat facings provided being in square lay in a manner similar as in the case of square gates having square openings, the length of sealing perimeter is the same as that in case of square gates. The permissible leakage rate for circular gates, therefore, shall be the same as in the case of square gates.

Shop leakage and hydrostatic body tests cannot be carried out for all types and sizes of gates. These tests also involve extra costs. Purchasers, therefore, should consult the manufacturer concerned before specifying such tests.

Use of dummy spindle and dummy headstock of the test bench shall be permissible for operating the gate during above tests.

We do not undertake to carry out any tests other than those stated above unless agreed to by us specifically in writing prior to the placement of order.

A gate can be designed, manufactured and shop tested to produce a very low leakage rate, but installation factors beyond the control of the manufacturer can seriously affect leakage characteristics. Therefore, Field Leakage Test after installation of the gate is not agreed to.

HEAVY DUTY FABRICATED STAINLESS STEEL GATE
Specifications: Heavy Duty Fabricated Stainless Steel Gates

1.0 GENERAL
Fabricated stainless steel heavy service gates shall be fabricated from formed stainless steel plate and structural shapes. The size, quantity, gate configuration and operating conditions shall be as listed on the gate schedule. Design stress shall be the lesser of one fifth of ultimate tensile and shear or three quarters of tensile yield strength. Maximum allowable deflection under rated load or head is 1/720 of span. Manufacturer shall be experienced and in regular production of gates and water control equipment. Welders and procedures shall be certified according to AWS D1.6 or ASME section IX. The gate shall be fully shop assembled, adjusted, inspected and tested for operation and leakage before shipment. The gate shall be cleaned with water blast or glass bead blast to remove weld splatter and discoloration and produce even texture. All edges and corners shall be free of sharp burrs.

2.0 MATERIALS
Materials used in construction of gates shall be of type best suited for the application and shall conform to the following ASTM specifications.

2.1 Frame, Slide, Yoke and Stem Gate Accessories –
Stainless Steel, ASTM A276, Type 304 or 316 – specify on gate schedule.

2.2 Fasteners and Anchor Bolts –
Stainless Steel, ASTM F593/F594 alloy group 1 (304)
Stainless Steel, ASTM F594/F594 alloy group 2 (316) – specify on gate schedule.

2.3 Guides, Liner & Seals –
UHMW PE (Ultra high molecular weight polymer)

2.4 Flush Bottom Seal/Loading Pads –
Neoprene Rubber, ASTM D2000 grade 1BE625, NSF61 certified for potable water.

3.0 GATE CONSTRUCTION
3.1 Slide
The slide shall be a weldment of plate with integrally formed reinforcements at top and bottom with welded on interior reinforcements. Stitch welds (staggered welds) will not be acceptable. The slide shall have at least one vertical reinforcement on or adjacent to the vertical centerline. All edges and corners shall be radiused and polished for smooth operation within the guide seal assembly. Provision shall be provided for attaching stems to the gate with a clevis-type connection. Alternatively: stem block connection shall be used when precise adjustment of hydraulic cylinders is required.

3.2 Frame
The frame shall be of flange type design for mounting on anchor bolts and grout pad. Size and spacing of anchor bolt holes shall be suitable for the operating conditions of the gate. Spacing shall not exceed 300 mm (12 inches). The frame shall be of self contained or not self contained design as listed in the gate schedule. The frame shall be sufficiently rigid to transfer hydrostatic loads to the gate anchorage. The frame shall positively retain the polymer guide/seal strip and the neoprene loading pad on studs welded to it. Nonloosening (prevailing torque) fasteners shall be used on the gate guide assembly. The guide seal assembly shall be field adjustable and replaceable. The length (vertical height) of the guide shall retain at least two thirds of the slide height in the fully open position. Stitch welds (staggered welds) will not be acceptable.

3.3 Guide/Seal Assembly
Guide seal shall be special milled or molded polymer to positively retain the slide and form a tight seal on face plate edge. Sealing shall be accomplished by pinching action of the polymer guide/seal, the elastomer loading pad, and the fastener cover bar system. Enagement of slide into guide groove shall be 22 mm (.875 inch) nominal.

3.4 Top Seal and Bottom Seal (if standard bottom)
The top and bottom (if used) seal shall be specially milled or molded shape securely attached to the frame. It shall have an elastomer loading pad to ensure contact with the slide plate. Corners or intersections of seals and loading pads shall be interlocked and sealed for leak proof joint.

3.5 Flush Bottom Closure
Rectangular solid bulb section neoprene seal shall be attached to frame horizontal member. Sealing action shall be against lower edge of slide plate. The sealing face of neoprene seal shall form a chased invert.

3.6 Standard Bottom Closure
When specified by gate schedule, the gate shall be furnished with the special shaped polymer seal and loading pad on the gate frame lower member. The bottom edge of slide shall have integrally formed reinforcement and have gently ramped lead in surface to prevent damage to the seal.

3.7 Wedges
Gates 600 mm (24 inches) wide and wider shall have adjustable wedges across top of opening and across bottom of opening on standard bottom gate. Wedges may be fabricated or cast and shall be held onto slide reinforcing member with two inline welded studs with backing plate.

3.8 Yoke
The yoke or head frame may be welded or bolted to frame extensions. Stitch welds (staggered welds) will not be acceptable. The slide shall be removable thru the yoke opening or by disassembly/removal of the yoke. Yoke shall be sufficiently strong to prevent deflection greater than 6 mm (.25 inch) under load.

3.9 Stems
Gate stem diameter shall be adequate to withstand twice the force created by a 40 lb. pull on the handwheel or crank. Stems shall have rolled threads with a maximum roughness of 16 micro inches. Cut threads are not acceptable. The stem shall be supported by angle guides or fabricated stainless steel, bronze bushed stem guides, spaced to provide a slenderness ratio of 200 or less. Stems shall withstand 1.25 times the stalled motor thrust of the actuator.

3.10 Wall Thimbles
When thimbles are used, they shall be fabricated stainless steel with minimum thickness of 6 mm (.25 inch). The flange shall be flat and plane within 5 mm (.188 inch) without machining. Welded studs or threaded holes for screwed in studs shall be provided to match the gate layout. The top of the thimble flange shall be permanently marked top. The thimble shall be set plumb and flat within 3 mm (.125 inch) of true plane and plumb. The gate shall be mounted with hard setting mastic or polyurethane closed cell foam gasket of no more than 13 mm (.5 inch) uncompressed thickness. Refer to the gate schedule for type and application of wall thimbles.

3.11 Manual Lifts
Gate lifts shall be handwheel or geared crank type as shown in the gate schedule. Lifts shall operate the gate with a maximum pull of 40 lb. on the handwheel or crank. Handwheel or crank shall be located approximately 900 mm (36 inch) above grating or walkway. All lifts shall have thrust bearings, bronze lift nuts and a bronze stop nut to limit the downward travel of the stem and slide. All geared lifts shall have cast iron or steel housing and pedestals. Aluminum housing and pedestals shall not be acceptable. All lifts shall be rising stem type. Stem covers made of clear butyrate shall be furnished for all lifts. Lifts shall be grease lubricated and regreaseable through grease nipples. Oil bath lifts are not acceptable.

3.12 Motor Operated Lifts
Motor operator shall be a 575–V, 3 phase, 60–H motor with precision reduction gearing enclosed in weather-proof housing. The operator shall be designed to raise the gate at a rate of approximately 300 mm/min (12 in/min). Integral controls shall include a control power transformer, reversing controller, torque switches, space heater to prevent condensation and open-stop-closed pushbuttons.

3.13 Installation
The gate and accessories shall be installed according to manufacturer's recommendation. The gate shall be clean and free of construction debris, and stem threads shall be lubricated prior to operation of the gate. If electric motor operator is used, limit switches shall be adjusted according to manufacturer's instructions. If hydraulic cylinder is used, the rod or stem connection shall be adjusted for correct stroking and closing action. The gate shall be cycled minimum of 1.5 cycles (open-close-open or vise versa) to ensure smooth operation. The gates may be field leak tested by the contractor. Leakage shall not exceed .05 gpm per foot of perimeter at the rated head; seating or unseating. Consult installation drawing for pressure rating of the specific gate.

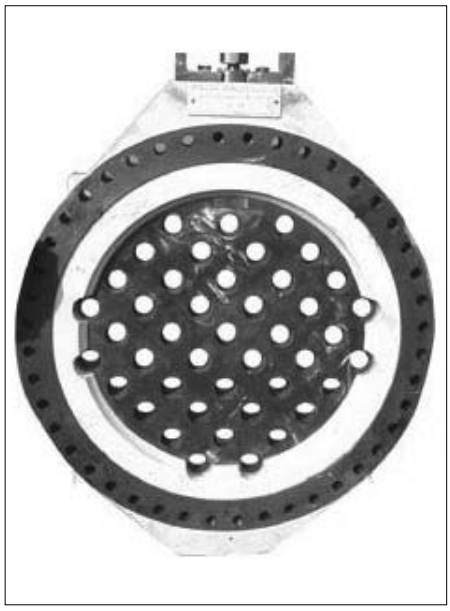
HEAVY DUTY FABRICATED STAINLESS STEEL GATE SCHEDULE
These slide gates are made generally as per AWWA C561 for slide gates and are supplied with 304 stainless steel wall thimbles if required. These slide gates are of robust construction and are suitable for unbalanced seating as well as unseating head applications.

SECTION L

Energy Dissipating Valves

SUGGESTED SPECIFICATIONS

Stealth IBC Energy Dissipating Valve



Body
All bodies shall be cast ductile iron ASTM A536 GR 65–45–12 or fabricated carbon steel. MTRs shall be submitted upon request. All bodies shall be epoxy coated internally and externally per the paint specification as indicated. All bodies shall incorporate identification plates in brass or stainless steel indicating the maximum pressure, temperature, date of manufacture, and SO number for full traceability. All bodies shall incorporate lifting lugs for vertical and horizontal lift. Lifting lugs shall be threaded hoist rings or integrally cast into the body. Tapped holes for hoist rings shall not penetrate the inside diameter of the body. Lifting lugs shall be sized to support the entire valve and actuator assembly. Cast mounting ears for actuators are unacceptable. All mounting pad surfaces shall incorporate a machined or milled surface to ensure flush mounting and concentricity. All bodies shall incorporate 316 stainless steel body journals. Bodies shall be available in wafer, lug and full-flanged configurations.

Fixed Discs
All fixed discs shall incorporate anti-corrosion rings between the body and disc to prevent seizing and corrosion. All fixed discs shall be recessed in the body and supported by the disc step in the body. All discs shall be capable of horizontal mounting when specified and incorporate non-corrosive dowel pins to prevent rotation allowing for field disassembly when required. All discs shall be designed with negligible deflection under maximum pressure. The fixed disc shall be 420 stainless steel with a minimum Rockwell C hardness of 45–55. The fixed disc shall incorporate an asymmetric located groove to ensure accurate placement of the holes relative to the linear disc and dual shafts. All discs shall be surface ground for the mating linear disc with tolerances not exceeding three thousandths of an inch. Fixed discs shall incorporate tapped lifting holes to permit field disassembly and assembly.

Linear Discs
All discs shall be surface ground for the mating fixed disc with tolerances not exceeding three thousandths of an inch. All linear discs shall incorporate a T-shaft connection designed with zero tensile deflection for lift or thrust under full pressure. All lower shaft bores shall incorporate non-metallic, non-corrosive bearings the full length of the bore for shaft engagement. All linear discs shall incorporate the anti-hydraulic lift mechanism in the lower shaft. All discs shall be capable of horizontal mounting when specified with Lower T-shafts. The disc or body shall incorporate non-corrosive, non-metallic guides to support the disc in the horizontal position when required. The disc shall be 420 stainless steel with a minimum Rockwell C hardness of 45–55. Linear discs shall incorporate tapped lifting holes to permit field disassembly and assembly. All linear discs shall operate within a machined groove in the body and travel in the fully open and closed position aligning with all holes in the fixed disc. The disc shall not contact the upstream side of the body groove. All linear discs shall incorporate a taper ring incorporating a non-corrosive, non-metallic wear ring and capable of intermittent bi-directional flow.

Shafts
All shafts shall be of solid one-piece construction. Material shall be 316 stainless steel ground and polished. Lower shafts shall incorporate milled grooves to prevent hydraulic lift of the disc.
All lower shafts shall be ground and milled incorporating an O-ring seal with a solid thrust hub bolted to the body of the valve. All lower shafts shall incorporate an outer thrust Cap with an O-ring and seals capable of field replacement without shaft removal. The lower cap seal and O-ring shall be field replaceable under flowing conditions without taking the valve out of service.

Packing and Seals
All upper shaft packing shall be chevron housed in a 316 stainless steel body journal. The chevron shall be retained by a floating internal C-clip and live loaded by a floating ring and upper seal bearing. The O-ring seals shall be housed in a non-metallic non-corrosive bearing. The bearing shall house two dynamic and two static O-ring seals. Both static O-rings shall be in full contact with the 316 stainless steel journal housing. The bearing and O-rings shall be field replaceable without valve removal from pipeline. The upper bearing will also live load the packing under normal operational conditions and be retained by a 316 stainless steel bearing cap.

Indication
All valves shall have visual position indication on the mounting bracket for the actuator. A scale shall be provided for 10 percent increments from the fully open and closed positions. The indicator shall be adjustable for recalibration should the valve be field adjusted.

Shaft Adjustment
The valve shaft shall be fully adjustable with an actuator or shaft extension coupling. The coupling shall incorporate an indicator that will operate in any orientation.

All removable components and hardware shall be 316 stainless steel. All valves shall be manufactured in Canada. Patented designs will be considered and infringements on such designs will not be accepted. All valves shall be manufactured by Stealth International Inc.

SECTION M

Knifegate Valves

SUGGESTED SPECIFICATIONS

Knifegate Valve Stainless Steel

Body
All bodies shall be cast ASTM A351 Grade CFBM Type 316 stainless steel and shall be of one-piece construction. All bodies shall incorporate integrally cast gate lock-ups to ensure sealing during closure. All bodies shall be of lugged design, fully tapped to conform to ANSI B16.5 Class 150 lb. All bodies shall be designed and tested according to MSS–SP81 and TAPPI TIS405–8 specifications.

Gate
All gates shall be AISI Type 316 stainless steel, nitrided or chrome plated for automated valves. All gates shall be machined with a beveled and lapped seating edge. Adjustable gate guides shall be used to ensure proper gate alignment during travel. Gate lock-ups shall be used to prevent gate deflection under design conditions. Gate thickness shall be in accordance with ASME VIII formula for zero deflection and proper sealing.

Seat
All standard metal seats shall be integrally cast within the valve body. Seating faces shall be lapped to ensure proper seal through repeated cycling. Hardened seat inserts shall be mechanically retained to the valve flange for ease of replacement. Resilient seats of L-shaped profile shall be retained by a machined groove within the insert. Gasket seating faces shall have a machined face to ensure proper sealing.

Stem
All stems shall be ASTM A581 Grade 303 stainless steel. Standard stems shall be of rising design with hardened aluminum handwheel for actuation. Non-rising stems shall incorporate a bronze travelling nut fixed to the gate. ASTM A581 Grade 303 stainless steel stanchions shall be used to support the actuator, stem and gate in the fully open position. All stems shall be coupled to the gate using bolts centered on a horizontal axis to ensure proper alignment and even distribution of thrust loads.

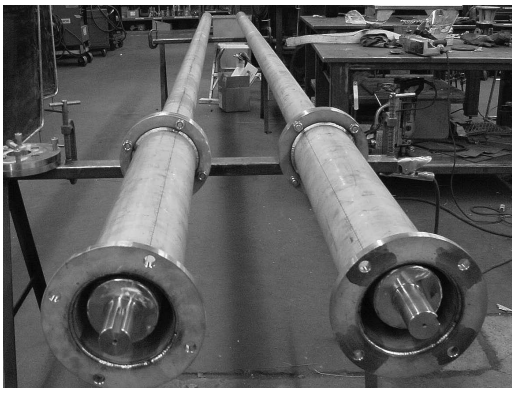
Packing
All packing shall be synthetic teflon with EPDM energizer core. All packing shall be of ribbon design properly sized to ensure zero leakage. All packing shall be mechanically retained within the packing box, and live loaded via the EPDM core.

