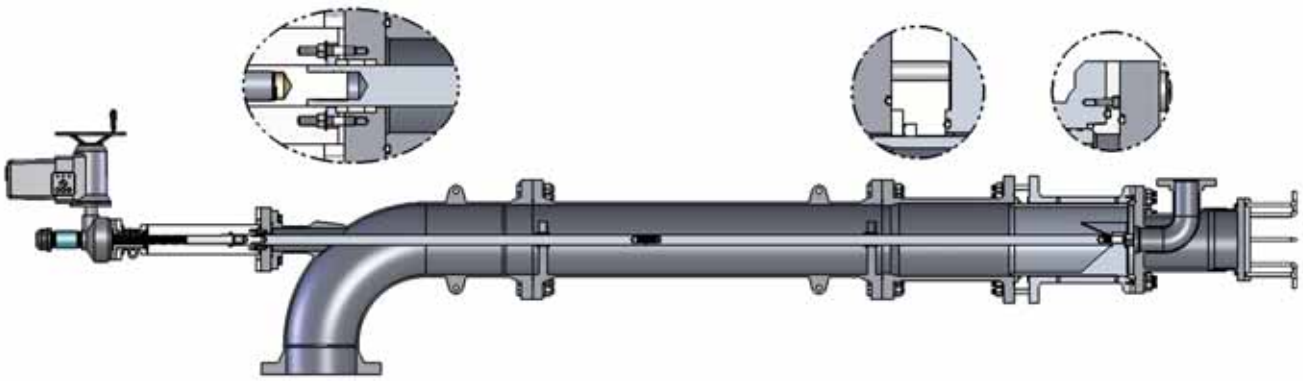
B11 SLEEVE VALVE

Model B-11 Sleeve Valve
Submerged Discharge Configuration

BAILEY VALVE INC
moving water forward

INTRODUCTION

The Bailey Valve model B-11 sleeve valve has been designed to incorporate features that provide superior valve performance for atmospheric or submerged discharge in flow control and pressure reduction applications. Typical applications for the model B-11 are turbine bypass, reservoir discharge and ground water recharge. The Bailey model B-11 valve dissipates energy and controls flow by diverting the water through multiple orifices located within the sleeve and discharging to atmosphere or body of water. The valve modulates flow by sliding one pipe called the gate inside over another pipe called the sleeve. The sleeve is designed with multiple sized and spaced tapered nozzles for each specific project. This 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 pressure control over the entire requested flow range. Flow passes from the inside of the valve out through tapered nozzles in the sleeve and energy is dissipated outside of the valve body. The advance and retract movement of the gate is accomplished through drive screw(s) or hydraulic cylinder(s) located on the top of the valve. The Bailey Valve model B-11 is capable of flowing 500 GPM to over 440,000 GPM.



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

Size Range:
8" (200mm) through 72" (1800mm)

Pressure Class:

