

## Alternate Measures of Control (AMC) for Secondary Clarifier #2 Confined Space Entry

City of Penticton AWWTP  
March 13, 2015

Appendix A  
Appendix B  
Appendix C  
Appendix D

Professional Engineers Approval  
Drawings of Confined Space  
Valve Specifications  
Pictures

### Alternate Measures Submission Elements:

1. The confined space is an open air circular concrete secondary clarifier. The tank is 25 m in diameter and is just over 4m in depth. The tank floor has a minor slope towards the middle. There are two adjacent pipes; one is a 750 mm gravity feed from the upstream bio reactor. The second feed is a 200 mm pipe that is connected to the suction side of the return pumping system which pumps sludge back to the bio reactor. The purpose for this confined space entry is to replace a 25 year old gear box with a new unit; this work is anticipated to take 3-5 days and is scheduled for the week of April 20<sup>th</sup> 2015. Future entries would be for emergency repairs only. The space will be emptied with pumps and any residual material will be hosed and cleaned out prior to entry, from above.
2. The space cannot be isolated as per specifications in section 9.18. "Double block and bleed" can't be implemented due to the fact that the pipes are all below grade and there is nowhere to safely bleed to. Blind flanging is impractical on the 750 mm gravity lines as it is buried under ground.
3. Glenn Robertson 250-490-2553 [glenn.roberston@penticton.ca](mailto:glenn.roberston@penticton.ca) (City Safety coordinator) administers the Confined Space program for the City of Penticton, Glenn Robertson and Randy Craig 250 490-2559 [randy.craig@penticton.ca](mailto:randy.craig@penticton.ca) (AWWTP Supervisor) prepared the Alternate Measures and Hazard Identification/Risk Assessment
4. Two adjacent pipes are potential hazards for this space;
  - a. A 750 mm gravity feed has a buried butterfly valve which will provide one point of isolation; it was installed in 1990 and is exercised annually. Specification sheet attached Appendix C. Total head of water from the bio reactor (upstream tank) to the bottom of the clarifier is 6.028 m or 8.5 psi of head. The liquid contained in this pipe is from a secondary WWTP

process, which contains many different types of microorganism found in a typical Secondary Wastewater Treatment Plant, temperature range of 12-20 °C and pH of 7.0.

- b. The secondary feed is a 200 mm pipe that feeds a pumping system from the center sump of the tank; it will be isolated by a knife gate that was installed in 2013, engineered drawing attached (Appendix C). The potential head on this knife gate is the same as the 750 mm gravity valve as both valves are holding back the same amount of head. 343.443 m bottom elevation of tank is 337.415 m = 6.028 m or 8.5 psi. The pipe contains the same liquid as the 750 mm.

5. Alternate Measures;

- 750 mm Butterfly is buried and will be closed and locked out. The analysis of valves as a control measure should assume that all valves leak. However, there is no expectation that a properly installed and maintained valve will fail catastrophically if no work is being performed on it. It is recognized that systems will often permit some leakage; a means of pumping out the fluid will be undertaken. The center column that feeds the clarifier will be pumped down to the 90 deg bend (See Appendix B) and visual checks will be performed every 20 minutes while space is occupied, if the water level is observed rising in the stilling well (leakage) that level will be measured and recorded and if required we can pump that liquid out to a safe area. If excessive leakage is observed the confined space will be evacuated and the issue will be addressed prior to re-entry. These duties will be carried out by the assigned standby person who will be stationed at the entrance to the confined space and will be in constant communication with workers inside confined space.
- 200 mm knife gate will be close and locked out. P. Eng. signed drawing attached (Appendix C). Any potential leakage will be monitored in the center sump. Any Leakage will be pump out to a safe area. These duties will be carried out by the assigned standby person who will be stationed at the entrance to the confined space and will be in constant communication with workers inside confined space.
- Medium Hazard Confined Space Entry Procedures will be followed, which includes continuous ventilation and continuous atmospheric monitoring.
- AWWTP Confined Space Emergency Procedure will be followed.