SECTION N

Shaft Extensions, Pedestals, Free Standing Torque Tubes, Rod Extensions, Wall Brackets

Shaft Extension and Pedestal Specification (All rotary valves)

General



The floor pedestal shall incorporate a lower split plate to support inner shaft extension. All shaft extensions shall be designed for removal from the valve shaft while under non-flowing pressure provided the valve shaft is locked into position. Packing retaining plates shall be incorporated with the valve in all designs. Inner shaft extensions shall be manufactured in a steady rest and machine finished and faced. Designs causing stagnant water inside the extension are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly.

Inner Torque Tubes

All inner torque tubes shall be designed for a maximum allowable torsional deflection of .50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube-mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall have vent holes drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Shaft extensions shall be 316 stainless steel unless otherwise noted. Stainless steel extensions do not require plugs. HDG shaft extensions when specified shall incorporate sealing plugs. All lengths exceeding 6.5 metres (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connections shall be single key male and female hubs. The flange connection will not serve as the positive drive.

Shaft Extension Pedestals

All pedestals shall be designed to withstand the maximum output torque of the actuator with a maximum torsional deflection of .5 degrees over the total required length. Pedestals shall be carbon steel epoxy coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of four mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the maximum output torque of the actuator. All pedestals shall be indicating when the actuator is mounted to the valve. All extensions and pedestal assemblies shall be manufactured by Stealth International Inc.

Rod Extension and Pedestal Specification
(All rotary valves)

General
The pedestal or wall bracket shall support all rod extensions. All rod extensions shall be designed for removal from the valve shaft without removal of the actuator. Torsional deflection calculations shall be submitted with all bids.

Rod Extension Pedestals
All pedestals shall be designed to withstand the torque from ___ lbs in pull on the handwheel with a maximum torsional deflection of .5 degrees over the required length. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel epoxy coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of four mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the maximum design torque applied to the handwheel. All handwheels shall be a minimum of 300 mm (12 inches) in diameter.

Rod Extensions
All rod extensions shall be 316 stainless steel and coupled using square internal drives. The connecting pins for any two sections shall be solid. The connection at the input shaft of the actuator shall be designed with a square drive and rod coupling to accommodate the input shaft of the actuator and full diameter. The input shaft connecting pin shall be a solid dowel pin. The weight of the rod extension shall be supported by the pedestal or wall bracket using delrin or acetal in conformance to NSF 61.

Wall Brackets
All wall brackets shall be designed for horizontal adjustment. All brackets shall be designed to carry the full load of the rod extension over the entire length. The wall bracket shall incorporate a positive drive support bearing to prevent rotational ovaling of the extension and premature failure of the input shaft seal. All rod extension and pedestal assemblies shall be manufactured by Stealth International Inc.

SECTION O

Ball Valves

PMP Automated (and Manual) Ball Valve Specifications

PMP M306 – 3–PC

All bodies to be CF8M investment cast, full-bore 3-piece rated at 13790 KPA (2000 PSIG) C.W.P. Valve body bolts to be fully enclosed. Bi-directional shut-off based on full pressure/ temperature rating of the valve. All balls are to be solid and polished. Hollow ball construction is unacceptable. There shall be sufficient preload on the seats to provide a bubble tight seal at less than .0001 PSIG. All end connections to be interchangeable, NPT, SW, and BW in each size. Pressure and temperature to ANSI B16.34 and MSS–SP25 marking standards. MSS–SP72 for flanged or butt weld ends on ball valves. The valve is to meet API607 latest revision Fire Safe requirements. The stem shall be a single piece blow out proof stem incorporating a square drive end at 45 degrees to accommodate ISO actuation. All valve seats are to be second generation RPTFE. Stem packing is to be adjustable graphoil and viton. All valve stems must incorporate PTFE thrust washers. Belleville washers must be incorporated on the packing to provide consistent live loading to the packing under full pressure and simultaneous actuator rotational load. The packing will incorporate anti-rotational locking mechanisms to ensure the packing remains secure for high cycle applications. All manual valves are to be supplied with stainless steel locking levers and locating stops. All valves are to be designed to seal bubble tight at both the full rated pressure and low pressure. All valves shall be PMP Model M306 or reviewed equivalent.

PMP M276 – 2–PC

Valve to be full bore 2-piece construction, 6205 KPA (900 PSI) C.W.P. End connections to be NPT. The valve is to MSS–SP25 marking standards. The body is to be of stainless steel CF8M investment cast construction. It is to have an integral ISO 5211 top-mounting pad. It is to have bi-directional shut-off against full pressure rating. The stem shall be blow-out proof. The Stem connection to actuator shall be square 45 degrees. The ball to be solid 316SS and polished for low friction. The valve seats are to be PTFE with a viton back up for low friction. The stem packing is to be dual O-rings of viton with a backup secondary PTFE stem seal. The stem is to have a PTFE thrust washer. Manual valve to be supplied with stainless steel locking levers. All valves are to be designed to seal bubble tight at both the full rated pressure and low pressure. All valves shall be PMP Model M276 or reviewed equivalent.

PMP Manual Ball Valve Specification
(316 Stainless Steel)
1pc, 2pc and 3pc

PMP A101 – 1 PC Manual Ball Valve Specification

All bodies to be CF8M Investment Cast, reduced-bore 1-piece body construction rated at 5516 KPA (800 PSIG) C.W.P. Bi-directional shut-off based on full pressure rating of the valve. All valve stems shall be blow-out proof. All balls are to be solid. Hollow ball construction is unacceptable. There shall be sufficient preload on the seats to provide a bubble tight seal at less than .0001 PSIG. All end connections to NPT all sizes and MSS–SP25 marking standards. All valve seats are to be RPTFE. Stem packing is to be adjustable PTFE. All manual valves are to be supplied with stainless steel locking levers and locating stops. All valves are to be designed to seal bubble tight at the rated pressure and low pressure. All valves shall be PMP A101 or reviewed equivalent.

PMP A201 – 2 PC Manual Ball Valve Specification

All bodies to be CF8M Investment Cast, full-bore 2-piece rated at 6895 KPA (1000 PSIG) C.W.P. Bi-directional shut-off based on full pressure rating of the valve. All valve stems shall be blow-out proof. All balls are to be solid. Hollow ball construction is unacceptable. There shall be sufficient preload on the seats to provide a bubble tight seal at less than .0001 PSIG. All end connections to NPT all sizes. Pressure and temperature rating to ANSI B16.34 and MSS–SP25 marking standards. All valve seats are to be RPTFE. Stem packing is to be adjustable PTFE. All manual valves are to be supplied with stainless steel locking levers and locating stops. All valves are to be designed to seal bubble tight at the rated pressure and low pressure. All valves shall be PMP A201 or reviewed equivalent.

PMP A301 – 3 PC Manual Ball Valve Specification

All bodies to be CF8M Investment Cast, full-bore 3-piece rated at 6895 KPA (1000 PSIG) C.W.P. Bi-directional shut-off based on full pressure rating of the valve. All valve stems shall be blow-out proof. All balls are to be solid. Hollow ball construction is unacceptable. There shall be sufficient preload on the seats to provide a bubble tight seal at less than .0001 PSIG. All end connections to be interchangeable, NPT, SW, and BW in each size. Pressure and temperature to ANSI B16.34 and MSS-SP25 marking standards. MSS–SP72 for flanged or butt weld ends on ball valves. Swing out center body to accommodate inline maintenance. All valve seats are to be RPTFE. Stem packing is to be adjustable PTFE. All manual valves are to be supplied with Stainless Steel Locking levers and locating stops. All valves are to be designed to seal bubble tight at the rated pressure and low pressure. All valves shall be PMP A301 or reviewed equivalent.

Rubinetterie Bresciane (RB) Brass Ball Valve Specifications

RB 161N

All bodies to be brass CW617 UNI EN 12165, full-bore, 2-piece design, female NPT, rated to 4137 KPA (600 PSI) WOG, 1034 KPA (150 PSI) WSP. The temperature range shall be -29° C to 186° C (-20° F to 366° F). The ball shall be brass CW617N UNI 12165 and shall be chrome plated. The stem shall be brass CW614N UNI EN 12164 and shall be blow-out proof. The seats shall be P.T.F.E., and the stem seals shall consist of two only O-rings, one Buna and one Viton®. All valves shall be electronically tested in the open and closed position at 552 KPA (80 PSI). Valves shall have CRN numbers and the following approvals: ANSI/NSF61, CGA 3.16, CGA CR91–002 ANSI Z21.15, CAN1–9.1, UL–YSDT, UL–YRPV, UL–VQGU, and FM Class 1140.

RB 1515

All bodies to be brass CW617 UNI EN 12165, full-bore, 2-piece design, female solder ends, rated to 4137 KPA (600 PSI) WOG, 1034 KPA (150 PSI) WSP. The temperature range shall be -29° C to 186° C (-20° F to 366° F). The ball shall be brass CW617N UNI 12165 and shall be chrome plated. The stem shall be brass CW614N UNI EN 12164 and shall be blow-out proof. The seats shall be P.T.F.E., and the stem seals shall consist of two only O-rings, one Buna and one Viton®. All valves shall be electronically tested in the open and closed position at 552 KPA (80 PSI). Valves shall have CRN numbers and shall be approved to ANSI/NSF61.

RB 171N

All bodies to be brass CW617 UNI EN 12165, full-bore, 2-piece design, female NPT, rated to 4137 KPA (600 PSI) WOG, 1034 KPA (150 PSI) WSP. The temperature range shall be -29° C to 186° C (-20° F to 366° F). The ball shall be brass CW617N UNI 12165 and shall be chrome plated. The stem shall be brass CW614N UNI EN 12164 and shall be blow-out proof. The seats shall be P.T.F.E., and the stem seals shall consist of one only Buna O-ring and 2 P.T.F.E. seals. All valves shall be electronically tested in the open and closed position at 552 KPA (80 PSI). Valves shall have CRN numbers and the following approvals: ANSI/NSF61, CGA 3.16, UL–YSDT, UL–YRPV, UL–VQGU, FM Class 1140.

RB 1715

All bodies to be brass CW617 UNI EN 12165, full-bore, 2-piece design, female solder ends, rated to 4137 KPA (600 PSI) WOG, 1034 KPA (150 PSI) WSP. The temperature range shall be -29° C to 186° C (-20° F to 366° F). The ball shall be brass CW617N UNI 12165 and shall be chrome plated. The stem shall be brass CW614N UNI EN 12164 and shall be blow-out proof. The seats shall be P.T.F.E., and the stem seals shall consist of one only Buna O-ring and 2 P.T.F.E. seals. All valves shall be electronically tested in the open and closed position at 552 KPA (80 PSI). Valves shall have CRN numbers and shall be approved to ANSI/NSF61.

SECTION P

CRISPIN
Air and Vacuum Relief Valve (Chambered Valves), Tilting Disc Check Valves (Top Mounted Dashpot) and Tilting Disc Check Valves (Bottom Mounted Dashpot)

BACK TO INDEX

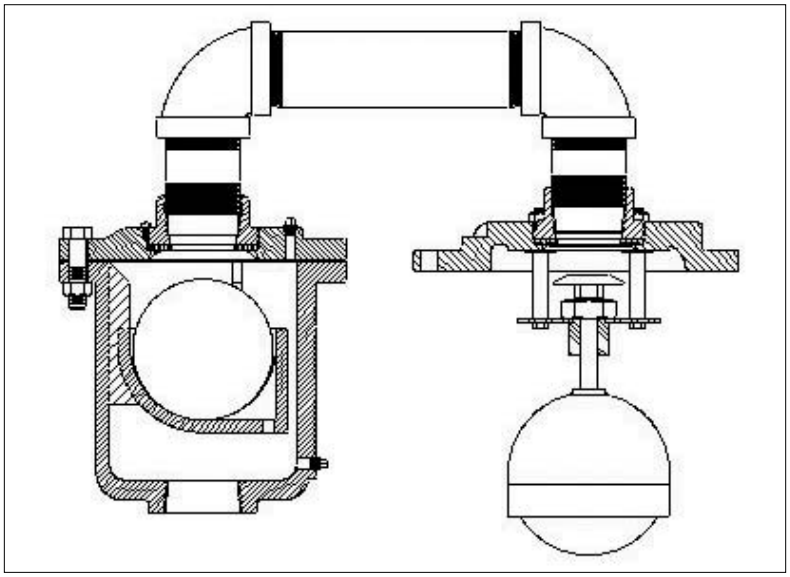
Air/Vacuum Valve Specification Chambered Application

Air/Vacuum valve(s) shall be installed at high points on the pipeline or as directed by the engineer to exhaust large quantities of air upon system start-up and allow large quantities of air into the pipeline upon system shut-down or line break. As water enters the valve during start-up, the float rises to the seat and seals the outlet. The valve remains closed until system pressure drops to near zero pressure. It should be noted that this valve would not open when the system is pressurized to release accumulating air. When the system pressure drops to near zero pressure, the valve will open and allow air in to prevent the possibility of vacuum formation and a possible pipeline collapse. This also allows the line to be drained rapidly when pipeline maintenance is required.

It should be noted that when this valve is installed in a vault or manhole, there is a possibility of external fluids entering the pipeline and contaminating potable water. For instance, if the manhole floods and the pipeline goes to negative pressure, the Air/Vacuum valve will open and suck the external fluids into the pipeline.

When using an Air/Vacuum valve, there are a number of ways to prevent fluid from entering the system. First, the valve outlet can be piped to a level above the flood line. Secondly, the valve itself can be located at a point above the flood line. Finally, a float device like the one shown below can be used *(See Figure 1)*. When the external fluid rises, the float rises to seal the outlet thus preventing fluid from entering the system. Keep in mind, however, that when the manhole is flooded, the Air/Vacuum valve will not allow any air into the system if it goes to negative pressure.

Figure 1



The Air/Vacuum valve should be protected from freezing when located at a station that is subject to freezing. One way to do this would be to fit the valve with a Crispin Thermally Activated Valve (TAV). The Thermally Activated valve is a device that opens up when the temperature approaches freezing and allows the system fluid to be discharged, thus creating movement inside the valve and preventing it from freezing. Also, the valve can be insulated or wrapped with heat tracing to keep the internal temperature above freezing.

Crispin Tilting Disc Check Valve (Top Mounted Dashpot) Specifications

The Tilting Disc Check Valve fitted with a top mounted dashpot shall be designed to allow media flow forward and downstream of the pump, but disallow flow reversal. The valve shall consist of two body halves bolted together at 55-degree angle, forming a center flange. Inspection ports are to be located in each body half. A body seat ring shall be clamped between the inlet and outlet body halves at the center flange and must be bevelled on the seating surface. The outlet body half will contain a disc onto which is bolted a disc seat ring. The disc seat ring will be bevelled to meet the seating surface of the body seat ring. The disc shall be held in place by two pivot pins that insert through both sides of the outlet body half. The pins will hold the disc in place at bushings on the disc. The bushings are to be located so that approximately two thirds of the disc weight is below the pivot pins on seating.

The disc is to be designed so that, at the fully opened position, the media will flow over both the top and bottom sides due to its "aerofoil" shape. The disc will pivot away from the body seat in a manner that allows no contact of the two seat rings except at the end of the sealing stroke. The entire flow area through the valve will meet or exceed the nominal pipe diameter. The body halves will be designed to gradually enlarge to achieve at least a 40 percent increase over the nominal pipe diameter at the seat area. This will minimize valve head loss. The valve shall be tested to the operating characteristics of AWWA specification # C–508. The valve shall be Crispin series "TD", as manufactured by Crispin-Multiplex Manufacturing Co., Berwick PA, or approved equal.

The top mounted oil dashpot will be installed through the top inspection port. The device is to be directly connected to the valve disc. The dashpot will provide controlled opening of the valve, while also allowing two-stage control of the disc closure. Both functions are to be fully adjustable in the field in order to meet diverse system requirements and reduce the effects of surges and water hammer. The dashpot shall consist of a 34474 KPA (5000 PSI) hydraulic cylinder, two external oil reservoirs (one pressurized), two adjustable flow control valves, and piping. The cylinder shall have an internal flow control and the unit will have two external flow controls. The dashpot will be connected to the valve by means of a spacer containing an air gap, so that hydraulic fluid does not enter the system. The spacer will also contain O-rings serving as "wipers" for the same result. A rod connected to the cylinder will extend down through the spacer bushing and be attached directly to the valve disc by heavy gauge links and pins.

