B10 SLEEVE VALVE

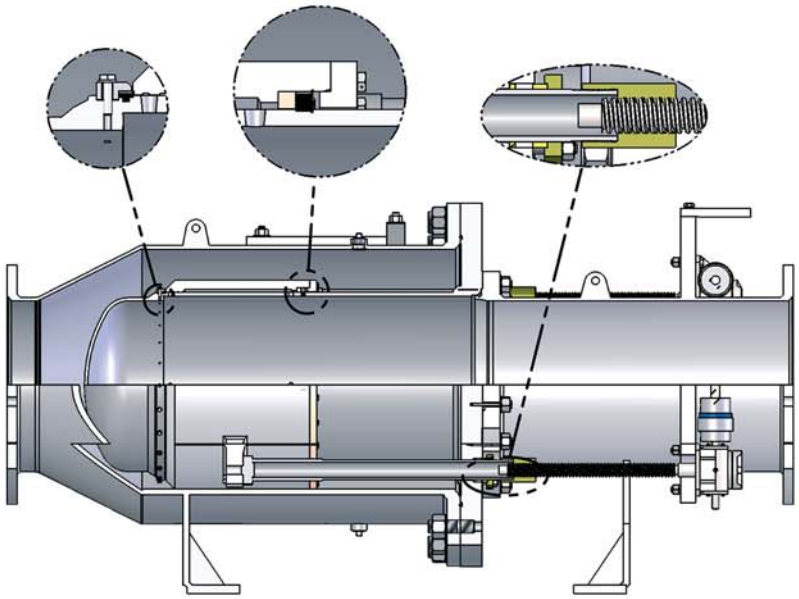
Model B-10 Sleeve Valve
Inline Configuration

BAILEY VALVE INC
moving water forward

INTRODUCTION

The Bailey Valve model B-10 sleeve valve has been designed to incorporate features that provide superior valve performance for inline flow control and pressure reduction application. Typical applications for the model B-10 are water treatment plant flow control, pump control, tank level control, metering vaults reservoir discharge and ground water recharge. The Bailey model B-10 valve dissipates energy and controls flow by diverting the water path over a nose cone into a chamber that is housed between the outer body and the sleeve/gate assembley. The valve modulates flow by sliding an outer pipe called the gate over an inner pipe called the sleeve. The sleeve is designed with multiple sized and spaced tapered nozzles for each specific project.

The design controls cavitation by directing damaging implosions away from any metallic surfaces, thus reducing vibration and noise normally associated with modulating valves. The nozzles are placed within the sleeve in a helical pattern that allows for specifically desired incremental volume change with movement of the gate. Each sleeve nozzle configuration is designed for the application needs to produce superior flow and pressure control over the entire requested flow range. Flow passes through tapered nozzles in the sleeve and energy is dissipated during a mixing process in the center of the valve prior to exiting the valve body. The advance and retract movement of the gate is accomplished through two (2) drive screws or hydraulic cylinders located on each side of the valve. The Bailey Valve model B-10 is capable of flowing from 500 GPM to over 380,000 GPM.



Size Range:
8" (200mm) through 72" (1830mm)

Standard Materials:
Valve Body: Epoxy Coated Carbon Steel
Sleeve: 304 or 316 Stainless Steel
Gate: Stellite Hardfaced 304 or 316 Stainless Steel
Seat Ring: 304 or 316 Stainless Steel
Seals: Buna-N

Pressure Class:

ANSI B16.5	Working Press
Class 150	275 PSI
Class 300	720 PSI
Class 600	1440 PSI

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DATA MODELS

BAILEY VALVE MODEL B-10
CV VERSUS STROKE

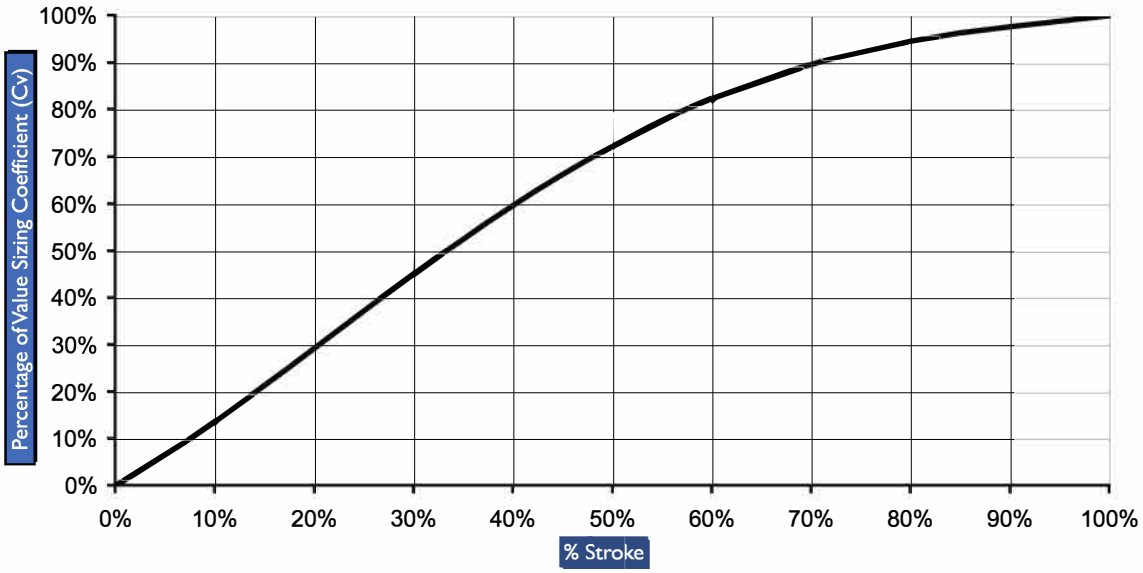


Table 1

Valve Size		Flow Rate (Based on 30 ft/sec port velocity)			
(in)	(mm)	gpm	cfs	mgd	cms
8	200	4698	10.47	6.76	0.30
10	250	7340	16.35	10.57	0.46
12	300	10570	23.55	15.22	0.67
14	350	14387	32.05	20.72	0.91
16	400	18791	41.87	27.06	1.19
18	450	23782	52.99	34.25	1.50
20	500	29361	65.42	42.28	1.85
24	600	42280	94.20	60.88	2.67
30	750	66062	147.19	95.13	4.17
36	900	95130	211.95	136.99	6.00
42	1000	129482	288.49	186.46	8.17
48	1200	169120	376.80	243.53	10.67
54	1400	214042	476.89	308.22	13.51
60	1500	264249	588.75	380.52	16.67
66	1670	319742	712.39	460.43	20.17
72	1820	380519	847.80	547.95	24.01

Table 2

Valve Size		Flow Coefficient (Cv)						
(in)	(mm)	gpm/√psi	cfs/√psi	mgd/√psi	gpm/√ft	cfs/√ft	mgd/√ft	cms/√m
8	200	987	2.20	1.42	650	1.45	0.94	0.07
10	250	1548	3.45	2.23	1019	2.27	1.47	0.12
12	300	2232	4.97	3.21	1469	3.27	2.12	0.17
14	350	3040	6.77	4.38	2001	4.46	2.88	0.23
16	400	3973	8.85	5.72	2615	5.83	3.76	0.30
18	450	5029	11.21	7.24	3310	7.37	4.77	0.38
20	500	6210	13.84	8.94	4087	9.10	5.88	0.47
24	600	8942	19.92	12.88	5885	13.11	8.47	0.67
30	750	13972	31.13	20.12	9195	20.49	13.24	1.05
36	900	20117	44.82	28.97	13239	29.50	19.06	1.51
42	1000	27379	61.00	39.43	18018	40.14	25.95	2.06
48	1200	35756	79.66	51.49	23531	52.43	33.88	2.69
54	1400	45250	100.82	65.16	29779	66.35	42.88	3.40
60	1500	55860	124.46	80.44	36761	81.90	52.94	4.20
66	1670	67585	150.58	97.32	44478	99.10	64.05	5.08
72	1820	80427	179.19	115.82	52929	117.93	76.22	6.05

** Cv values are not guaranteed. They are typical and within 5%*

FEATURES

1:1 Stroke To Diameter Ratio:

- Provides better flow control over short stroke configuration by increasing the sleeve nozzle spacing
- Reduces the risk of oscillating on the seat under low flow and high delta P condition
- Allows for more cavitation dissipation inside valve compared to shorter stroke valves
- Reduces vibration by spreading discharge energy over broader range compared to shorter stroke valves
- High flow turndown allows the use of one valve in lieu of multiple parallel valves.