6. Workers will be orientated to AMC and required to sign off on their orientation.
7. AMC will be supervised by AWWTP Supervisor and regular visits documented.
8. Time frame that the AMC needed is 1 year as per Engineers letter.

# Appendix A

## Professional Engineers Approval

# PENTAGON ENGINEERING LTD.

142 PENROSE COURT  
PENTICTON, BC, V2A 9B6  
TELEPHONE: (250) 809-9933

E-MAIL: P-ENG@OUTLOOK.COM

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Date: March 6, 2015

**City of Penticton AWWTP**  
459 Waterloo Ave  
Penticton, BC

**Via email:** randy.craig@penticton.ca

**Attention: Randy Craig**

**RE: Penticton AWWTP – Alternate Measures of Control (AMC), Secondary Clarifier #2**

Dear Mr. Craig,

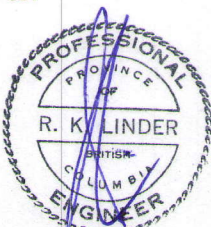
The 200mm knife gate is of adequate engineering, construction and maintenance to hold back the head applied to it for the time required to be in the confined space.

The analysis of buried 750mm valve as a control measure assumes that all valves leak. However, there is no expectation that a properly installed and maintained valve will fail catastrophically if no work is being performed on it which this valve is. It is recognized that systems will often permit some leakage; a means of pumping out the fluid should be undertaken. The stilling well that feeds the clarifier should be pumped empty down to the 90 deg bend and visual checks performed every 20 minutes while space is occupied, if the water level is observed rising in the stilling well (leakage) that level should be measured and recorded and if required pump that liquid out. If excessive leakage is observed the confined space should be evacuated and the issue addressed prior to re-entry.

Given these facts it is our opinion that the proposed AMC for entering the Secondary Clarifier #2 confined is adequate. This AMC is adequate for one year and after that time it should be revisited to ensure its adequacy.

**PENTAGON ENGINEERING LTD.**

Per:



Rob Linder, P.Eng.  
**Director**

## Appendix B

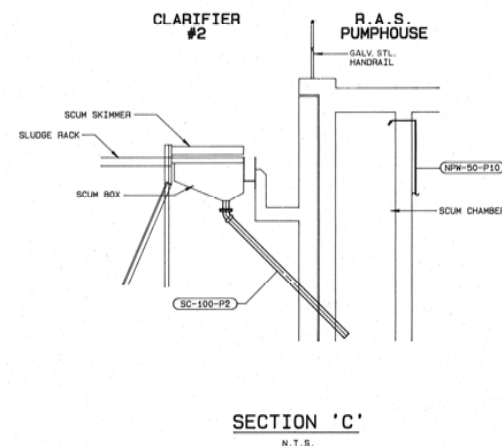
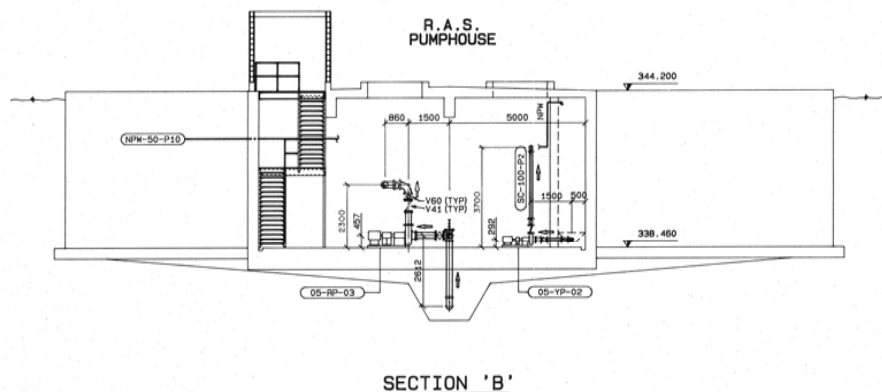
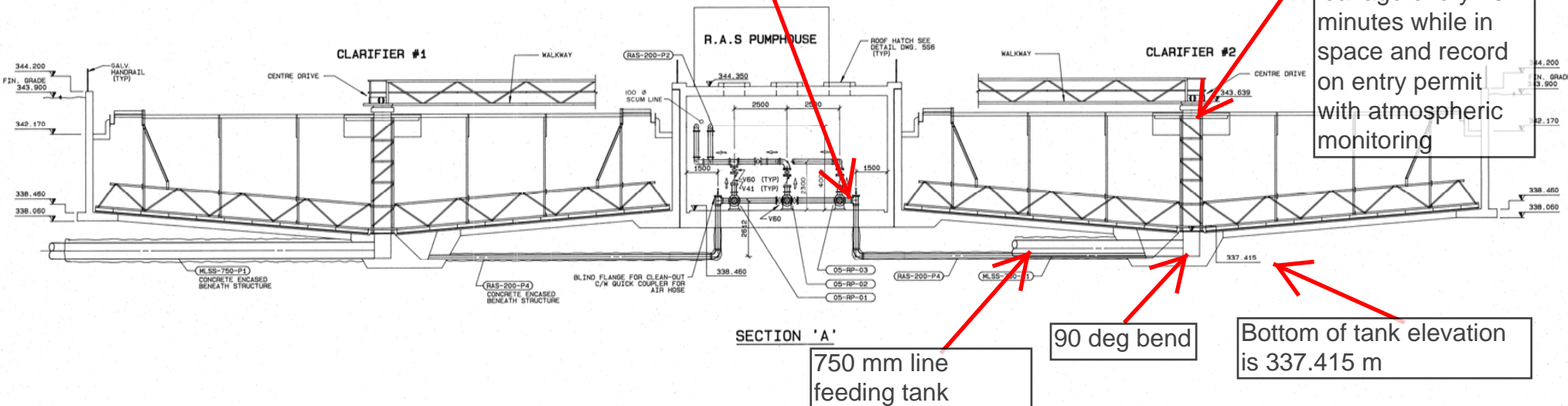
### Drawing of Confined Space



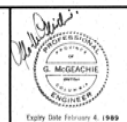
Typical water level of  
bio reactor is 343.443 m

Knife gate isolation

Pump out this 750  
mm column down  
to 90 deg bend and  
observe for  
leakage every 20  
minutes while in  
space and record  
on entry permit  
with atmospheric  
monitoring



		6	MICROFILMED		
		5	PLAN OF RECORD	80/03/20	
		4	APPROVAL FOR CONSTRUCTION	15/05/03	
		3	FOR TENDER	28/09/03	
		2	FOR APPROVAL		
		1	PRELIMINARY	880728	
NO.	DATE	DESCRIPTION	BY	APPROVED	NO.
		REVISIONS			DRAWING STATUS



STANLEY ASSOCIATES ENGINEERING LTD.

DESIGNED BY G. McGEACHIE	APPROVED BY <i>G. McGeachie</i>
DRAWN BY K. STRECKER	CHECKED BY <i>K. Strecker</i>
SCALE 1:100	

CITY OF PENTICTON		DATE DRAWN	880728
ADVANCED WASTEWATER TREATMENT PLANT		SHEET NO.	OF
CONTRACT NUMBER:		JOB NO.	90-319-3
FINAL CLARIFIERS		REVISION	DRAWING
SECTIONS		1	5
		STATUS NO	5P2