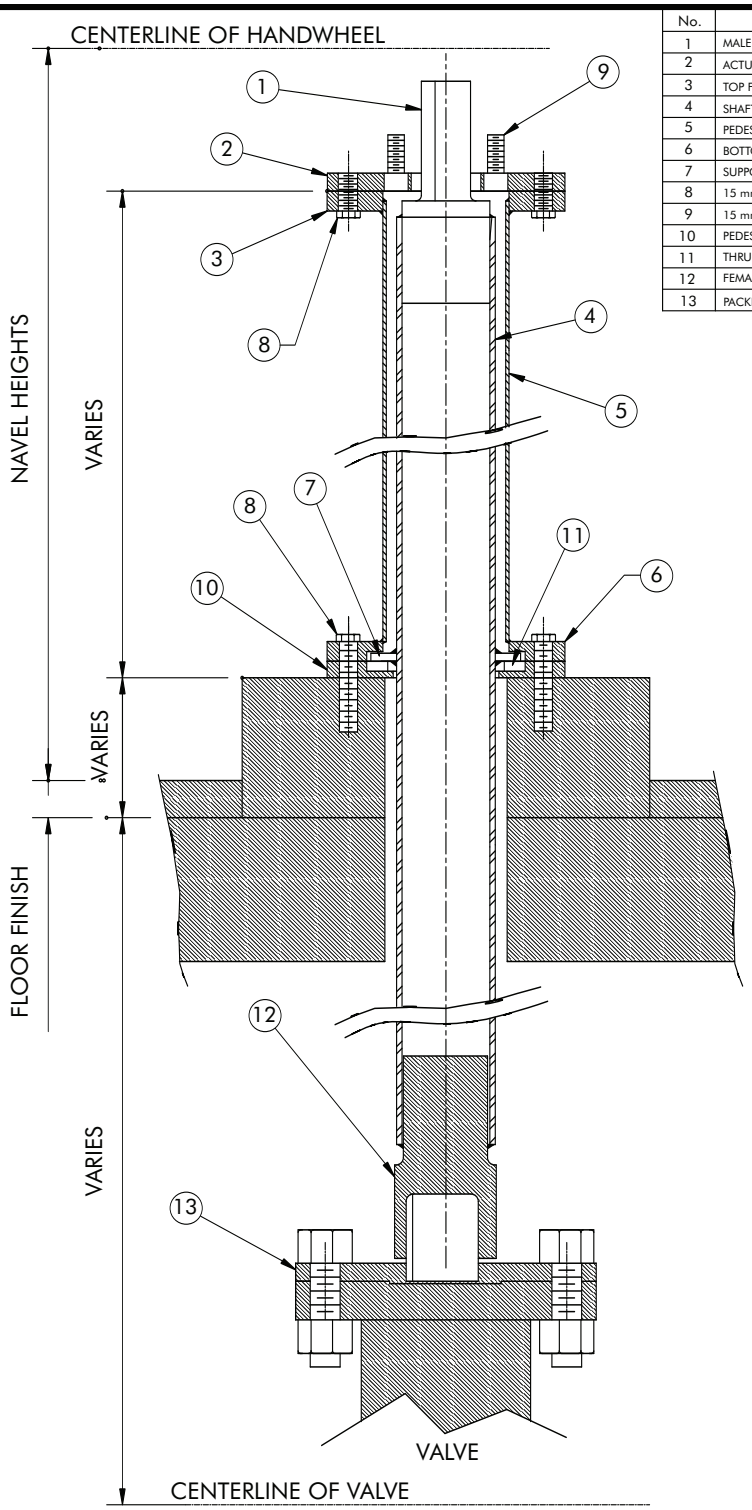
Crispin Tilting Disc Check Valve (Bottom Mounted Dashpot) Specifications

The Tilting Disc Check Valve fitted with a bottom mounted dashpot shall be designed to allow media flow forward and downstream of the pump, but disallow flow reversal. The valve shall consist of two body halves bolted together at 55-degree angle, forming a center flange. Inspection ports are to be located in each body half. A body seat ring shall be clamped between the inlet and outlet body halves at the center flange, and must be bevelled on the seating surface. The outlet body half will contain a disc onto which is bolted a disc seat ring. The disc seat ring will be bevelled to meet the seating surface of the body seat ring. The disc shall be held in place by two pivot pins that insert through both sides of the outlet body half. The pins will hold the disc in place at bushings on the disc. The bushings are to be located so that approximately two thirds of the disc weight is below the pivot pins on seating. The disc is to be designed so that, at the fully opened position, the media will flow over both the top and bottom sides due to its "aerofoil" shape. The disc will pivot away from the body seat in a manner that allows no contact of the two seat rings except at the end of the sealing stroke. The entire flow area through the valve will meet or exceed the nominal pipe diameter. The body halves will be designed to gradually enlarge to achieve at least a 40 percent increase over the nominal pipe diameter at the seat area. This will minimize valve head loss. The valve shall be tested to the operating characteristics of AWWA specification # C–508. The valve shall be Crispin series "TD", as manufactured by Crispin–Multiplex Manufacturing Co., Berwick PA, or approved equal.

The bottom mounted oil dashpot will be installed through the bottom inspection port. The device is not to be connected to the valve disc.The dashpot will provide controlled closure of the valve during the last 10 percent of the valve stroke. This function is to be fully adjustable in the field in order to meet diverse system requirements and reduce the effects of surges and water hammer. The dashpot shall consist of a 34474 KPA (5000 PSI) hydraulic cylinder, an external pressurized oil reservoir, an adjustable flow control valve, and piping. The dashpot will be connected to the valve by means of a spacer containing an air gap so that hydraulic fluid does not enter the system. The spacer will also contain O-rings serving as "wipers" for the same result. A snubber-rod connected to the cylinder will extend up through the spacer bushing and directly into the valve seating area. Upon closure, the disc will strike the snubber-rod and it's travel will be cushioned by the oil cylinder.

SECTION Q

Drawings



No.	PART NAME	QTY	MATERIAL
1	MALE HUB	1	316 STAINLESS STEEL
2	ACTUATOR ADAPTER PLATE	1	316 STAINLESS STEEL
3	TOP FLANGE	1	CARBON STEEL NYLON COATED
4	SHAFT EXTENSION	1	STAINLESS STEEL SCH 40 PIPE
5	PEDESTAL	1	CARBON STEEL SCH 40 PIPE NYLON COATED
6	BOTTOM FLANGE	1	CARBON STEEL NYLON COATED
7	SUPPORT COLLAR	1	STAINLESS STEEL
8	15 mm (5/8") UNC HEX HEAD CAP SCREW	8	STAINLESS STEEL
9	15 mm (5/8") SOCKET HEAD CAP SCREW	4	STAINLESS STEEL
10	PEDESTAL PLATE	1	CARBON STEEL NYLON COATED
11	THRUST BEARING	1	BRASS
12	FEMALE HUB	1	STAINLESS STEEL
13	PACKING RETAINING PLATE	1	CARBON STEEL NYLON COATED

All keyways are in line with valve shaft

No.	ERN	Date
6		
5		
4		
3		
2		
1	Converted to 8.5x11	MAR10/03
RFP	.	.

Revisions

Drawn by: DJD
Date: 03/10/03
Checked by: Bruce James
Date: –
Approved by: Bruce James
Date: –

Tolerances (except as noted)
Decimal ±.005
Fractional ±.015
Angular ±1/2?
Finish 125 AARH
Fillets & Radii .031
Break Sharp Edges

STEALTH INTERNATIONAL INC. www.stealthvalve.com

CURB MOUNTED PEDESTAL & SHAFT EXTENSION G.A.
– REQUIRED DIMENSIONS FOR NAVEL HEIGHT SPECIFICATIONS –

Material: C.S. NYLON COATED
DO NOT SCALE
Dwg #: SVD02000
REV 1
P.O.#:
S.O.#:
Scale:

Stealth Pedestals & Shaft Extensions - Specifications

The pedestal shall support all shaft extensions. All shaft extensions shall be designed for removal from the valve shaft while under non-flowing pressure. Packing retaining plates shall be incorporated in all designs. Inner tubes shall be manufactured in a steady rest and machined finished and faced. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. Single keyways in the upper and lower hubs only.

Inner Torque Tubes:

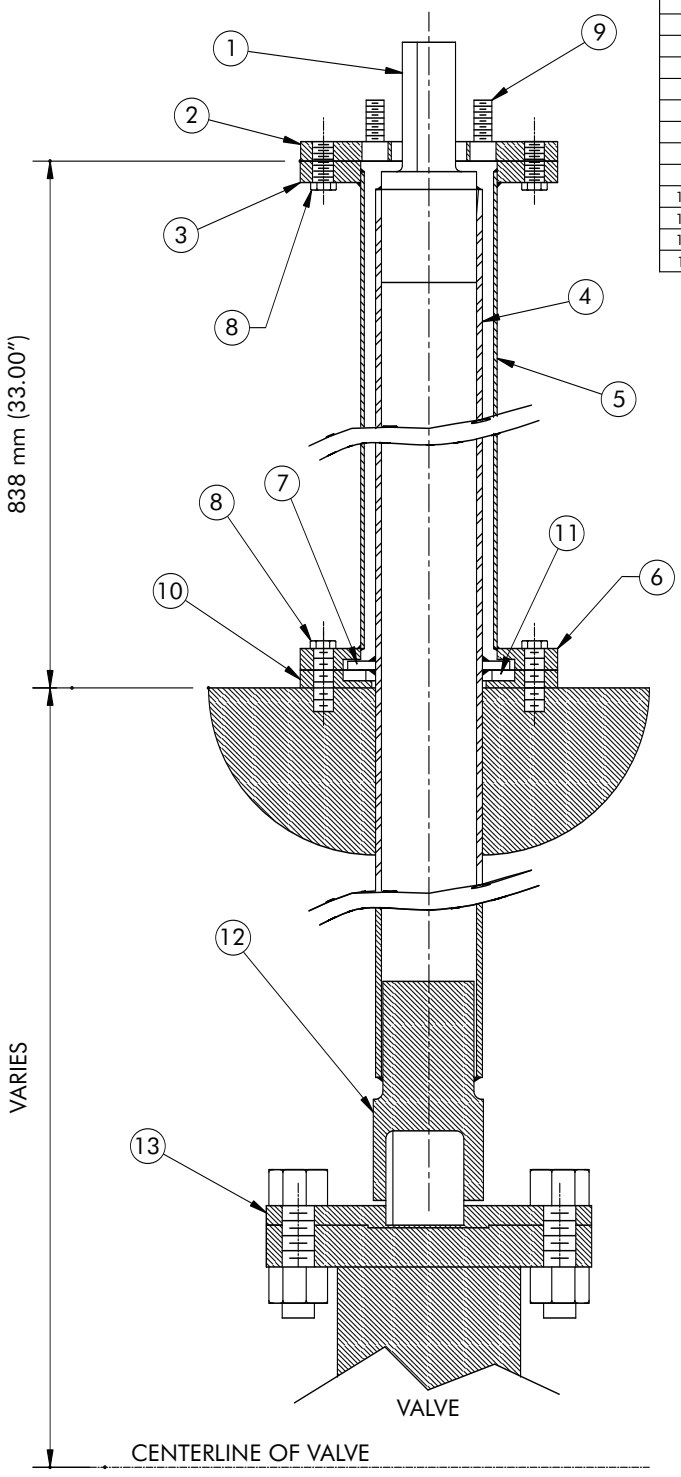
All inner torque tubes shall be designed for a maximum allowable torsional deflection of 0.50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube-mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Shaft extensions shall be 316 stainless steel unless otherwise noted. Stainless steel extensions do not require plugs. HDG shaft extensions when specified shall incorporate sealing plugs. All length's exceeding 6.5 meters (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive.

Shaft Extension Pedestals:

All pedestals shall be designed to withstand the maximum output torque of the actuator with a maximum torsional deflection of .5 degrees with 610 N–m (450 lbs./ft.) of torque on the input shaft of the actuator. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel nylon coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of 4 mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the total torsional deflection at maximum output torque of the actuator. All extensions and pedestal assemblies shall be manufactured by Stealth International Inc.

STEALTH INTERNATIONAL INC.
A Division of Stealth Valve & Controls Ltd.
1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:		
Customer:		
P.O.#:	S.O.#:	Approved by:
Date Released to Production:	Dwg #: SVD02000	



No.	PART NAME	QTY	MATERIAL
1	MALE HUB	1	316 STAINLESS STEEL
2	ACTUATOR ADAPTER PLATE	1	316 STAINLESS STEEL
3	TOP FLANGE	1	CARBON STEEL NYLON COATED
4	SHAFT EXTENSION	1	STAINLESS STEEL SCH 40 PIPE
5	PEDESTAL	1	CARBON STEEL SCH 40 PIPE NYLON COATED
6	BOTTOM FLANGE	1	CARBON STEEL NYLON COATED
7	SUPPORT COLLAR	1	STAINLESS STEEL
8	15 mm (5/8") UNC HEX HEAD CAP SCREW	8	STAINLESS STEEL
9	15 mm (5/8") SOCKET HEAD CAP SCREW	4	STAINLESS STEEL
10	PEDESTAL PLATE	1	CARBON STEEL NYLON COATED
11	THRUST BEARING	1	BRASS
12	FEMALE HUB	1	STAINLESS STEEL
13	PACKING RETAINING PLATE	1	CARBON STEEL NYLON COATED

All keyways are in line with valve shaft

No.	ERN	Date
6		
5		
4		
3		
2		
1	Converted to 8.5x11	MAR10/03
RFP	.	.

Revisions

Drawn by: DJD
Date: 03/10/03
Checked by: Bruce James
Date: –
Approved by: Bruce James
Date: –

Tolerances (except as noted)
Decimal ±.005
Fractional ±.015
Angular ±1/2?
Finish 125 AARH
Fillets & Radii .031
Break Sharp Edges

STEALTH INTERNATIONAL INC. www.stealthvalve.com

PEDESTAL & SHAFT EXTENSION GENERAL ARRANGEMENT
– LESS THAN 6 M (20 FEET) LONG WITH SEALED HUB –

Material: C.S. NYLON COATED
DO NOT SCALE
P.O.#:
S.O.#:
Scale:
Dwg #: SVD02001
REV 1

Stealth Pedestals & Shaft Extensions - Specifications

The pedestal shall support all shaft extensions. All shaft extensions shall be designed for removal from the valve shaft while under non-flowing pressure. Packing retaining plates shall be incorporated in all designs. Inner tubes shall be manufactured in a steady rest and machined finished and faced. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. Single keyways in the upper and lower hubs only.