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

DATA MODELS

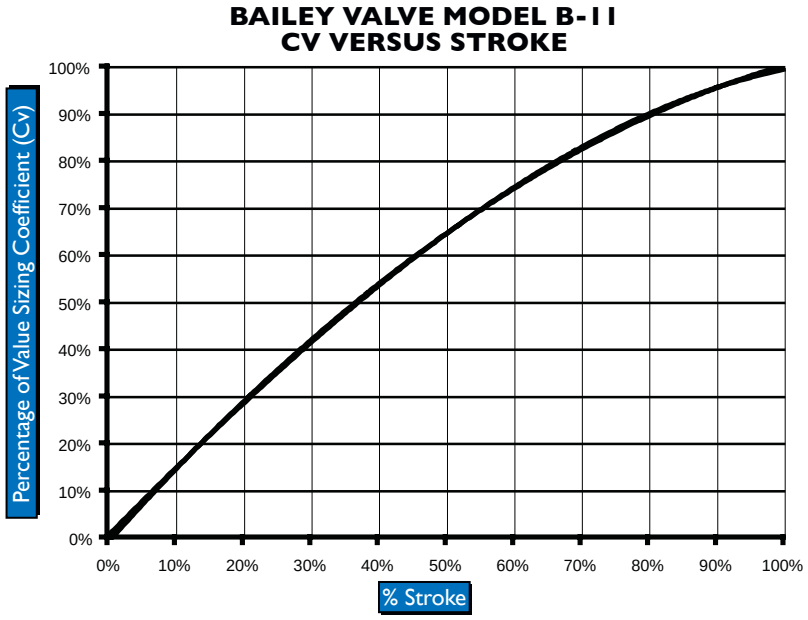


Table 1

Valve Size		Flow Rate (Based on 25 ft/sec Velocity)				Flow Rate (Based on 30 ft/sec Velocity)			
Size	mm	gpm	cfs	mgd	cms	gpm	cfs	mgd	cms
8	200	3920	8.7	5.6	0.25	4700	10.5	6.8	0.30
10	250	6130	13.7	8.8	0.39	7360	16.4	10.6	0.46
12	300	8830	19.7	12.7	0.56	10600	23.6	15.2	0.67
14	350	12000	27	17.2	0.76	14400	32.1	20.7	0.91
16	400	15700	35	23	0.99	18800	41.9	27.0	1.19
18	450	19900	44	29	1.26	23900	53.2	34.3	1.51
20	500	24600	55	35	1.55	29500	65.7	42.4	1.86
24	600	35300	79	51	2.23	42400	94.4	60.9	2.67
30	750	55200	123	79	3.48	66300	147.7	95.3	4.18
36	900	79500	177	114	5.01	95400	212.5	137.1	6.02
42	1000	108000	241	155	6.81	130000	289.5	186.8	8.20
48	1200	141000	314	203	8.89	170000	378.6	244.3	10.72
54	1400	179000	399	257	11.3	215000	478.8	308.9	13.6
60	1500	221000	492	318	13.9	265000	590.2	380.8	16.7
66	1700	266000	592	382	16.8	319000	710.5	458.4	20.1
72	1800	317000	706	455	20.0	380000	846.3	546.0	24.0

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

Table 2

Valve Size		Flow Coefficient (Cv)						
(in)	(mm)	gpm/$\sqrt{psi}$	cfs/$\sqrt{psi}$	mgd/$\sqrt{psi}$	gpm/$\sqrt{ft}$	cfs/$\sqrt{ft}$	mgd/$\sqrt{ft}$	cms/$\sqrt{m}$
8	200	1230	2.74	1.77	810	1.80	1.16	0.09
10	250	1922	4.28	2.76	1265	2.82	1.82	0.14
12	300	2770	6.20	3.98	1824	4.06	2.62	0.21
14	350	3770	8.40	5.42	2482	5.53	3.57	0.28
16	400	4920	11.00	7.07	3239	7.21	4.65	0.37
18	450	6230	13.9	9.0	4102	9.1	5.89	0.47
20	500	7690	17.1	11.0	5063	11.3	7.27	0.58
24	600	11070	24.7	15.9	7288	16.2	10.5	0.83
30	750	17300	38.5	24.9	11390	25.4	16.4	1.30
36	900	24900	55.5	35.8	16394	36.5	23.6	1.87
42	1000	33900	75.5	48.7	22319	49.7	32.1	2.55
48	1200	44300	98.7	63.7	29166	65.0	41.9	3.33
54	1400	56000	125	80.5	36869	82.1	53.0	4.21
60	1500	69200	154	99	45560	101	65.5	5.21
66	1700	83700	186	120	55106	123	79.2	6.30
72	1800	99700	222	143	65640	146	94.3	7.50

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 valve gate
- 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 0.05*

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 25 ft/sec through the inlet elbow or 30 ft/sec through the valve body. 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 size and corresponding value size noted (or recorded). Various units are provided for simplicity.