# Appendix C

## Valve Specifications

VALVE SIZE		DIMENSIONS													
INCH	MM	INCHES MILLIMETER													
		A	B	C	D	E	F	G	H	J	K	L	M	N	
2	50	4.75	5/8-11 UNC	2	2	.52	3.00	.50	1.88	4.00	6.00	14.93	12.90	8.00	
		13				76	13	48	102	152	379	328	203		
3	80	6.00	5/8-11 UNC	2	2	.52	3.75	.50	2.00	4.75	7.50	16.65	14.62	8.00	
		13				95	13	51	121	191	423	371	203		
4	100	7.50	5/8-11 UNC	6	2	.52	4.50	.50	2.00	5.00	9.75	19.93	16.90	8.00	
		13				114	13	51	127	248	506	429	203		
5	125	8.50	3/4-10 UNC	6	2	.61	5.00	.62	2.25	5.75	10.38	24.32	19.56	12.00	
		15				127	16	57	146	264	618	497	305		
6	150	9.50	3/4-10 UNC	6	2	.66	5.50	.62	2.25	5.75	11.31	25.88	21.07	12.00	
		14				140	16	57	146	287	657	535	305		
8	200	11.75	3/4-10 UNC	6	2	.61	6.75	.62	2.75	6.38	14.00	31.43	24.65	12.00	
		15				171	16	70	162	356	798	626	305		

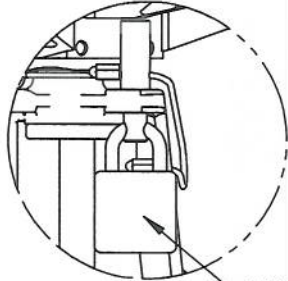
A	VALVE
B	ACTUATOR

#### NOTE:

1. VALVE IS SHOWN IN CLOSED POSITION.
2. VALVE ORDERED WITH THRU BOLTING HAVE ALL HOLES, EXCEPT THOSE THAT ARE BLIND TAPPED, DRILLED TO ANSI STANDARDS CLASS 125 & 150.
3. DRAWING SHOWS FLANGES TAPPED FOR THE USE WITH ANSI FLANGES, FOR USE WITH OTHER THAN ANSI FLANGES SEE A-52587.
4. VEE ORIFICE OPTION IS SHOWN ON DRAWING WITH PHANTOM LINES.
5. INSTALL THE VALVE WITH THE HIGHER PRESSURE AGAINST THE SIDE OPPOSITE THE SEAT WHEN THE VALVE IS CLOSED; EXCEPT AT THE BOTTOM OF DRY MATERIAL STORAGE VESSELS WHERE THE VALVE SHOULD BE INSTALLED WITH THE SEAT UPWARD.