Inner Torque Tubes:

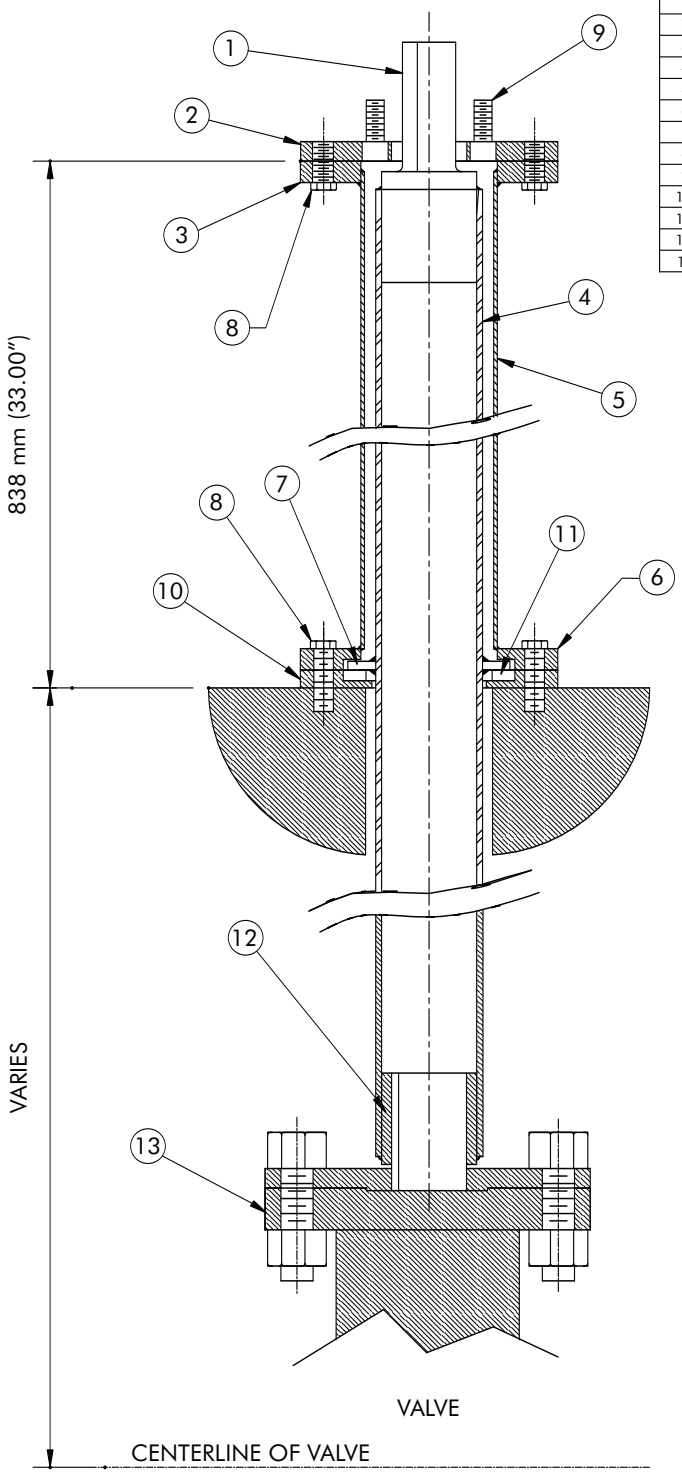
All inner torque tubes shall be designed for a maximum allowable torsional deflection of 0.50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube-mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Shaft extensions shall be 316 stainless steel unless otherwise noted. Stainless steel extensions do not require plugs. HDG shaft extensions when specified shall incorporate sealing plugs. All length's exceeding 6.5 meters (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive.

Shaft Extension Pedestals:

All pedestals shall be designed to withstand the maximum output torque of the actuator with a maximum torsional deflection of .5 degrees with 610 N–m (450 lbs./ft.) of torque on the input shaft of the actuator. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel nylon coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of 4 mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the total torsional deflection at maximum output torque of the actuator. All extensions and pedestal assemblies shall be manufactured by Stealth International Inc.

STEALTH INTERNATIONAL INC.
A Division of Stealth Valve & Controls Ltd.
1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:		
Customer:		
P.O.#:	S.O.#:	Approved by:
Date Released to Production:	Dwg #: SVD02001	



No.	PART NAME	QTY	MATERIAL
1	MALE HUB	1	316 STAINLESS STEEL
2	ACTUATOR ADAPTER PLATE	1	316 STAINLESS STEEL
3	TOP FLANGE	1	CARBON STEEL NYLON COATED
4	SHAFT EXTENSION	1	STAINLESS STEEL SCH 40 PIPE
5	PEDESTAL	1	CARBON STEEL SCH 40 PIPE NYLON COATED
6	BOTTOM FLANGE	1	CARBON STEEL NYLON COATED
7	SUPPORT COLLAR	1	STAINLESS STEEL
8	15 mm (5/8") UNC HEX HEAD CAP SCREW	8	STAINLESS STEEL
9	15 mm (5/8") SOCKET HEAD CAP SCREW	4	STAINLESS STEEL
10	PEDESTAL PLATE	1	CARBON STEEL NYLON COATED
11	THRUST BEARING	1	BRASS
12	FEMALE HUB	1	STAINLESS STEEL
13	PACKING RETAINING PLATE	1	CARBON STEEL NYLON COATED

All keyways are in line with valve shaft

No.	ERN	Date
6		
5		
4		
3		
2		
1	Converted to 8.5x11	MAR10/03
RFP	.	.

Revisions

Drawn by: DJD
Date: 03/10/03
Checked by: Bruce James
Date: –
Approved by: Bruce James
Date: –

Tolerances (except as noted)
Decimal ±.005
Fractional ±.015
Angular ±1/2?
Finish 125 AARH
Fillets & Radii .031
Break Sharp Edges

STEALTH INTERNATIONAL INC. www.stealthvalve.com

PEDESTAL & SHAFT EXTENSION GENERAL ARRANGEMENT
– LESS THAN 6 M (20 FEET) LONG WITH NON-SEALED HUB –

Material: C.S. NYLON COATED
DO NOT SCALE
P.O.#:
S.O.#:
Scale:
Dwg #: SVD02002
REV 2

Stealth Pedestals & Shaft Extensions - Specifications

The pedestal shall support all shaft extensions. All shaft extensions shall be designed for removal from the valve shaft while under non-flowing pressure. Packing retaining plates shall be incorporated in all designs. Inner tubes shall be manufactured in a steady rest and machined finished and faced. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. Single keyways in the upper and lower hubs only.

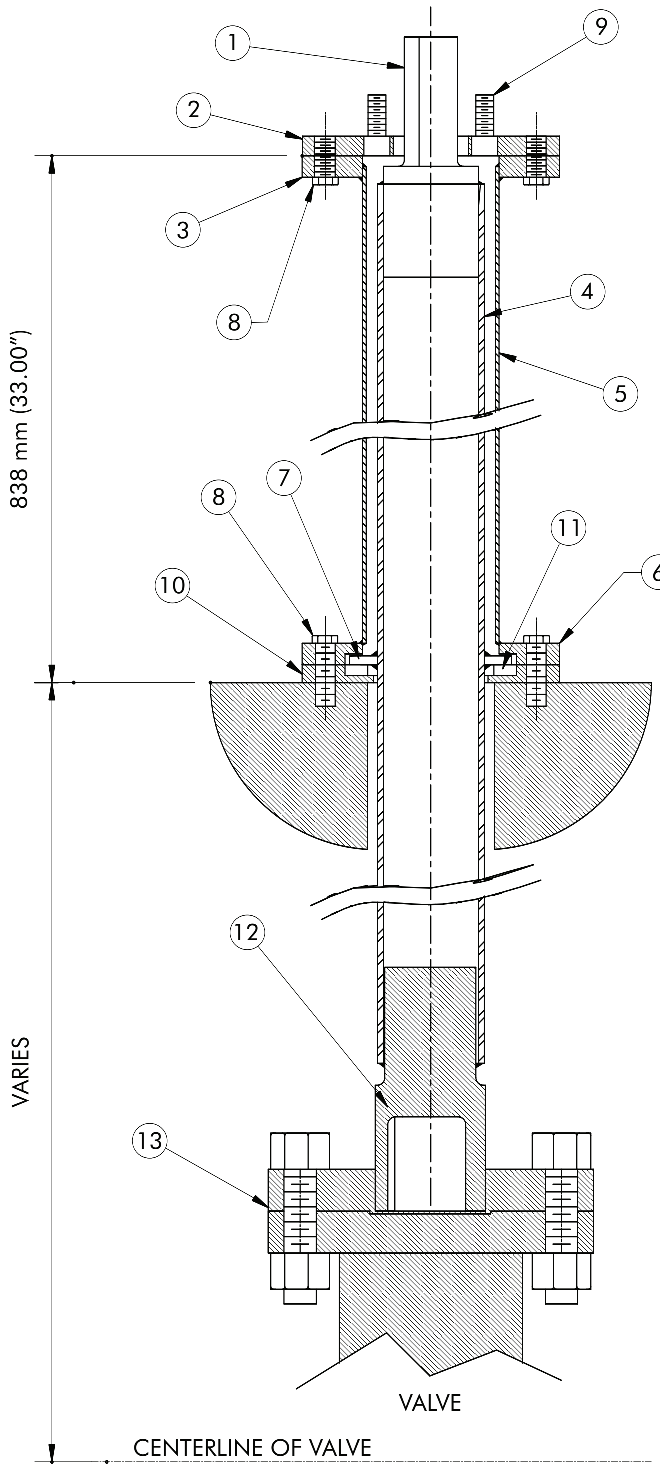
Inner Torque Tubes:
All inner torque tubes shall be designed for a maximum allowable torsional deflection of 0.50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube-mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Shaft extensions shall be 316 stainless steel unless otherwise noted. Stainless steel extensions do not require plugs. HDG shaft extensions when specified shall incorporate sealing plugs. All length's exceeding 6.5 meters (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive.

Shaft Extension Pedestals:
All pedestals shall be designed to withstand the maximum output torque of the actuator with a maximum torsional deflection of .5 degrees with 610 N–m (450 lbs./ft.) of torque on the input shaft of the actuator. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel nylon coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of 4 mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the total torsional deflection at maximum output torque of the actuator. All extensions and pedestal assemblies shall be manufactured by Stealth International Inc.

STEALTH INTERNATIONAL INC.
A Division of Stealth Valve & Controls Ltd.
1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:		
Customer:		
P.O.#:	S.O.#:	Approved by:
Date Released to Production:	Dwg #: SVD02002	

No.	PART NAME	QTY	MATERIAL
1	MALE HUB	1	316 STAINLESS STEEL
2	ACTUATOR ADAPTER PLATE	1	316 STAINLESS STEEL
3	TOP FLANGE	1	316 STAINLESS STEEL
4	SHAFT EXTENSION	1	STAINLESS STEEL SCH 40 PIPE
5	PEDESTAL	1	316 STAINLESS STEEL SCH 40 PIPE
6	BOTTOM FLANGE	1	316 STAINLESS STEEL
7	SUPPORT COLLAR	1	316 STAINLESS STEEL
8	15 mm (5/8") UNC HEX HEAD CAP SCREW	8	316 STAINLESS STEEL
9	15 mm (5/8") SOCKET HEAD CAP SCREW	4	316 STAINLESS STEEL
10	PEDESTAL PLATE	1	316 STAINLESS STEEL
11	THRUST BEARING	1	BRASS
12	FEMALE HUB	1	316 STAINLESS STEEL
13	PACKING RETAINING PLATE	1	316 STAINLESS STEEL



All keyways are in line with valve shaft

No.	ERN	Date
6		
5		
4		
3		
2		
1	Converted to 8.5x11	MAR10/03
RFP	.	.

Revisions

Drawn by: DJD
Date: 03/10/03
Checked by: Bruce James
Date: –
Approved by: Bruce James
Date: –

Tolerances (except as noted)
Decimal ±.005
Fractional ±.015
Angular ±1/2?
Finish 125 AARH
Fillets & Radii .031
Break Sharp Edges

STEALTH INTERNATIONAL INC. www.stealthvalve.com

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PEDESTAL & SHAFT EXTENSION GENERAL ARRANGEMENT
– LESS THAN 6 M (20 FEET) LONG WITH SEALED HUB –

Material: 316 STAINLESS STEEL
DO NOT SCALE
Dwg #: SVD02003
REV 1
P.O.#:
S.O.#:
Scale:

Stealth Pedestals & Shaft Extensions - Specifications

The pedestal shall support all shaft extensions. All shaft extensions shall be designed for removal from the valve shaft while under non-flowing pressure. Packing retaining plates shall be incorporated in all designs. Inner tubes shall be manufactured in a steady rest and machined finished and faced. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. Single keyways in the upper and lower hubs only.

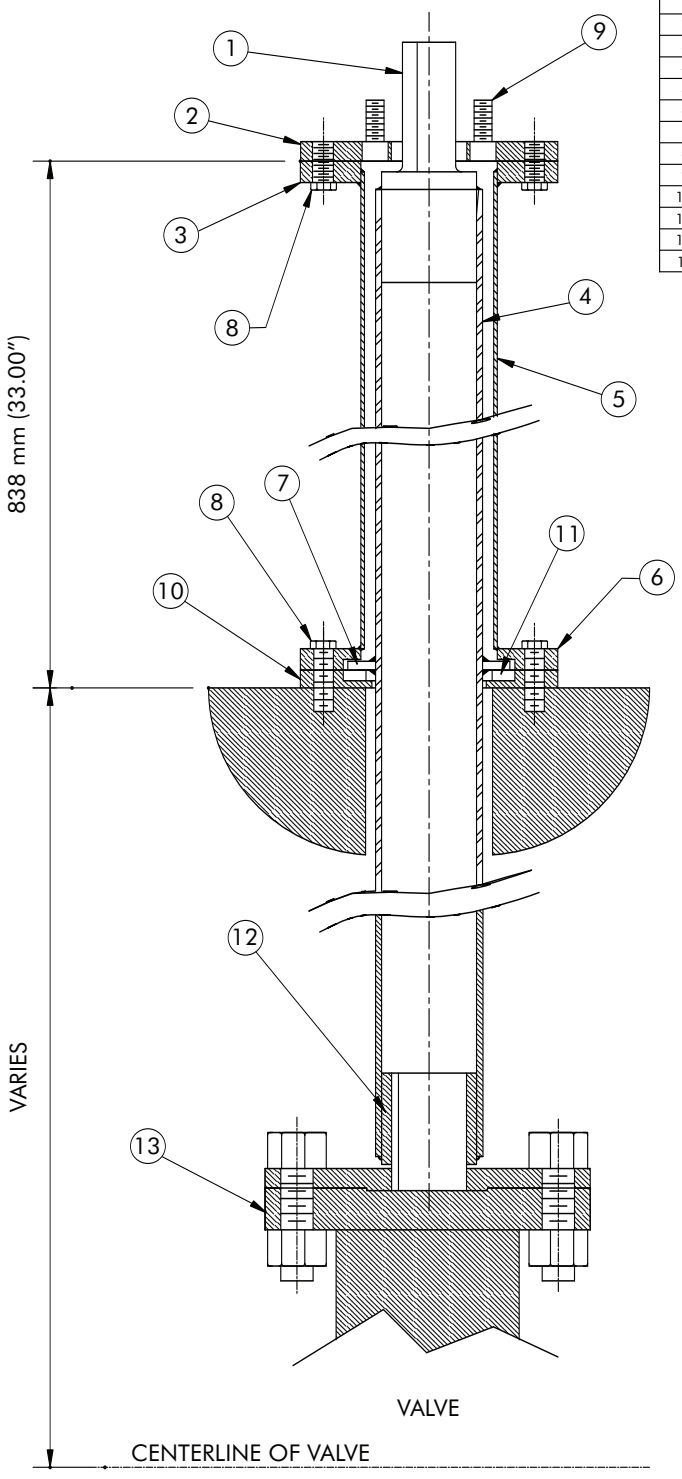
Inner Torque Tubes:
All inner torque tubes shall be designed for a maximum allowable torsional deflection of 0.50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube-mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Shaft extensions shall be 316 stainless steel unless otherwise noted. Stainless steel extensions do not require plugs. HDG shaft extensions when specified shall incorporate sealing plugs. All length's exceeding 6.5 meters (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive.

Shaft Extension Pedestals:
All pedestals shall be designed to withstand the maximum output torque of the actuator with a maximum torsional deflection of .5 degrees with 610 N–m (450 lbs./ft.) of torque on the input shaft of the actuator. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel nylon coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of 4 mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the total torsional deflection at maximum output torque of the actuator. All extensions and pedestal assemblies shall be manufactured by Stealth International Inc.

STEALTH INTERNATIONAL INC.
A Division of Stealth Valve & Controls Ltd.
1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:		
Customer:		
P.O.#:	S.O.#:	Approved by:
Date Released to Production:	Dwg #: SVD02003	

No.	PART NAME	QTY	MATERIAL
1	MALE HUB	1	316 STAINLESS STEEL
2	ACTUATOR ADAPTER PLATE	1	316 STAINLESS STEEL
3	TOP FLANGE	1	316 STAINLESS STEEL
4	SHAFT EXTENSION	1	STAINLESS STEEL SCH 40 PIPE
5	PEDESTAL	1	316 STAINLESS STEEL SCH 40 PIPE
6	BOTTOM FLANGE	1	316 STAINLESS STEEL
7	SUPPORT COLLAR	1	316 STAINLESS STEEL
8	15 mm (5/8") UNC HEX HEAD CAP SCREW	8	316 STAINLESS STEEL
9	15 mm (5/8") SOCKET HEAD CAP SCREW	4	316 STAINLESS STEEL
10	PEDESTAL PLATE	1	316 STAINLESS STEEL
11	THRUST BEARING	1	BRASS
12	FEMALE HUB	1	316 STAINLESS STEEL
13	PACKING RETAINING PLATE	1	316 STAINLESS STEEL



All keyways are in line with valve shaft

No.	ERN	Date
6		
5		
4		
3		
2		
1	Converted to 8.5x11	MAR10/03
RFP	.	.