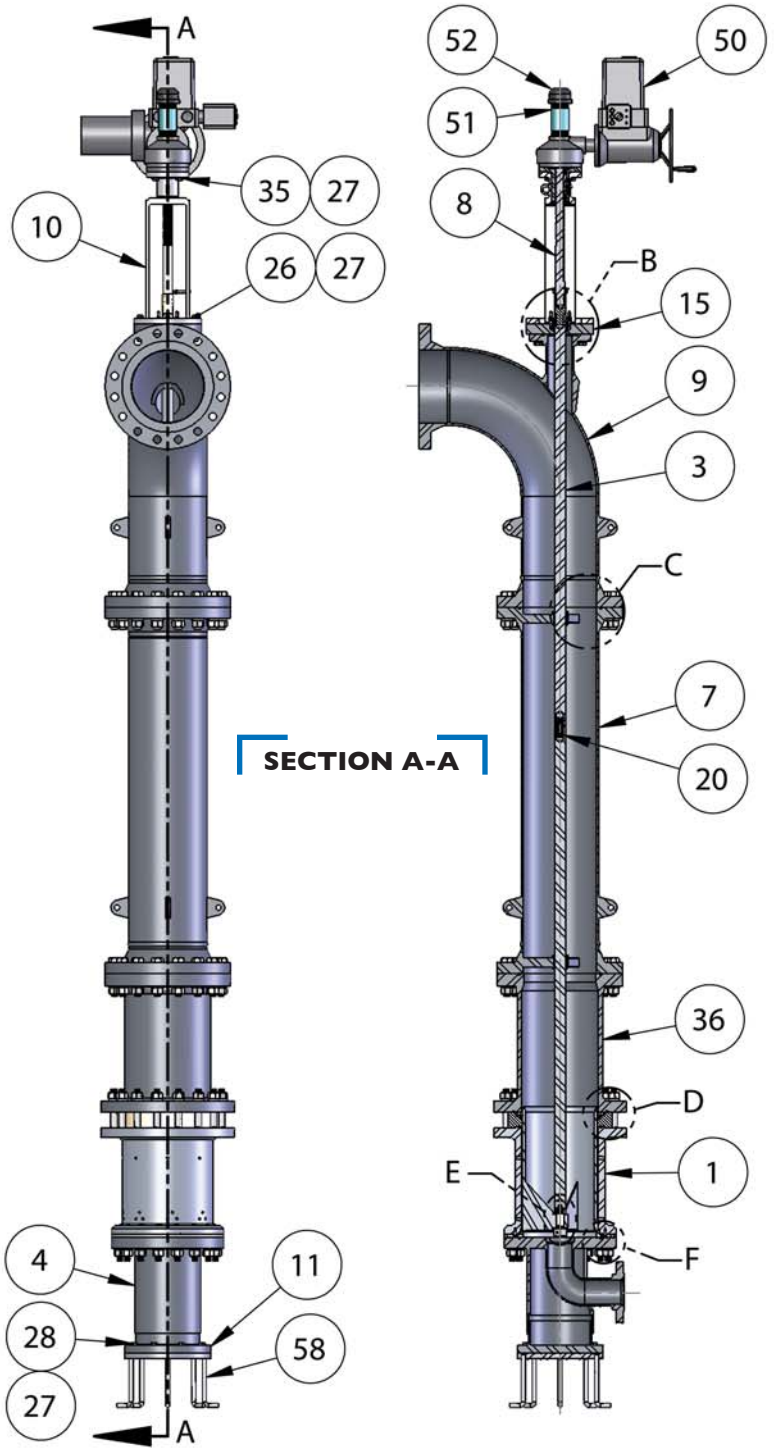
Step 4 - Flow Capacities (Cv)

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:

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

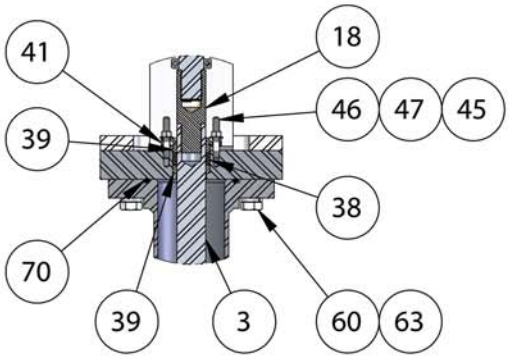
Once the application Cv is calculated from the above equation, a safety factor of 20% is added to the value for valve Cv deviation and potential nozzle fouling from entrapped debris within the flow media. The Cv plus 20% value (C20) is compared to table 2 to determine the appropriate valve size for the 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