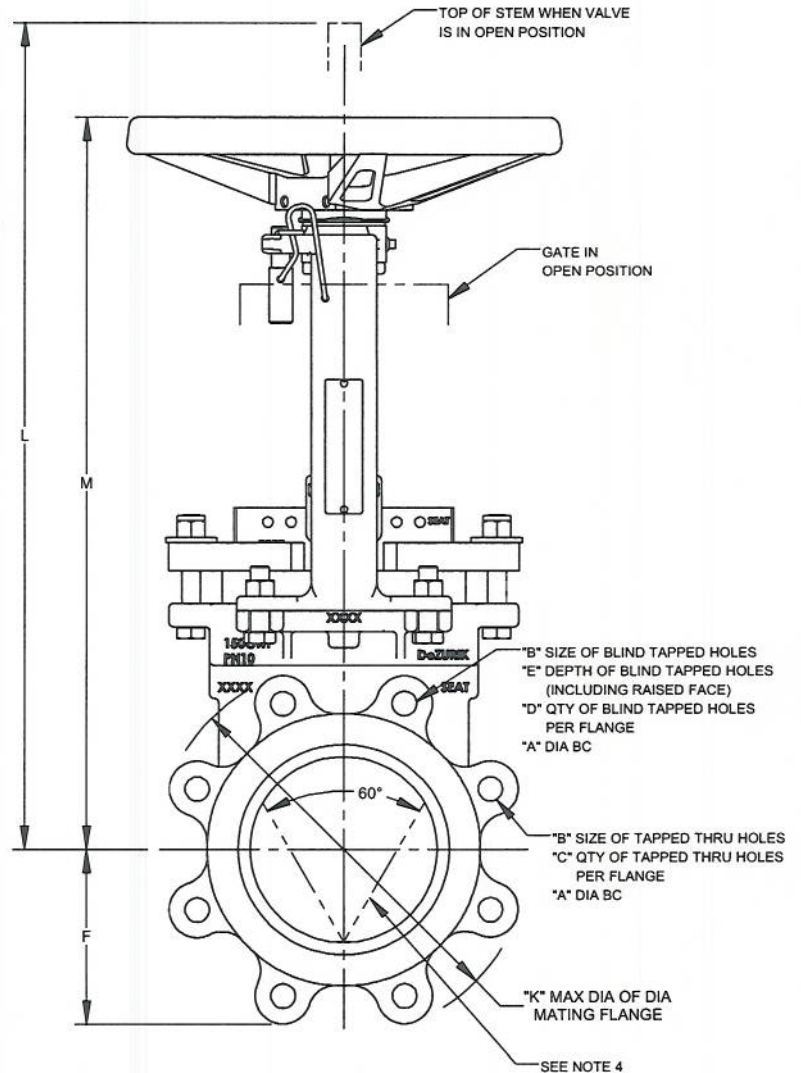
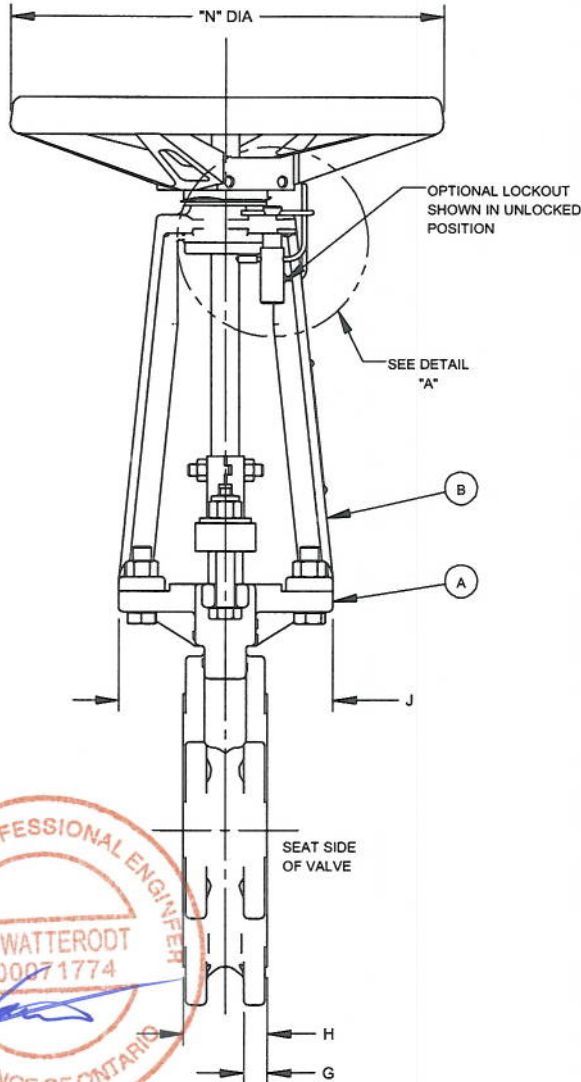
#### NOTICE

THIS DRAWING DOES NOT SHOW ACTUATOR ACCESSORIES, IF ACCESSORIES ARE REQUIRED, REFER TO THE APPROPRIATE ACCESSORY INSTALLATION DRAWING FOR DIMENSIONS AND OTHER RELATED INFORMATION.