Revisions

Drawn by: DJD
Date: 03/10/03
Checked by: Bruce James
Date: –
Approved by: Bruce James
Date: –

Tolerances (except as noted)
Decimal ±.005
Fractional ±.015
Angular ±1/2?
Finish 125 AARH
Fillets & Radii .031
Break Sharp Edges

STEALTH INTERNATIONAL INC. www.stealthvalve.com

PEDESTAL & SHAFT EXTENSION GENERAL ARRANGEMENT
– LESS THAN 6 M (20 FEET) LONG WITH NON-SEALED HUB –

Material: 316 STAINLESS STEEL
DO NOT SCALE
Dwg #: SVD02004
REV 2
P.O.#:
S.O.#:
Scale:

Stealth Pedestals & Shaft Extensions - Specifications

The pedestal shall support all shaft extensions. All shaft extensions shall be designed for removal from the valve shaft while under non-flowing pressure. Packing retaining plates shall be incorporated in all designs. Inner tubes shall be manufactured in a steady rest and machined finished and faced. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. Single keyways in the upper and lower hubs only.

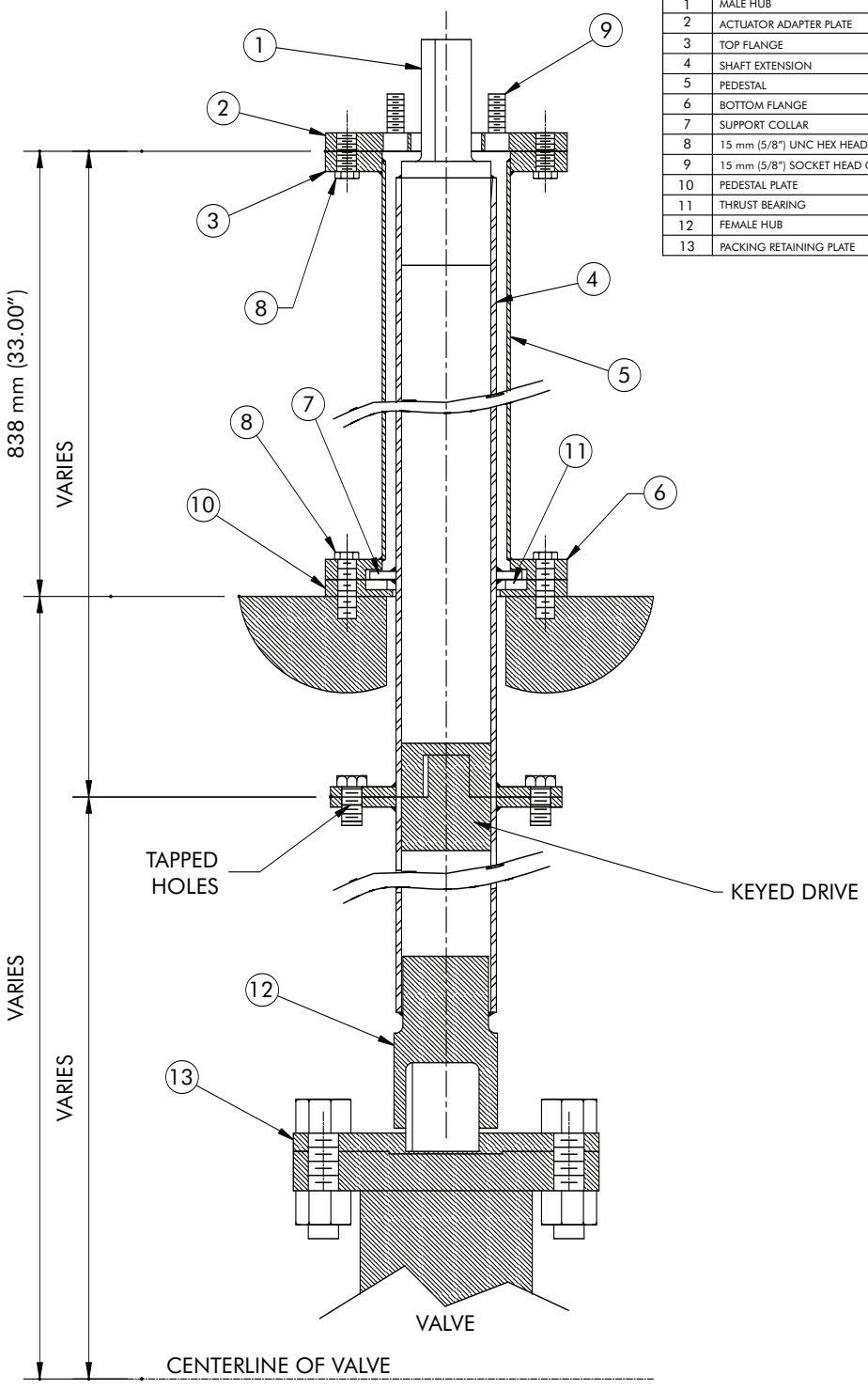
Inner Torque Tubes:
All inner torque tubes shall be designed for a maximum allowable torsional deflection of 0.50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube-mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Shaft extensions shall be 316 stainless steel unless otherwise noted. Stainless steel extensions do not require plugs. HDG shaft extensions when specified shall incorporate sealing plugs. All length's exceeding 6.5 meters (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive.

Shaft Extension Pedestals:
All pedestals shall be designed to withstand the maximum output torque of the actuator with a maximum torsional deflection of .5 degrees with 610 N–m (450 lbs./ft.) of torque on the input shaft of the actuator. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel nylon coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of 4 mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the total torsional deflection at maximum output torque of the actuator. All extensions and pedestal assemblies shall be manufactured by Stealth International Inc.

STEALTH INTERNATIONAL INC.
A Division of Stealth Valve & Controls Ltd.
1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:		
Customer:		
P.O.#:	S.O.#:	Approved by:
Date Released to Production:	Dwg #: SVD02004	

No.	PART NAME	QTY	MATERIAL
1	MALE HUB	1	316 STAINLESS STEEL
2	ACTUATOR ADAPTER PLATE	1	316 STAINLESS STEEL
3	TOP FLANGE	1	CARBON STEEL NYLON COATED
4	SHAFT EXTENSION	1	STAINLESS STEEL SCH 40 PIPE
5	PEDESTAL	1	CARBON STEEL SCH 40 PIPE NYLON COATED
6	BOTTOM FLANGE	1	CARBON STEEL NYLON COATED
7	SUPPORT COLLAR	1	STAINLESS STEEL
8	15 mm (5/8") UNC HEX HEAD CAP SCREW	8	STAINLESS STEEL
9	15 mm (5/8") SOCKET HEAD CAP SCREW	4	STAINLESS STEEL
10	PEDESTAL PLATE	1	CARBON STEEL NYLON COATED
11	THRUST BEARING	1	BRASS
12	FEMALE HUB	1	STAINLESS STEEL
13	PACKING RETAINING PLATE	1	CARBON STEEL NYLON COATED



All keyways are in line with valve shaft

No.					
6			Drawn by: DJD	Tolerances (except as noted)	STEALTH INTERNATIONAL INC. www.stealthvalve.com
5			Date: 03/10/03	Decimal ±.005	
4				Fractional ±.015	The information contained herein shall not be copied, transferred, conveyed or displayed in any manner that would violate its proprietary nature without the express written permission of STEALTH INTERNATIONAL INC. – 1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
3			Checked by: Bruce James	Angular ±1/2?	
2			Date: –	Finish 125 AARH	PEDESTAL & SHAFT EXTENSION GENERAL ARRANGEMENT – LESS THAN 6 M (20 FEET) LONG WITH SEALED HUB –
1	Converted to 8.5x11	MAR10/03			
RFP	.	.	Approved by: Bruce James	Fillets & Radii .031	Material: C.S. NYLON COATED / DO NOT SCALE / Dwg #: SVD02005 / REV 1
No.	ERN	Date	Date: –	Break Sharp Edges	P.O.#: S.O.#: / Scale:
Revisions					

Stealth Pedestals & Shaft Extensions - Specifications

The pedestal shall support all shaft extensions. All shaft extensions shall be designed for removal from the valve shaft while under non-flowing pressure. Packing retaining plates shall be incorporated in all designs. Inner tubes shall be manufactured in a steady rest and machined finished and faced. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. Single keyways in the upper and lower hubs only.

Inner Torque Tubes:
All inner torque tubes shall be designed for a maximum allowable torsional deflection of 0.50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube-mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Shaft extensions shall be 316 stainless steel unless otherwise noted. Stainless steel extensions do not require plugs. HDG shaft extensions when specified shall incorporate sealing plugs. All length's exceeding 6.5 meters (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive.

Shaft Extension Pedestals:
All pedestals shall be designed to withstand the maximum output torque of the actuator with a maximum torsional deflection of .5 degrees with 610 N–m (450 lbs./ft.). of torque on the input shaft of the actuator. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel nylon coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of 4 mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the total torsional deflection at maximum output torque of the actuator. All extensions and pedestal assemblies shall be manufactured by Stealth International Inc.

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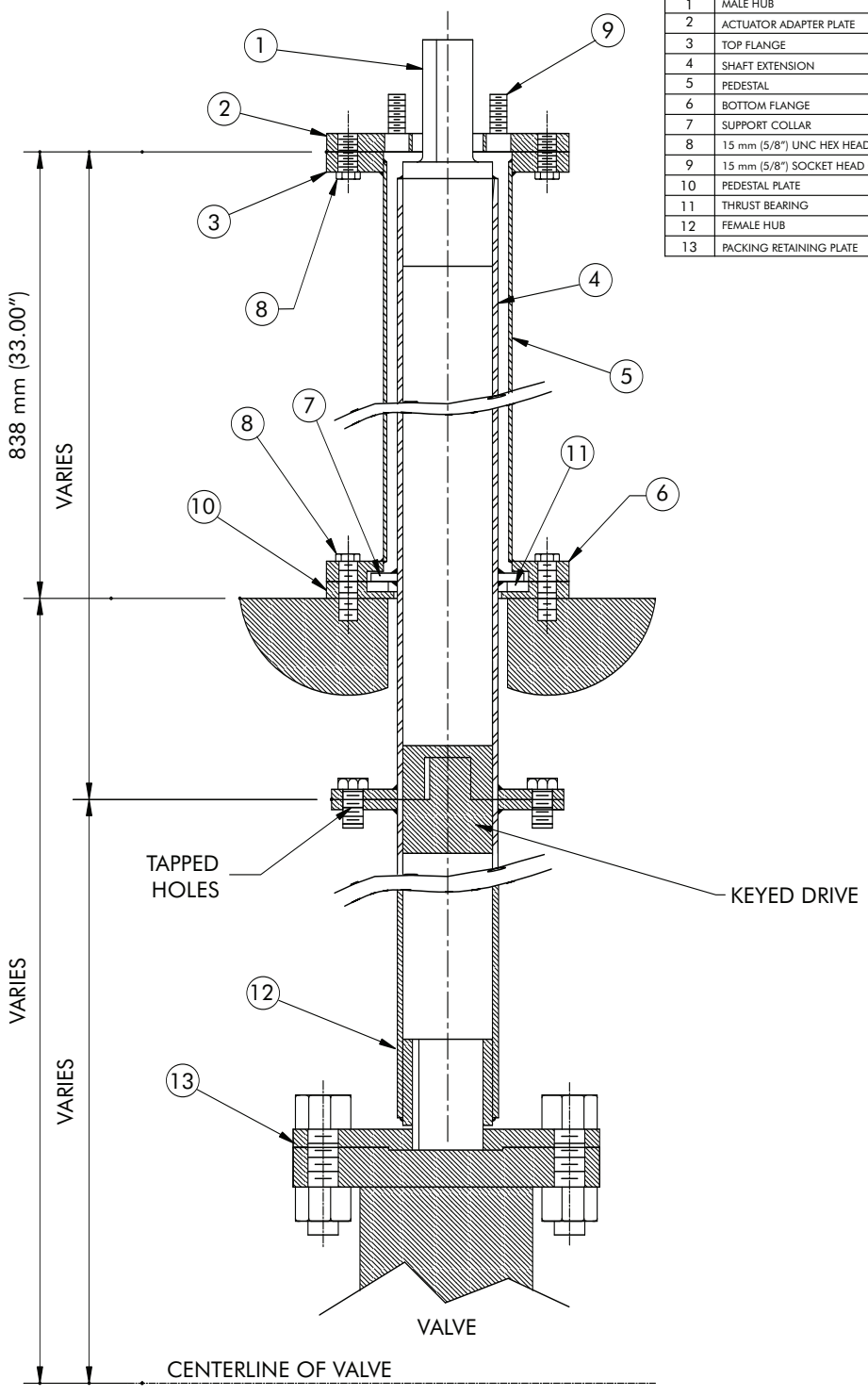
Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:		
Customer:		
P.O.#:	S.O.#:	Approved by:
Date Released to Production:	Dwg #: SVD02005	

No.	PART NAME	QTY	MATERIAL
1	MALE HUB	1	316 STAINLESS STEEL
2	ACTUATOR ADAPTER PLATE	1	316 STAINLESS STEEL
3	TOP FLANGE	1	CARBON STEEL NYLON COATED
4	SHAFT EXTENSION	1	STAINLESS STEEL SCH 40 PIPE
5	PEDESTAL	1	CARBON STEEL SCH 40 PIPE NYLON COATED
6	BOTTOM FLANGE	1	CARBON STEEL NYLON COATED
7	SUPPORT COLLAR	1	STAINLESS STEEL
8	15 mm (5/8") UNC HEX HEAD CAP SCREW	8	STAINLESS STEEL
9	15 mm (5/8") SOCKET HEAD CAP SCREW	4	STAINLESS STEEL
10	PEDESTAL PLATE	1	CARBON STEEL NYLON COATED
11	THRUST BEARING	1	BRASS
12	FEMALE HUB	1	STAINLESS STEEL
13	PACKING RETAINING PLATE	1	CARBON STEEL NYLON COATED



All keyways are in line with valve shaft

No.			Drawn by: DJD	Tolerances (except as noted)
6				
5			Date: 03/10/03	Decimal ±.005
4				
3			Checked by: Bruce James	Fractional ±.015
2				Angular ±1/2?
1	Converted to 8.5x11	MAR10/03	Date: –	Finish 125 AARH
RFP	.	.	Approved by: Bruce James	Fillets & Radii .031
No.	ERN	Date	Date: –	Break Sharp Edges
Revisions				

STEALTH INTERNATIONAL INC. www.stealthvalve.com

PEDESTAL & SHAFT EXTENSION GENERAL ARRANGEMENT
– LESS THAN 6 M (20 FEET) LONG WITH NON-SEALED HUB –

Material: C.S. NYLON COATED	DO NOT SCALE	Dwg #: SVD02006	REV 1
P.O.#: S.O.#:	Scale:		

Stealth Pedestals & Shaft Extensions - Specifications

The pedestal shall support all shaft extensions. All shaft extensions shall be designed for removal from the valve shaft while under non-flowing pressure. Packing retaining plates shall be incorporated in all designs. Inner tubes shall be manufactured in a steady rest and machined finished and faced. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. Single keyways in the upper and lower hubs only.