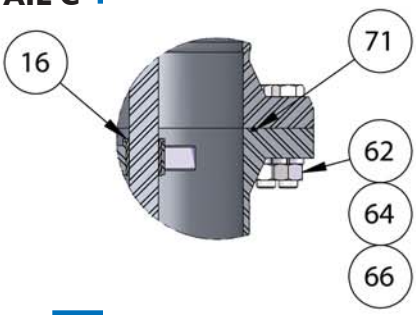


SECTION A-A

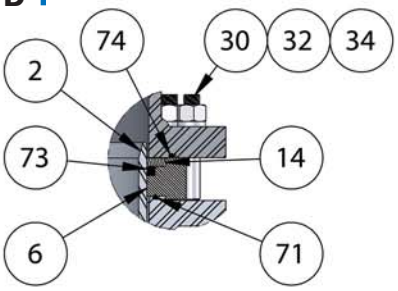
DETAIL B



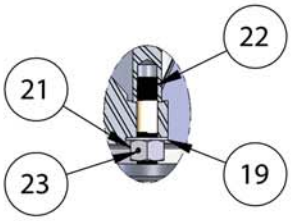
DETAIL C



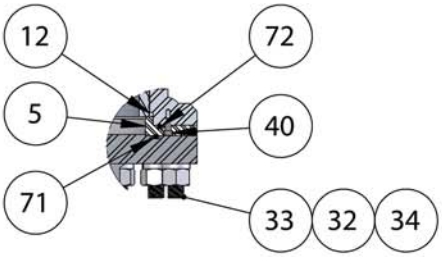
DETAIL D



DETAIL E



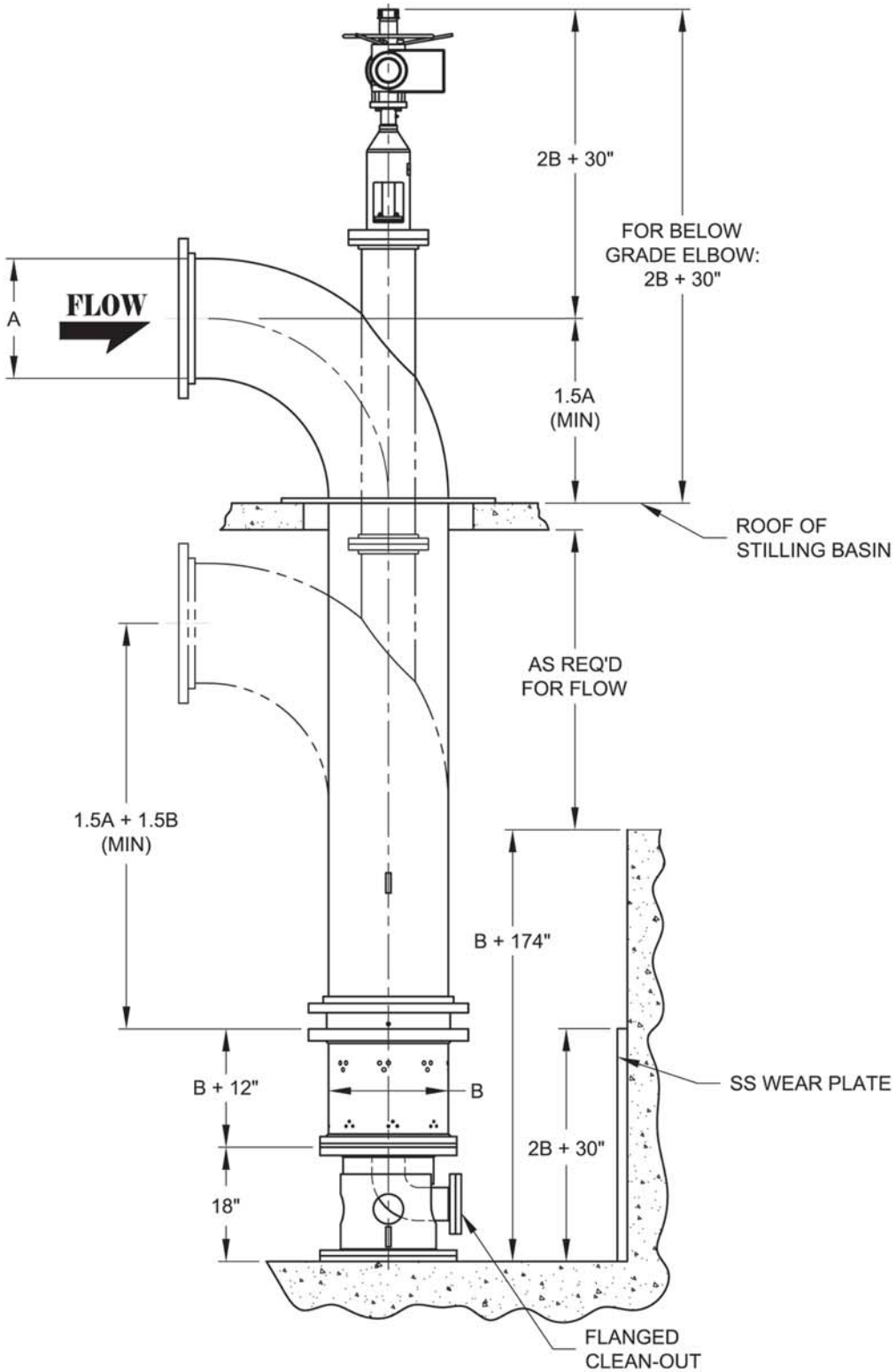
DETAIL F



PARTS LIST

Item NO.	Description	Typical Materials
1	Valve Body	304L SS
2	Valve Gate	304L, Stellite 6
3	Shaft	304L SS
3	Shaft	304L SS
4	Bottom Cover	304L SS
5	Seat Ring	304L SS
6	Bearing	ASTM-B148 Alloy 95200
7	Extension	Steel/304 SS/Bronze
8	Operator Shaft	304L SS
9	Inlet Elbow	Steel
10	Stem Housing	Steel
11	Base	304 SS
12	Seat	Nylon 6/10
13	Collar	316 SS
14	Scraper Ring	Aluminum Bronze
15	Closure Cover	304L SS
16	Guide	Bronze
18	Stem Adapter	Bronze
19	Washer	18/8 SS
20	Stem Stud	Bronze
21	Stem Nut	304 SS
22	Gate Stud	Bronze
23	Set Screw	Stainless Steel
26	Hex Head Cap Screw	316 SS
27	Flat Washer	18/8 SS
28	Hex Bolt	316 SS
30	Tap-End Stud	304 SS
31	Scale	Laminate