DETAIL "A"  
OPTIONAL LOCKOUT  
SHOWN IN LOCKED POSITION

PADLOCK FURNISHED  
BY CUSTOMER



REVISIONS				
REV.	DESCRIPTION	DATE	APPROVED	DRAWN
A	P.C.N. 62428. CHANGED ALL VALUES OF K	1/17/2013	SW	WL

**DeZURIK**  
Sartell, MN USA 56377  
www.dezurik.com

KGC HD KNIFE GATE VALVES SIZE 2 - 8  
MN-HD\_ HANDWHEEL ACTUATED

DOCT. CODE	DRAWN	FHM	APPROVED	RT
C1	CHECKED	RT	DATE	4/20/12

A59086





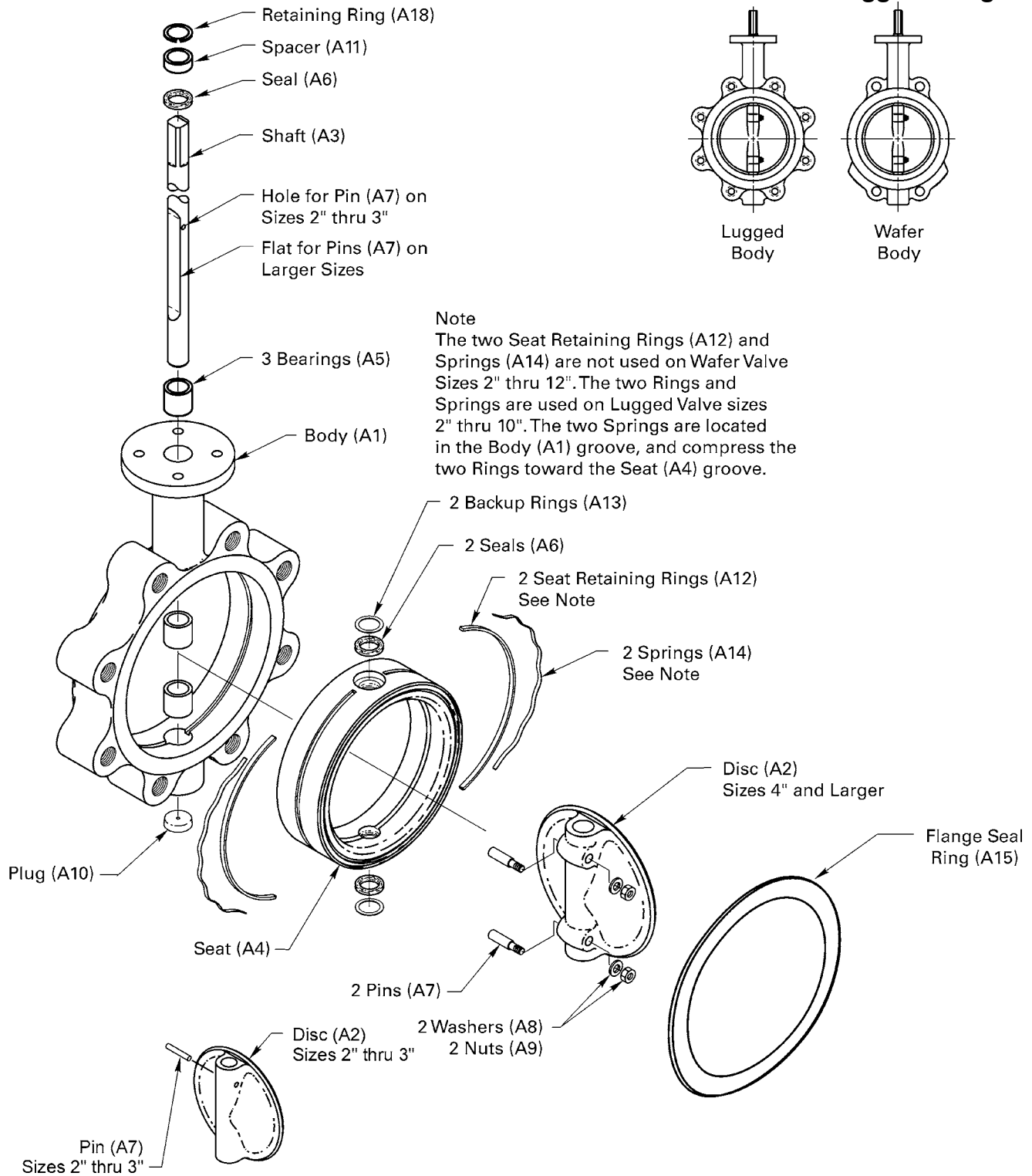
## **BRS RESILIENT SEATED BUTTERFLY VALVE TECHNICAL SPECIFICATIONS**



## Materials of Construction

### 2–20" Valves (50–300mm)

## Wafer and Lugged Designs

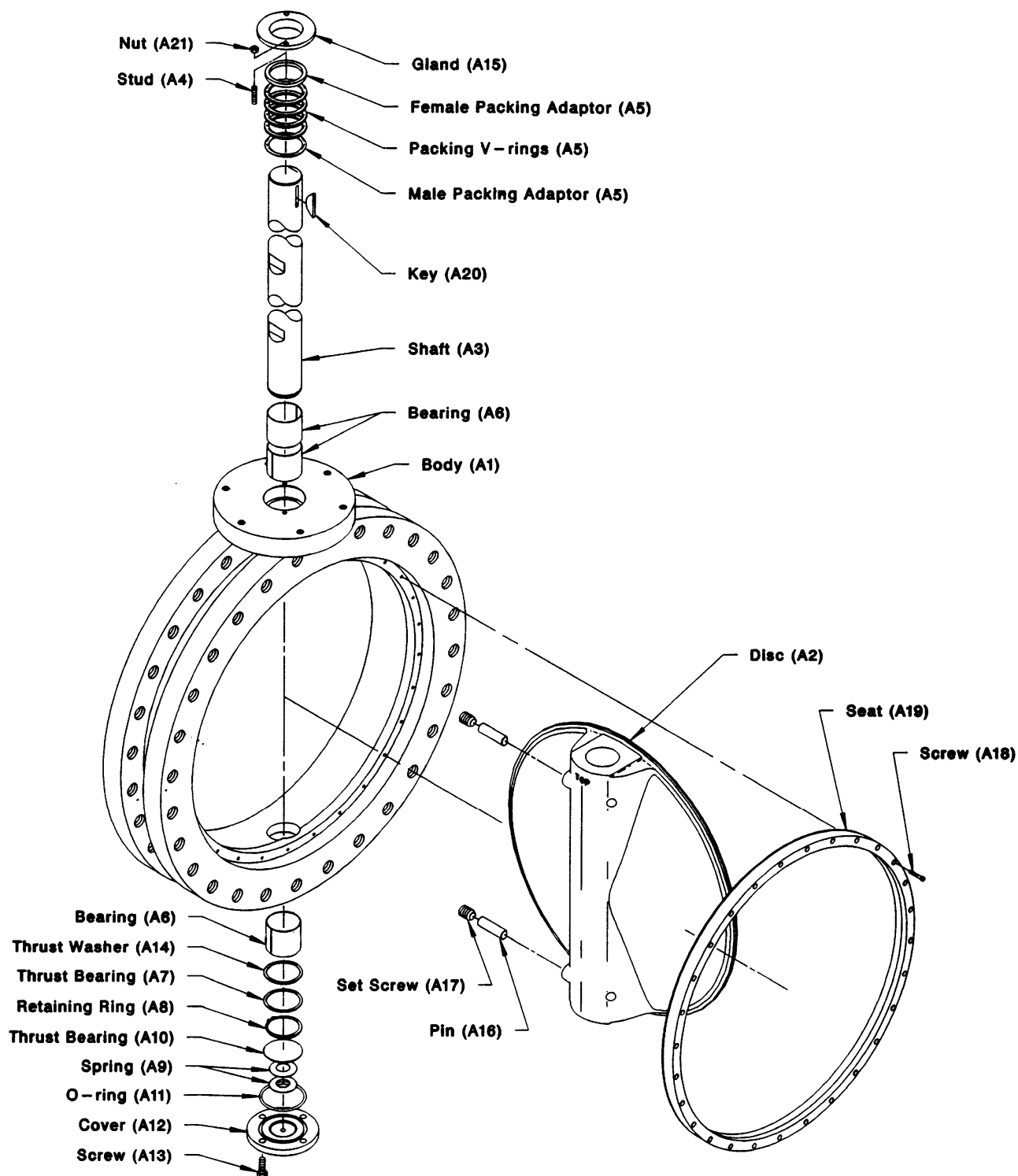


## 2–20" Valves (50–500mm)

Item	Description	Materials
<b>A1</b>	Body	Cast Iron, ASTM A126 Class B
		Ductile Iron, ASTM A536 Grade 65-45-12 (meets AWWA C504)
<b>A2</b>	Disc	Bronze, ASTM B584/B763, Grade C84400
		Ductile Iron electroless nickel plated, ASTM A536 Grade 65-45-12
		Ductile Iron with nickel edge, ASTM A536 Grade 65-45-12 (5–20") (meets AWWA C504)
		316 stainless steel, ASTM 473, Grade CF-8M
<b>A3</b>	Shaft	316 stainless steel, ASTM A276