Stellite Hardfaced Valve Gate:

- Provides superior hard surface edge to reduce high velocity erosion of the seating and wear surfaces
- Creates dissimilar hardness in non-bound mating materials
- Provides leading edge hardness sufficient to shear debris within the nozzle

Custom Valve Configuration:

- Allows for flange matching between valve and associated piping
- Multiple access options
- Valve material options (Carbon Steel, Stainless Steel)

Actuation Configurations:

- Electric Motor Operated
- Oil Hydraulic Operated w/ Hydraulic Power unit
- Water Hydraulic Operated from pipeline pressure

Valve Function:

- Pressure reduction
- Pressure sustaining
- Flow control

SLEEVE VALVE SIZE

Once the Bailey valve configuration (Inline, Y-Pattern, submerged, angle or non-modulating) has been selected, the next step in choosing the best solution for the application is sizing the valve for the operating conditions. This is first done by collecting key data, which will be used to determine the severity of cavitation as indicated by the cavitation index sigma (σ), velocity flow and flow capacities (Cv).

Step 1 - Data

Maximum Flow Rate ➡ Qmax
Inlet Pressure at Qmax ➡ Pi @ Qmax

Outlet Pressure at Qmax ➡ Po @ Qmax
Minimum Flow Rate ➡ Qmin

Inlet Pressure at Qmin ➡ Pi @ Qmin
Outlet Pressure at Qmin ➡ Po @ Qmin

Step 2 - Sigma

The sigma value or cavitation index is calculated and used to configure the performance class of sleeve valve or to determine if alternate options such as ball valves or butterfly valves are acceptable for the application conditions. The following equation is used to calculate the sigma value:

$$\sigma = Po - Pv \,/\, Pi - Po$$

Where:
Pi = Inlet Pressure (psig)
Po = Outlet Pressure (psig)
Pv = Vapor pressure (-14.6 psig for 60°F water at sea level)

** Contact Factory for assistance if σ is less than 0.15*

Step 3 - Velocity Flow

The maximum flow rate (Qmax) is compared to Table 1 to determine the corresponding valve size based on an allowable continuous velocity of 30 ft/sec through the valve port. Higher velocities can be attained for intermittent operating conditions and it is recommended that you contact the factory for sizing. Your flow rate should be rounded up to the next table corresponding value size noted (or recorded). Various units are provided for simplicity.

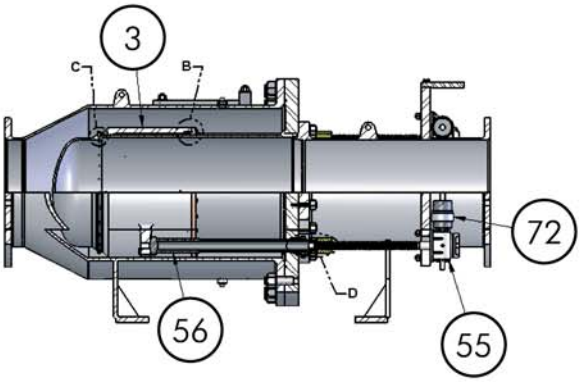
Step 4 - Flow Capacities (Cv)

The maximum flow rate (Qmax) and associated inlet pressure (Pi) and outlet pressure (Po) are used to calculate the required Flow Capacity of Cv of the application. The Cv equation is as follows:

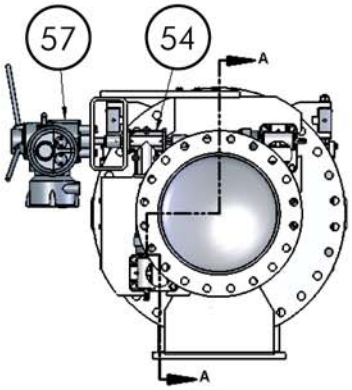
$$Cv = Q \,/\, \sqrt{(Pi\text{-}Po)}$$

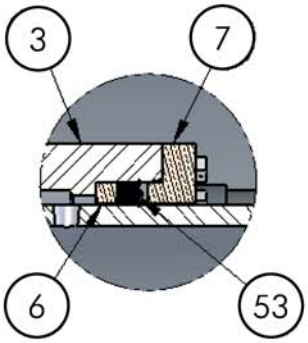
Once the application Cv is calculated from the above equation, a safety factor of 20% is added to the value for valve Cv deviation and potential nozzle fouling from entrapped debris within the flow media. The Cv plus 20% value (C20) is compared to table 2 to determine the appropriate valve size for the application. The chosen valve size must have a higher capacity than the C20 calculated form the operationg conditions. The valve size chosen from the Cv table is then compared to the valve size chosen from the previous table1 and the larger of the two valves is the correct size for the application conditions.