32	Lock Washer	18/8, 304, or 316 SS
33	Tap-End Stud	304 SS
34	Heavy Hex Nut	316 SS
35	Hex Bolt	316 SS
38	Packing	Garlock #432
39	Gland Ring	Bronze
40	Socket Head Cap Screw	316 SS
41	Gland	304 SS
42	Torque Device	304 SS
43	Key	Aluminum Bronze
44	Socket Head Cap Screw	304 SS
45	Flat Washer	316 SS
46	Tap-end Stud	18/8 SS
47	Hex Nut	316 SS
48	Socket Head Cap Screw	316 SS
49	Grease Fitting	303 SS
50	Actuator	~
51	Nipple	Galvanized Steel
52	Pipe Cap	Malleable Cast Iron
58	Embed Assembly	304L SS
60	Hex Head Cap Screw	304 SS
62	Hex Nut	304 SS
63	Lock Washer Heavy	18/8, 304 or 316 SS
64	Hex Head Cap Screw	304 SS
66	Lock Washer, Heavy	18/8, 304, 316 SS
70	O-Ring	Buna-N, 70 Duro,
71	O-Ring	70 Durometer Buna-N
72	O-Ring	70 Durometer Buna-N
73	Polypak	Molythane
74	O-Ring	70 Durometer Buna-N

DIMENSIONS


2B + 30"
FOR BELOW GRADE ELBOW: 2B + 30"
A
FLOW
1.5A (MIN)
ROOF OF STILLING BASIN
AS REQ'D FOR FLOW
1.5A + 1.5B (MIN)
B + 174"
B + 12"
B
SS WEAR PLATE
2B + 30"
18"
FLANGED CLEAN-OUT