		416 stainless steel, ASTM A582
<b>A4</b>	Seat	XNBR - Carboxylic-Acrylonitrile-Butadiene
		NBR - Acrylonitrile-Butadiene
		CR - Chloroprene
		EPDM - Ethylene Propylene a Diene Terpolymer
		EU - Polyether Urethane
<b>A5</b>	Bearing	PTFE coated stainless steel
<b>A6</b>	Seal	NBR - Acrylonitrile-Butadiene
		EPDM - Ethylene Propylene a Diene Terpolymer
<b>A7</b>	Pin	316 stainless steel, ASTM A276
<b>A8</b>	Washer, 4–20" Valves	316 stainless steel
<b>A9</b>	Nut, 4–20" Valves	316 stainless steel
<b>A10</b>	Plug	Cold rolled steel, zinc plated
<b>A11</b>	Spacer	316 L stainless steel
<b>A12</b>	Seat Retained Ring 14–20" Wafer Valves 2–20" Lugged Valves	Cold rolled steel
<b>A13</b>	Backup Ring	Teflon
<b>A14</b>	Spring 14–20" Wafer Valves 2–20" Lugged Valves	302 stainless steel
<b>A15</b>	Flange Seal	Carbon steel with adhesive gasket
<b>A16</b>	Thrust Plate (not shown) 16-20 Valves	Steel ASTM A36
<b>A17</b>	Gasket (not shown)	Non-asbestos
<b>A18</b>	Retaining Ring	302 stainless steel

# Materials of Construction

## 24–36" Valves (600–900mm)



**24–36" Valves (600–900mm)**

Item	Description	Material