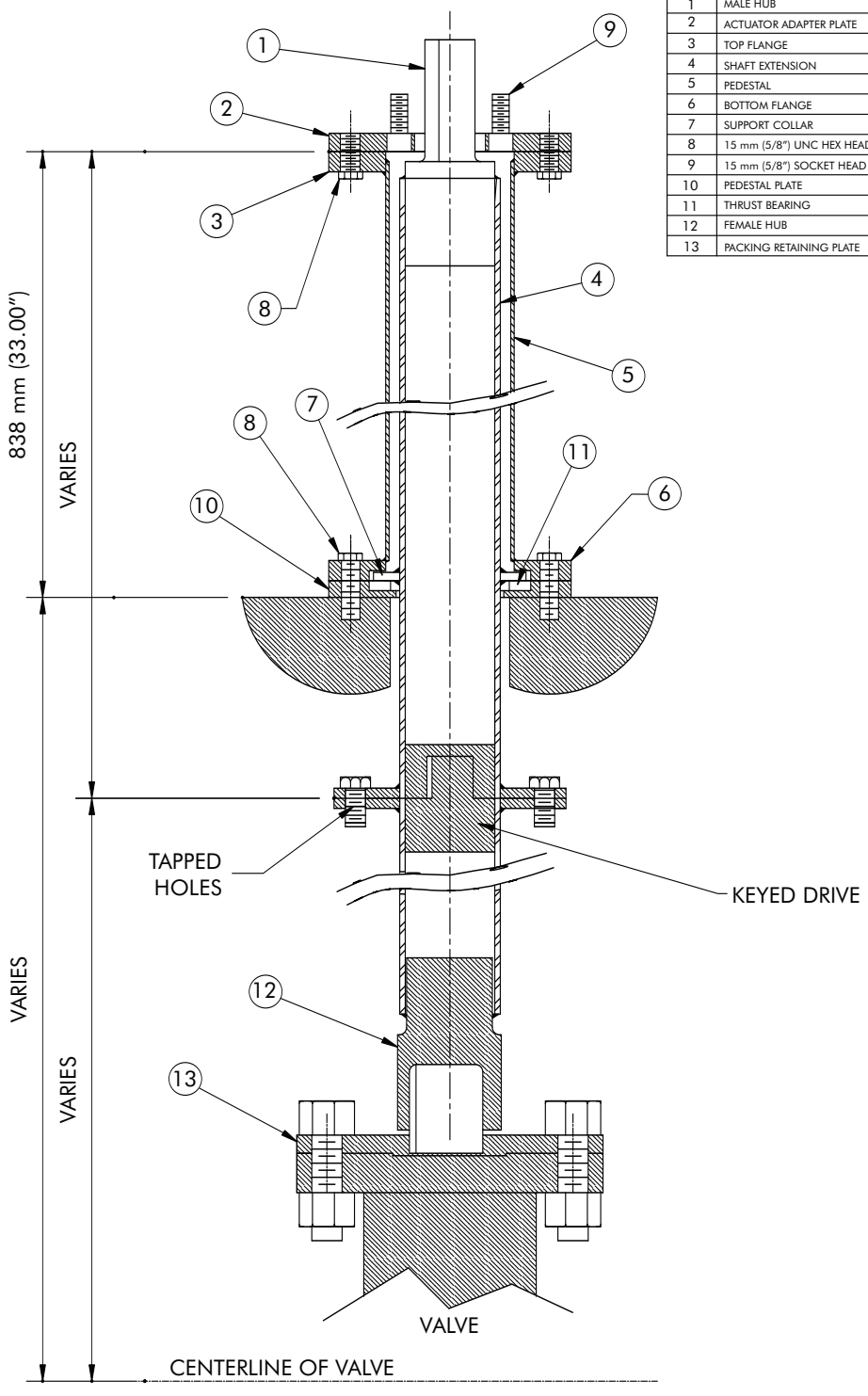
Inner Torque Tubes:
All inner torque tubes shall be designed for a maximum allowable torsional deflection of 0.50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube-mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Shaft extensions shall be 316 stainless steel unless otherwise noted. Stainless steel extensions do not require plugs. HDG shaft extensions when specified shall incorporate sealing plugs. All length's exceeding 6.5 (21 feet) meters shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive.

Shaft Extension Pedestals:
All pedestals shall be designed to withstand the maximum output torque of the actuator with a maximum torsional deflection of .5 degrees with 610 N–m (450 lbs./ft.) of torque on the input shaft of the actuator. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel nylon coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of 4 mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the total torsional deflection at maximum output torque of the actuator. All extensions and pedestal assemblies shall be manufactured by Stealth International Inc.

STEALTH INTERNATIONAL INC.
A Division of Stealth Valve & Controls Ltd.
1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:		
Customer:		
P.O.#:	S.O.#:	Approved by:
Date Released to Production:	Dwg #: SVD02006	

No.	PART NAME	QTY	MATERIAL
1	MALE HUB	1	316 STAINLESS STEEL
2	ACTUATOR ADAPTER PLATE	1	316 STAINLESS STEEL
3	TOP FLANGE	1	316 STAINLESS STEEL
4	SHAFT EXTENSION	1	STAINLESS STEEL SCH 40 PIPE
5	PEDESTAL	1	316 STAINLESS STEEL SCH 40 PIPE
6	BOTTOM FLANGE	1	316 STAINLESS STEEL
7	SUPPORT COLLAR	1	316 STAINLESS STEEL
8	15 mm (5/8") UNC HEX HEAD CAP SCREW	8	316 STAINLESS STEEL
9	15 mm (5/8") SOCKET HEAD CAP SCREW	4	316 STAINLESS STEEL
10	PEDESTAL PLATE	1	316 STAINLESS STEEL
11	THRUST BEARING	1	BRASS
12	FEMALE HUB	1	316 STAINLESS STEEL
13	PACKING RETAINING PLATE	1	316 STAINLESS STEEL



All keyways are in line with valve shaft

No.			Drawn by: DJD	Tolerances (except as noted)
6				
5			Date: 03/10/03	Decimal ±.005
4				
3			Checked by: Bruce James	Fractional ±.015
2				Angular ±1/2?
1	Converted to 8.5x11	MAR10/03	Date: –	Finish 125 AARH
RFP	.	.	Approved by: Bruce James	Fillets & Radii .031
No.	ERN	Date	Date: –	Break Sharp Edges
Revisions				

STEALTH INTERNATIONAL INC. www.stealthvalve.com

PEDESTAL & SHAFT EXTENSION GENERAL ARRANGEMENT
– LESS THAN 6 M (20 FEET) LONG WITH SEALED HUB –

Material: 316 STAINLESS STEEL	DO NOT SCALE	Dwg #: SVD02007	REV 1
P.O.#: S.O.#:	Scale:		

Stealth Pedestals & Shaft Extensions - Specifications

The pedestal shall support all shaft extensions. All shaft extensions shall be designed for removal from the valve shaft while under non-flowing pressure. Packing retaining plates shall be incorporated in all designs. Inner tubes shall be manufactured in a steady rest and machined finished and faced. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. Single keyways in the upper and lower hubs only.

Inner Torque Tubes:
All inner torque tubes shall be designed for a maximum allowable torsional deflection of 0.50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube-mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Shaft extensions shall be 316 stainless steel unless otherwise noted. Stainless steel extensions do not require plugs. HDG shaft extensions when specified shall incorporate sealing plugs. All length's exceeding 6.5 meters (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive.

Shaft Extension Pedestals:
All pedestals shall be designed to withstand the maximum output torque of the actuator with a maximum torsional deflection of .5 degrees with 610 N–m (450 lbs./ft.) of torque on the input shaft of the actuator. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel nylon coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of 4 mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the total torsional deflection at maximum output torque of the actuator. All extensions and pedestal assemblies shall be manufactured by Stealth International Inc.

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Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:		
Customer:		
P.O.#:	S.O.#:	Approved by:
Date Released to Production:	Dwg #: SVD02007	

No.	PART NAME	QTY	MATERIAL
1	MALE HUB	1	316 STAINLESS STEEL
2	ACTUATOR ADAPTER PLATE	1	316 STAINLESS STEEL
3	TOP FLANGE	1	316 STAINLESS STEEL
4	SHAFT EXTENSION	1	STAINLESS STEEL SCH 40 PIPE
5	PEDESTAL	1	316 STAINLESS STEEL SCH 40 PIPE
6	BOTTOM FLANGE	1	316 STAINLESS STEEL
7	SUPPORT COLLAR	1	316 STAINLESS STEEL
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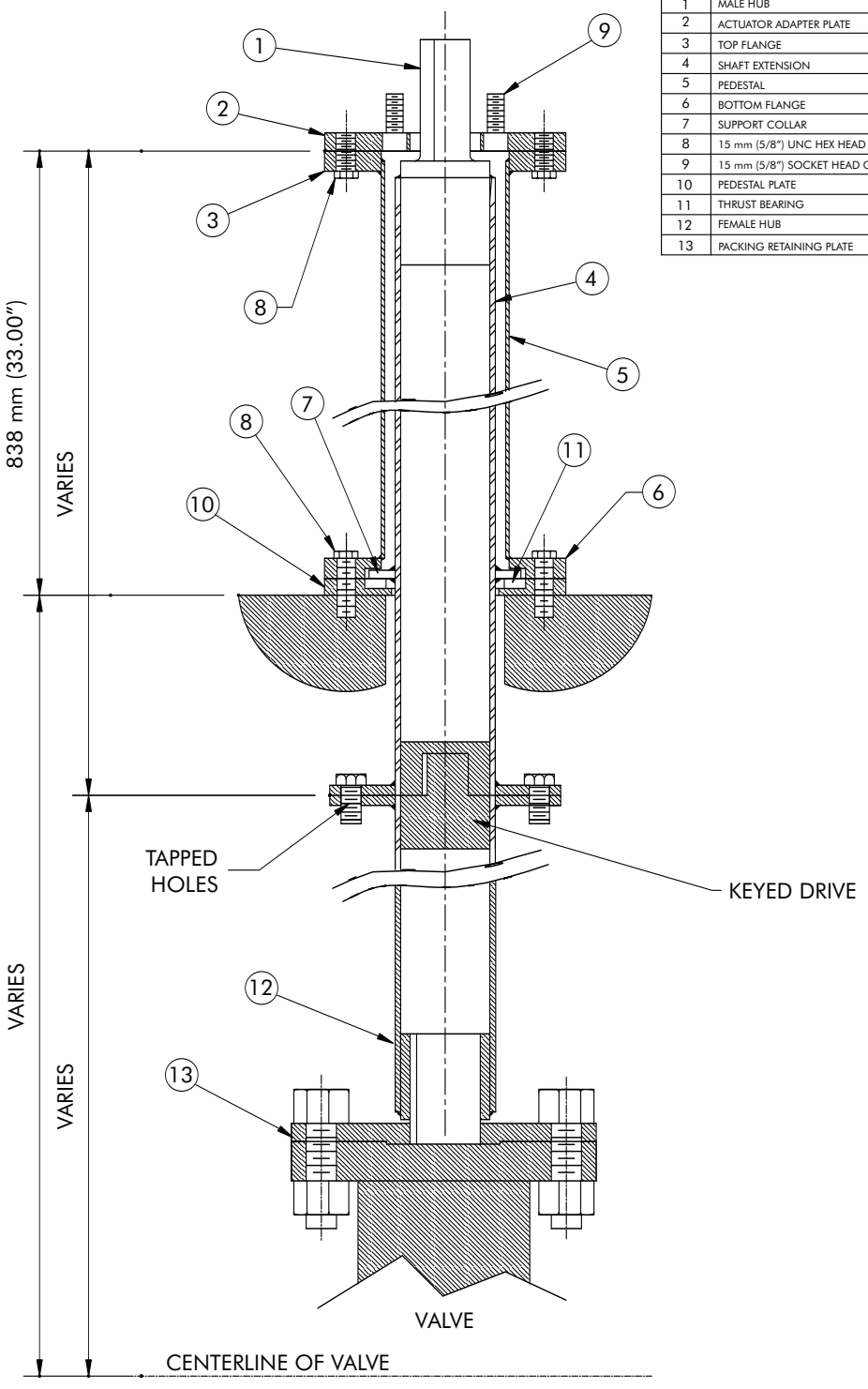
10	PEDESTAL PLATE	1	316 STAINLESS STEEL
11	THRUST BEARING	1	BRASS
12	FEMALE HUB	1	316 STAINLESS STEEL
13	PACKING RETAINING PLATE	1	316 STAINLESS STEEL



All keyways are in line with valve shaft

No.			Drawn by: DJD	Tolerances (except as noted)
6				
5			Date: 03/10/03	Decimal ±.005
4				
3			Checked by: Bruce James	Fractional ±.015
2				Angular ±1/2?
1	Converted to 8.5x11	MAR10/03	Date: –	Finish 125 AARH
RFP	.	.	Approved by: Bruce James	Fillets & Radii .031
No.	ERN	Date	Date: –	Break Sharp Edges
Revisions				

STEALTH INTERNATIONAL INC. www.stealthvalve.com

PEDESTAL & SHAFT EXTENSION GENERAL ARRANGEMENT
– LESS THAN 6 M (20 FEET) LONG WITH NON-SEALED HUB –

Material: 316 STAINLESS STEEL	DO NOT SCALE	Dwg #: SVD02008	REV 1
P.O.#: S.O.#:	Scale:		

Stealth Pedestals & Shaft Extensions - Specifications

The pedestal shall support all shaft extensions. All shaft extensions shall be designed for removal from the valve shaft while under non-flowing pressure. Packing retaining plates shall be incorporated in all designs. Inner tubes shall be manufactured in a steady rest and machined finished and faced. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. Single keyways in the upper and lower hubs only.

Inner Torque Tubes:
All inner torque tubes shall be designed for a maximum allowable torsional deflection of 0.50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube-mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Shaft extensions shall be 316 stainless steel unless otherwise noted. Stainless steel extensions do not require plugs. HDG shaft extensions when specified shall incorporate sealing plugs. All length's exceeding 6.5 meters (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive.

Shaft Extension Pedestals:
All pedestals shall be designed to withstand the maximum output torque of the actuator with a maximum torsional deflection of .5 degrees with 610 N–m (450 lbs./ft.) of torque on the input shaft of the actuator. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel nylon coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of 4 mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the total torsional deflection at maximum output torque of the actuator. All extensions and pedestal assemblies shall be manufactured by Stealth International Inc.

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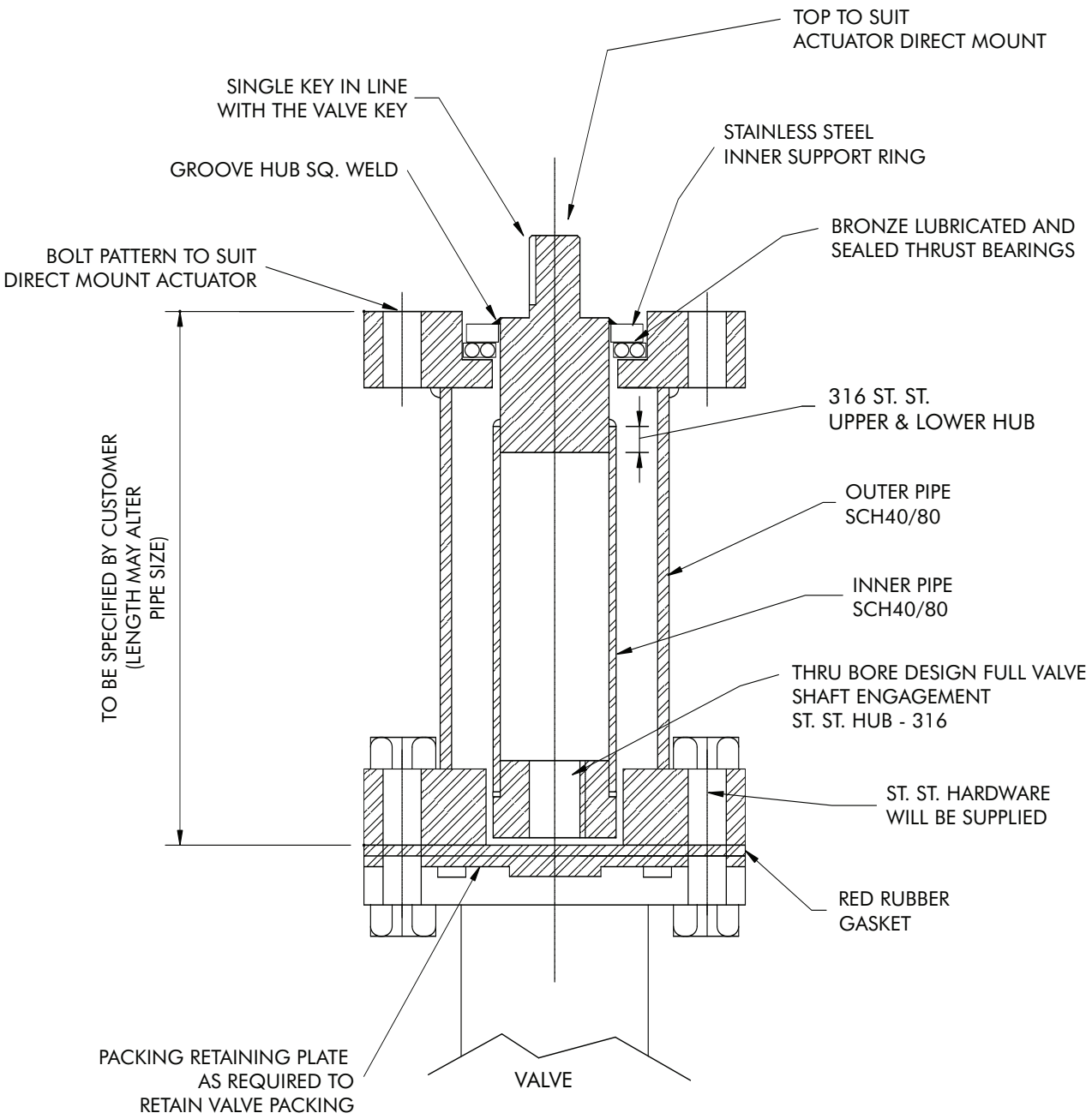
Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:		
Customer:		
P.O.#:	S.O.#:	Approved by:
Date Released to Production:	Dwg #: SVD02008	