PARTS

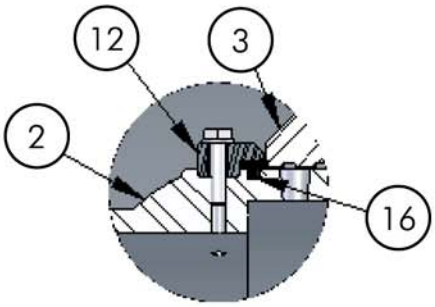


SECTION A-A

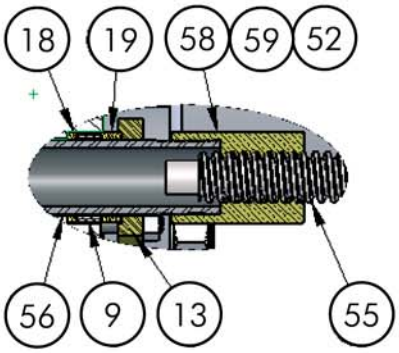




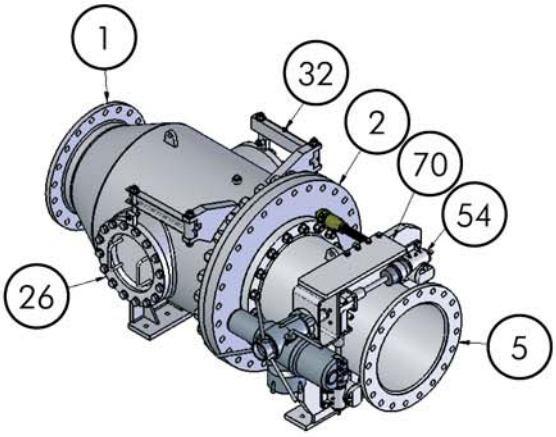
DETAIL B



DETAIL C



DETAIL D

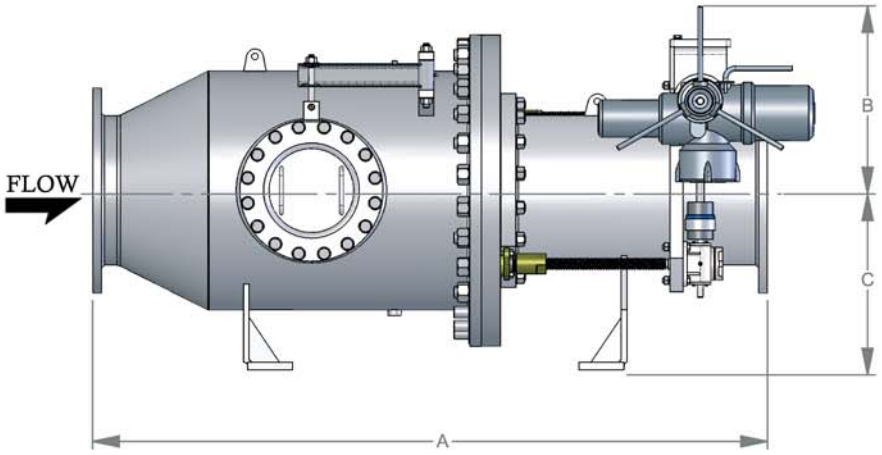


PARTS LIST

Item NO.	Description	Typical Materials
1	Inlet Body	ASTM-A516 Gr 70, ASTM-A36
2	Sleeve	ASTM-A403 Gr 304L, A240 Type 304L, ASTM-A516 Gr 70
3	Gate	ASTM-A240 Type 304L
5	Outlet Body	ASTM-A516 Gr 70, A-36,
6	Scraper Ring	ASTM-B271 Alloy C95200
7	Gland	ASTM-B271 Alloy C95200
9	Packing, 4 Rings + Top & Bottom	Garlock #432
10	Tap-end Stud	ASTM-A193 Grade B7
12	Seat Ring	ASTM-A351 CF3M (316L)
13	Gland	ASTM-A240 Type 304L
14	Hex Bolt-Drilled	316 SS
16	Resilent Seal	70 Durometer Buna-N
18	Scraper Ring	ASTM-B139 Alloy 51000
19	Gland Ring	ASTM B139 Alloy 51000
20	Hex Head Cap Screw	18/8 SS
21	Tap-end Stud	18/8 SS
22	Elastic Stop Nut	18/8 SS
23	Heavy Hex Nut	ASTM-A194 Grade 2H
24	O-Ring	70 Durometer Buna-N
25	Hex Head Cap Screw	18/8 SS
26	Clean-out	ASTM-A516 Gr. 70
27	Hex Head Cap Screw	18/8 SS
28	Hex Head Head Cap Screw	ASTM-A193 Gr B7
29	Hex Head Cap Screw - Drilled	316 SS
30	Shoulder Screw	18/8 SS
31	Flat Washer	18/8 SS
32	Davit Arm	ASTM A36
33	Grease Fitting, 1/8" angle	Plated Steel
34	Flat Washer	Steel
35	Heavy Hex Nut	ASTM-A194 Gr 2H
38	Hex Head Cap Screw -Drilled	316 SS
39	Flat Washer	316 SS
41	Elastic Stop Nut	18/8 SS
42	Tap-end Stud	ASTM-A193 Grade B7
43	Hex Nut	316 SS
44	Flat Washer	Steel
50	O-Ring	70 Durometer Buna-N
51	O-Ring	70 Durameter Buna-N
52	Set Screw	18/8 SS
53	Polypak Seal	Molythane
54	Angle Gear	Andantex R3590
55	Screw Jack	Duff-Norton DM9006
56	Drive Screw Tube	316 SS
57	Actuator	~
58	Lift Nut	ASTM-B148 Alloy 95800
59	Lift Nut Pin	360 Brass, Hard
60	Hex Nut	18/8 SS
61	Rod End	Type 304 Stainless Steel
62	Davit Pivot	ASTM-A276 Type 304L
63	Flat Washer	304 SS
65	Flat Washer	316 SS
70	Actuator Backet	ASTM A36
72	U-Joint/Coupling Assy	Steel
73	Stem Adapter	ASTM A276 Type 304 L
74	Stem Adapter	ASTM A276 Type 304 L
75	Hex Head Cap Screw	304 SS
76	Hex Nut	316 SS
77	Lock Washer - Split Ring	18/8, 304 or 316 SS
78	Lock Washer, Heavy Duty	18/8, 304, or 316 SS
80	Stem Adapter	ASTM A276 Type 304 L
81	Key - Square	18/8 SS
82	Key - Square	18/8 SS
84	Set Screw - Cup Pt. SCHD	18/8 SS
85	Pipe Plug - 3000#	304 SS
86	Retaining Ring-External	SS

Innovative products & improvements are our benchmark.

DIMENSIONS



Valve Size		A		B		C	
(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)
8	200	70	1778	18	457	15	381
10	250	76	1930	20	508	17	432
12	300	82	2083	22	559	19	483
14	350	88	2235	23	584	20	508
16	400	94	2388	24	610	21	533
18	450	100	2540	24	610	22	559
20	500	106	2692	25	635	24	610
24	600	118	2997	27	686	26	660
30	750	136	3454	30	762	29	737
36	900	152	3861	34	864	36	914
42	1000	170	4318	37	940	39	991
48	1200	188	4775	40	1016	43	1092
54	1400	206	5232	44	1118	47	1194
60	1500	224	5690	50	1270	53	1346
72	1800	260	6604	56	1422	60	1524