All keyways are in line with valve shaft

No.		
6		
5		
4		
3		
2		
1	Converted to 8.5x11	MAR10/03
RFP	.	.
No.	ERN	Date
Revisions		

Drawn by: DJD	
Date: 03/10/03	
Checked by: Bruce James	
Date: –	
Approved by: Bruce James	
Date: –	

Tolerances (except as noted)	
Decimal ±.005	
Fractional ±.015	
Angular ±1/2?	
Finish 125 AARH	
Fillets & Radii .031	
Break Sharp Edges	

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FLANGED TORQUE TUBE
GENERAL ARRANGEMENT

Material: 316 STAINLESS STEEL	DO NOT SCALE	Dwg #: SVD02009	REV 1
P.O.#: S.O.#:	Scale:		

CALCULATIONS

G = SHEAR MODULUS OF ELASTICITY
J = POLAR MOMENT OF INERTIA
L = LENGTH OF TUBE
T = APPLIED TORQUE
ro = OUTER RADIUS
ri = INNER RADIUS
ÿ = ANGLE OF TWIST
t = MAXIMUM SHEAR STRESS

100 mm (4") SCH40 J = 38.6595 in^4
100 mm (4") SCH80 J = 50.3366 in^4
150 mm (6") SCH40 J = 223.6366 in^4
150 mm (6") SCH80 J = 314.9677 in^4

$J = \frac{\pi}{2}(ro^4 - ri^4)$ $\quad ÿ = \frac{TL}{JG}$ $\quad t = \frac{Tro}{J}$

SPECIFICATIONS

General Assembly:
All torque tubes shall be fabricated preventing the weight of the inner and outer tube from being transmitted to the valve shaft. All inner and outer tubes shall be manufactured in a steady rest and machined finished and faced with all mounting flanges suitable for gasket sealing. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. All inner shafts shall be supported and designed for removal from the valve shaft while under non-flowing pressure. Packing retaining plates shall be incorporated in all designs. All torque tubes shall be designed and manufactured in Canada by Stealth International or reviewed equivalent.

Inner Torque Tube:
All inner torque tubes shall be designed for a maximum allowable torsional deflection of .50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Stainless steel inner torque tubes do not require plugs.

Outer Torque Tube:
All outer torque tubes shall be designed for a maximum allowable torsional deflection of .50 degrees over the total required length. Both mounting flanges shall be aligned to suit the Valve and Actuator bolt patterns on the same axis. Both flanges shall be machined stepped to accommodate the pipe O.D. prior to welding.
The upper mounting flange shall be designed to guide the inner male hub with a maximum clearance of 3.2 mm (.125 inches). All outer housing flanges shall be machined faced after assembly. Based on the valve design and mounting trunnion, the upper or lower flange shall incorporate an additional load bearing thrust flange or recess to accommodate the pre assembly of the inner torque tube. The thrust flange shall be 316 stainless steel and incorporate 316 stainless recessed steel mounting hardware. All length's exceeding 6.5 meters (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive. All torque tubes shall be manufactured by Stealth International Inc.

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A Division of Stealth Valve & Controls Ltd.
1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:		
Customer:		
P.O.#:	S.O.#:	Approved by:
Date Released to Production:	Dwg #: SVD02009	

Stealth Pedestals - Specification Sheet

Features:

- Optional lower load bearing plate
- Removable actuator plate
- Internal coating as standard
- Zero degrees torsional deflection
- Split pedestal support plates
- Inner drive to suit cored hole in floor

Material:
- ❑ Carbon Steel (Epoxy Coated)
- ❑ Carbon Steel (Nylon Coated)
- ❑ Carbon Steel (Hot Dip Galv)
- ❑ 304 Stainless Steel
- ❑ 316 Stainless Steel
- ❑ NSF Approved Coating

To Suit:
- ❑ Shaft Extension - Dia. _____
- ❑ Rod Extension - Dia. _____

Actuation:
- ❑ Pneumatic - Model _____
- ❑ Gear - Model _____
- ❑ Electric - Model _____

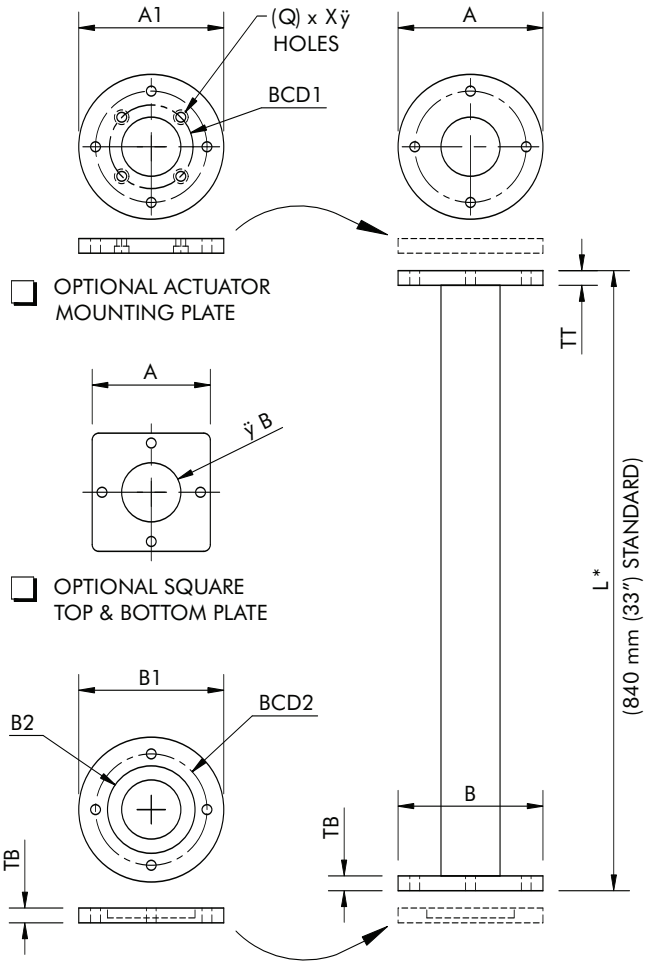
Note: _____

❑ Mounting Details Attached

Hardware: ❑ Stainless Steel ❑ Galvanized

Quantity: _____

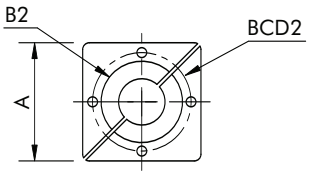
Diameter: _____ Schedule: _____



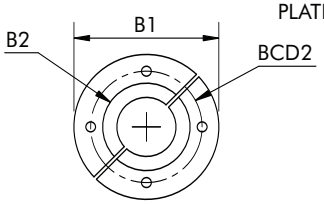
❑ OPTIONAL ACTUATOR MOUNTING PLATE

❑ OPTIONAL SQUARE TOP & BOTTOM PLATE

❑ OPTIONAL FLOOR MOUNTING BASE INNER SHAFT PEDESTAL SUPPORT PLATE



❑ OPTIONAL SQUARE SPLIT PEDESTAL INNER SHAFT SUPPORT PLATE



❑ OPTIONAL ROUND SPLIT PEDESTAL INNER SHAFT SUPPORT PLATE

NOTE : BOTH SQUARE OR ROUND INNER SHAFT PEDESTAL SUPPORT PLATE IS SPLIT TO ACCOMMODATE SHAFT INSERTION THROUGH THE FLOOR FROM BELOW

CUSTOM PRODUCT
ONCE ORDERED NOT SUBJECT
TO CANCELLATION OR RETURN

DIMENSIONS (in inches)

A	A1	TT	Q	X	BCD1	BCD2	B	B1	TB	B2	L*

* INDICATES REQUIRED DIMENSIONS

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Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:

Customer:

P.O.#: S.O.#: Approved by:

Date Released to Production:

Dwg #: STV-PED-GA-01

Stealth Pedestals & Shaft Extensions - Specifications

The pedestal shall support all shaft extensions. All shaft extensions shall be designed for removal from the valve shaft while under non-flowing pressure. Packing retaining plates shall be incorporated in all designs. Inner tubes shall be manufactured in a steady rest and machined finished and faced. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. Single keyways in the upper and lower hubs only.

Inner Torque Tubes:
All inner torque tubes shall be designed for a maximum allowable torsional deflection of 0.50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube-mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Shaft extensions shall be 316 stainless steel unless otherwise noted. Stainless steel extensions do not require plugs. HDG shaft extensions when specified shall incorporate sealing plugs. All length's exceeding 6.5 meters (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive.

Shaft Extension Pedestals:
All pedestals shall be designed to withstand the maximum output torque of the actuator with a maximum torsional deflection of .5 degrees with 610 N–m (450 lbs./ft.) of torque on the input shaft of the actuator. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel nylon coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of 4 mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the total torsional deflection at maximum output torque of the actuator. All extensions and pedestal assemblies shall be manufactured by Stealth International Inc.

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Project Name:		
Customer:		
P.O.#:	S.O.#:	Approved by:
Date Released to Production:	Dwg #: STV-PED-GA-01	

Stealth Shaft Extension - Specification Sheet

Features:

- Support collar as standard
- Standard solid stainless steel subs
- Internal and threaded flange drives on lengths over 6 m (20 feet)
- Deflections calculated at less than 0.75∞
- Ease of dissassembly when mounting through floors

Material:
- ❑ Carbon Steel (Epoxy Coated)
- ❑ Carbon Steel (Nylon Coated)
- ❑ Carbon Steel (Hot Dip Galv)
- ❑ 304 Stainless Steel
- ❑ 316 Stainless Steel

Actuation:
- ❑ Pneumatic - Model _____
- ❑ Gear - Model _____
- ❑ Electric - Model _____

Note: _____

❑ Mounting Details Attached

Hardware: ❑ Stainless Steel ❑ Galvanized

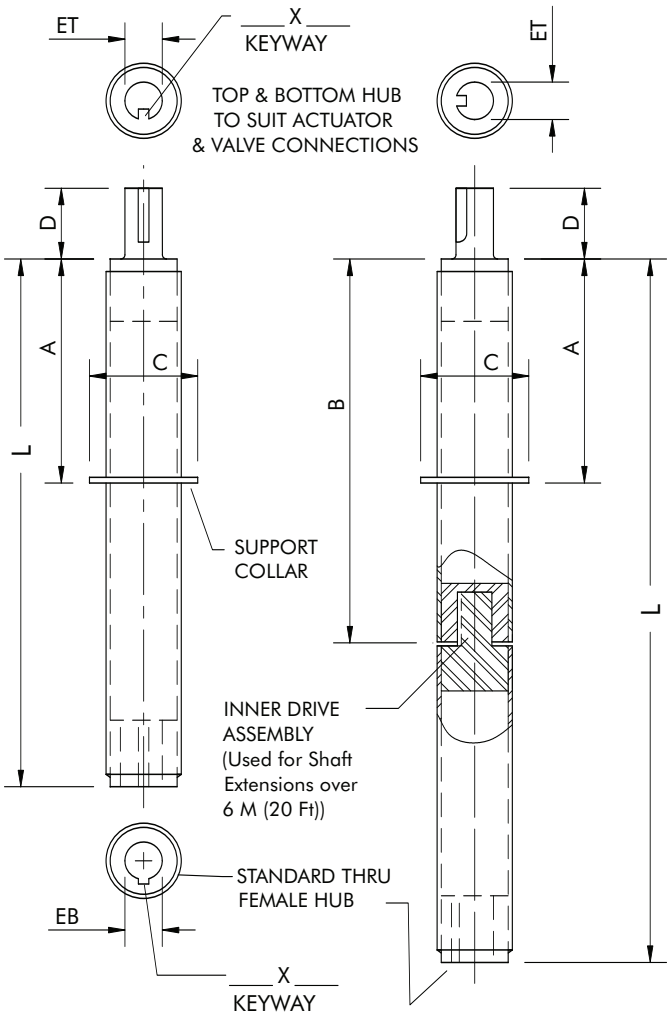
Quantity: _____

Diameter: _____ Schedule: _____

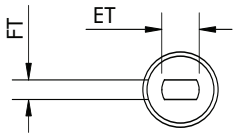
Maximum Torsional Deflection: _____

NOTE : CORE HOLE MUST BE GREATER THAN 'C' DIMENSION OR LOWER HUB DIAMETER, WHICH EVER IS GREATER

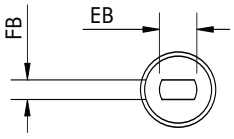
UNDER 6 M (20 FT) OVER 6 M (20 FT)



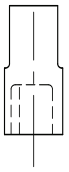
NOTE: Valve Shaft Keyway to be in line with upper hub keyway



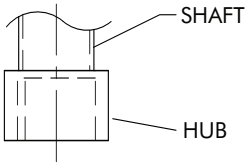
❑ OPTIONAL DOUBLE 'D' TOP



❑ OPTIONAL DOUBLE 'D' BOTTOM



❑ OPTIONAL SEALED FEMALE HUB



❑ OPTIONAL LARGE HUB DESIGN

DIMENSIONS (in inches)

L*	A*	B	C	D	ET	EB	FT	FB	.	.

* INDICATES REQUIRED DIMENSIONS

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sales@stealthvalve.com www.stealthvalve.com

Project Name:

Customer:

P.O.#: S.O.#: Approved by:

Date Released to Production:

Dwg #: STV-SHA-GA-01

Stealth Pedestals & Shaft Extensions - Specifications

The pedestal shall support all shaft extensions. All shaft extensions shall be designed for removal from the valve shaft while under non-flowing pressure. Packing retaining plates shall be incorporated in all designs. Inner tubes shall be manufactured in a steady rest and machined finished and faced. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. Single keyways in the upper and lower hubs only.

Inner Torque Tubes:
All inner torque tubes shall be designed for a maximum allowable torsional deflection of 0.50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube-mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. All inner torque tubes requiring HDG shall be tapped and plugged with stainless steel plugs prior to assembly. Shaft extensions shall be 316 stainless steel unless otherwise noted. Stainless steel extensions do not require plugs. HDG shaft extensions when specified shall incorporate sealing plugs. All length's exceeding 6.5 meters (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive.

Shaft Extension Pedestals:
All pedestals shall be designed to withstand the maximum output torque of the actuator with a maximum torsional deflection of .5 degrees with 610 N–m (450 lbs./ft.) of torque on the input shaft of the actuator. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel nylon coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of 4 mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the total torsional deflection at maximum output torque of the actuator. All extensions and pedestal assemblies shall be manufactured by Stealth International Inc.

STEALTH INTERNATIONAL INC.
A Division of Stealth Valve & Controls Ltd.
1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:		
Customer:		
P.O.#:	S.O.#:	Approved by:
Date Released to Production:	Dwg #: STV-SHA-GA-01	

Stealth Rod Extension - Specification Sheet

Features:

- Solid pin design - double shear
- Solid square or round internal drive
- Pre-drilled for field adjustment
- Modular design, easily field assembled
- Zero deflection

Material:

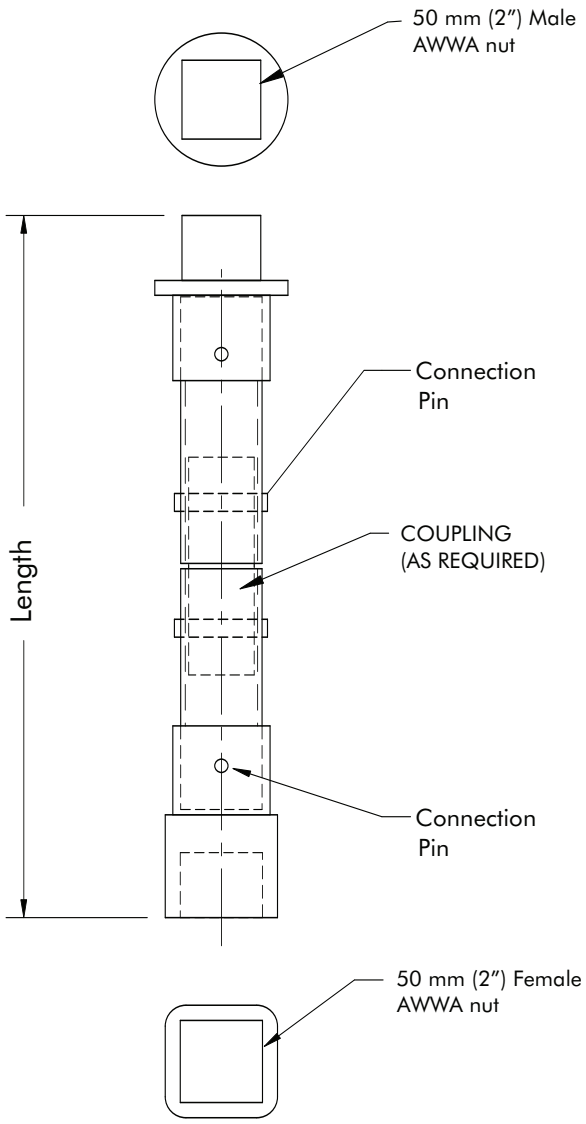
- ❑ Carbon Steel (Epoxy Coated)
- ❑ Carbon Steel (Nylon Coated)
- ❑ Carbon Steel (Hot Dip Galv)
- ❑ 304 Stainless Steel
- ❑ 316 Stainless Steel

Top Connection:	Bottom Connection:
❑ Female AWWA Nut	❑ Female AWWA Nut
❑ Male AWWA Nut	❑ Male AWWA Nut
❑ Other _____	❑ Other _____
_____	_____

Extension:	Coupling: (if required)
❑ Hollow Pipe	❑ Hollow Pipe
❑ Hollow Square	❑ Hollow Square
❑ Solid Round	❑ Solid Round
❑ Solid Square	❑ Solid Square
Diameter: _____	❑ Internal Drive
Schedule: _____	❑ External Couplings
Thickness: _____	Connection Style:
	❑ Thru ❑ Tangential

Quantity: _____

Length: _____



Coupling Options:

❑ Solid (Internal)

❑ Split (square)

❑ Solid

❑ Solid (square)

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Date Released to Production:	Dwg #: STV-ROD-GA-01	

Stealth Rod Extensions - Specifications

The pedestal or wall bracket shall support all rod extensions. All rod extensions shall be designed for removal from the valve shaft without removal of the actuator. Torsional deflection calculations shall be submitted with all bids.

Rod Extension Pedestals:
All pedestals shall be designed to withstand the maximum output torque of the handwheel with a maximum torsional deflection of .5 degrees. All pedestals shall be indicating with vertical or horizontal indicators. Pedestals shall be carbon steel nylon coated in accordance with NSF 61 inside and out or 316 stainless steel. Pedestal bases shall be square and designed for a minimum of 4 mounting bolts. Mounting plate bolts shall be designed for one bolt to accommodate the total shear force based on the total torsional deflection at maximum output torque of the actuator. All handwheels shall be nylon II coated and 300 mm (12 inch) in diameter.

Rod Extensions:
All rod extensions shall be 316/304 stainless steel and coupled using square internal drives. The connecting pins for any two sections shall not be in shear. The connection at the input shaft of the actuator shall be designed with a square drive and rod coupling to accommodate the input shaft of the actuator and full diameter. The input shaft-connecting pin shall be a solid taper pin retained with a lockwasher and nut. The weight of the rod extension shall be supported by the pedestal or wall bracket using delrin or acetyl in conformance to NSF 61.

All wall brackets shall be designed for 600 mm (24 inch) of horizontal adjustment and 150 mm (6 inch) of vertical adjustment on the wall. All brackets shall be designed to carry the full load of the rod extension over the entire length. The wall bracket shall incorporate a positive drive support bearing to prevent rotational ovaling of the rotation and premature failure of the input shaft seal. All rod extension and pedestal assemblies shall be manufactured by Stealth International Inc.

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1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
Phone: 905-845-4500 Fax: 905-845-4505
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Stealth Torque Tube (Free Standing) - Specification Sheet

Features:

- Internal shaft support
- No loading on the valve shaft
- Internal and external corrosion protection
- Stainless steel hubs (standard)
- Optional roller bearings on internal drive

Material:

Carbon Steel (Epoxy Coated)	❑ Inner	❑ Outer
Carbon Steel (Nylon Coated)	❑ Inner	❑ Outer
304 Stainless Steel	❑ Inner	❑ Outer
316 Stainless Steel	❑ Inner	❑ Outer

Actuation: ❑ Pneumatic - Model _____

❑ Gear - Model _____

❑ Electric - Model _____

Note: _____

❑ Mounting Details Attached

Hardware: ❑ Stainless Steel ❑ Galvanized

Pipe Schedule:

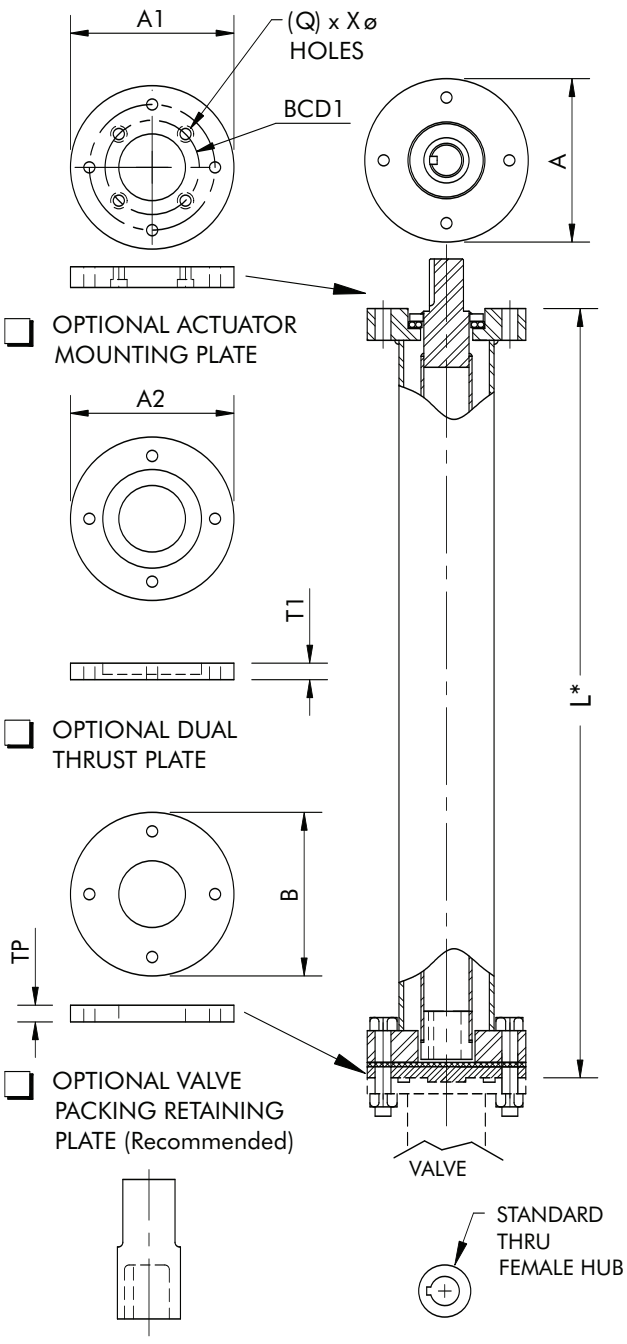
Inner _____ Outer _____

Pipe Diameter:

Inner _____ Outer _____

Maximum Torsional Deflection: _____

Quantity: _____



DIMENSIONS (in inches)

L*	A	A1	A2	T1	TP	Q	X	.	.	.

* INDICATES REQUIRED DIMENSIONS

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A Division of Stealth Valve & Controls Ltd.
1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
Phone: 905-845-4500 Fax: 905-845-4505
sales@stealthvalve.com www.stealthvalve.com

Project Name:

Customer:

P.O.#: S.O.#: Approved by:

Date Released to Production:

Dwg #: STV-TOR-GA-01

Stealth Free Standing Torque Tubes - Specifications

General Assembly:
All torque tubes shall be fabricated preventing the weight of the inner and outer tube from being transmitted to the valve shaft. All inner and outer tubes shall be manufactured in a steady rest and machined finished and faced with all mounting flanges suitable for gasket sealing. Designs causing stagnant water are unacceptable. Torsional deflection calculations shall be submitted with all bids. All welds shall be continuous and full penetration. All torque tubes shall incorporate a permanent stainless steel tag with the maximum allowable torque to be applied to the assembly. All inner shafts shall be supported and designed for removal from the valve shaft while under static pressure. Valve packing retaining plates shall be incorporated in all designs. All torque tubes shall be designed and manufactured in Canada by Stealth International or reviewed equivalent.

Inner Torque tube:
All inner torque tubes shall be designed for a maximum allowable torsional deflection of .50 degrees over the total required length. Both male and female hubs shall be 316 stainless steel, machined on the O.D., and inserted into the inner pipe a minimum of 75 mm (3 inches). All hubs shall be shouldered and fitted to the pipe prior to welding. The male hub shoulder O.D. shall be recessed below the outer tube mounting flange. The female hub length shall be equivalent to the valve shaft height in all cases. The Female hub shall be bored through and double keyed at 90 degrees and engage the entire length of the valve shaft. Blind or capped hubs are not acceptable. When acceptable, all inner torque tubes requiring HDG shall be drilled to prevent explosion. Stainless steel inner torque tubes do not require HDG.

Outer Torque Tube:
All outer torque tubes shall be designed for a maximum allowable torsional deflection of .50 degrees over the total required length. Both mounting flanges shall be aligned to suit the Valve and Actuator bolt patterns on the same axis. Both flanges shall be machined stepped to accommodate the pipe O.D. prior to welding. The upper mounting flange shall be designed to guide the inner male hub with a maximum clearance of 3.2 mm (.125 inches). All outer housing flanges shall be machined faced after assembly. Based on the valve design and mounting trunnion, the upper or lower flange shall incorporate an additional load bearing thrust flange or recess to accommodate the pre assembly of the inner torque tube. The thrust flange shall be 316 stainless steel and incorporate 316 stainless recessed steel mounting hardware. All length's exceeding 6.5 meters (21 feet) shall be coupled using flanges at each length and bolted as an assembly in the field. The internal drive between the connection shall be single key male and female hubs. The flange connection will not serve as the positive drive. Stealth International Inc shall manufacture all torque tubes.

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1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
Phone: 905-845-4500 Fax: 905-845-4505
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Project Name:			
Customer:			
P.O.#:	S.O.#:	Approved by:	
Date Released to Production:	Dwg #: STV-TOR-GA-01		

Stealth Wall Brackets - Specification Sheet

Features:

- Customized bracket spacing
- Non-corrosive bearing guide
- Slotted wall mounting plates for adjustment
- Stainless steel mounting hardware on horizontal guide
- Hinged design for inconsistent wall surfaces

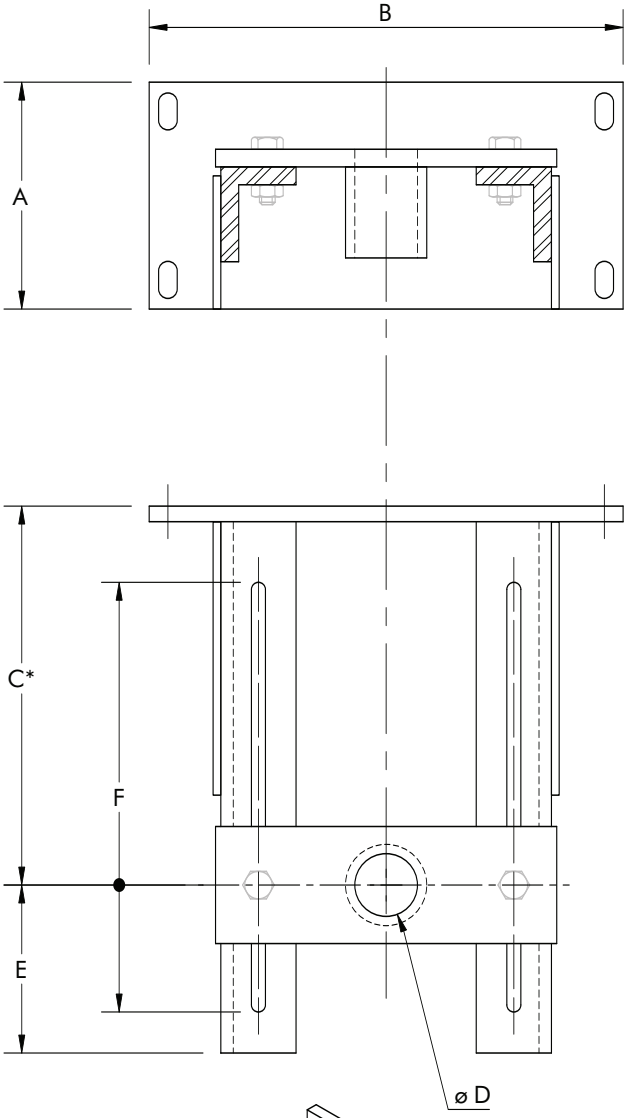
Material: ❑ Carbon Steel (Epoxy Coated)
❑ Carbon Steel (Nylon Coated)
❑ Carbon Steel (Hot Dip Galv)
❑ 304 Stainless Steel
❑ 316 Stainless Steel
❑ Duralon Bearings
❑ Stainless Steel Bearings
❑ Bronze Bearings

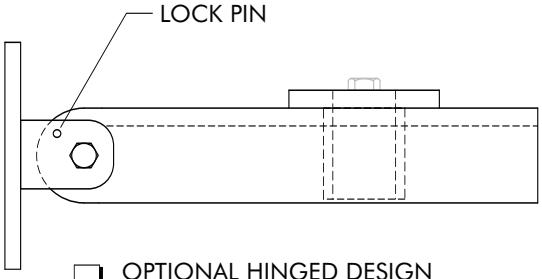
❑ NSF Approved Coating

To Suit: ❑ Shaft Extension (Dia._____)
❑ Rod Extension (SQ._____)

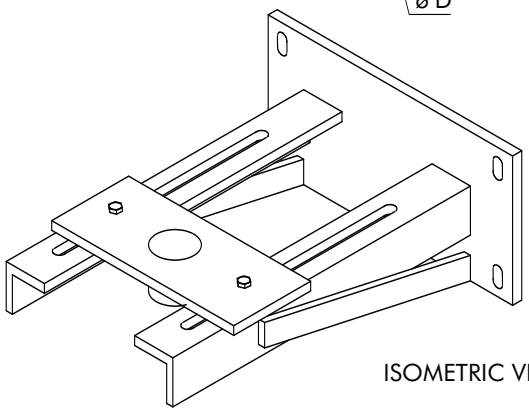
Spacing: _____

Quantity: _____





❑ OPTIONAL HINGED DESIGN WITH LOCK PIN



ISOMETRIC VIEW

DIMENSIONS (in inches)

A	B	C*	D*	E	F

* INDICATES REQUIRED DIMENSIONS

STEALTH INTERNATIONAL INC.
A Division of Stealth Valve & Controls Ltd.
1273 North Service Road East, Unit F7, Oakville, ON, L6H 1A7
Phone: 905-845-4500 Fax: 905-845-4505
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- Damper Valves ❑
- IBC High Energy Dissipating Valves ❑
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- Torque Tube and Shaft Extensions ❑
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Date: August 31, 2005

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ONTARIO – 1273 North Service Road East, Unit F7, Oakville ON L6H 1A7 – TEL 905 845 4500 • FAX 905 845 4505

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BRITISH COLUMBIA – 100 Park Royal, Suite 200, West Vancouver BC V7T 1A2 – TEL 604 922 1855 • FAX 604 922 1355