<b>A1</b>	Body	Cast Iron, ASTM A126 Class B
		Ductile Iron, ASTM A536, Grade 65-45-16 (meets AWWA C504)
<b>A2</b>	Disc	316 stainless steel, ASTM 743, Grade CF-8M
		Bronze, ASTM B584/B763, Grade C84400
		Ductile Iron with nickel edge, ASTM A536, Grade 65-45-12 (meets AWWA C504)
<b>A3</b>	Shaft	316 stainless steel, ASTM A276
		416 stainless steel, ASTM A582
<b>A4</b>	Stud	18-8 stainless steel
<b>A5</b>	Packing	NBR - Acrylonitrile-Butadiene PTFE
<b>A6</b>	Bearing	Fiber reinforced PTFE
<b>A7</b>	Thrust Bearing	Teflon with 304 stainless steel backing
<b>A8</b>	Retaining Ring	302 stainless steel
<b>A9</b>	Spring	302 stainless steel
<b>A10</b>	Thrust Bearing	Teflon with 304 stainless steel backing
<b>A11</b>	O-Ring	NBR - Acrylonitrile-Butadiene
		CMS - Chloro-Sulfonyl-Polyethylene
		FKM - Fluoro Rubber
<b>A12</b>	Cover	Steel, ASTM A36
<b>A13</b>	Screw	Steel, zinc plated
<b>A14</b>	Thrust Bearing	18-8 stainless steel
<b>A15</b>	Gland	Cast Iron, ASTM A236 Class B
<b>A16</b>	Pin	304 stainless steel, ASTM A276
<b>A17</b>	Set Screw	304 stainless steel, ASTM A276
<b>A18</b>	Screw	18-8 stainless steel
<b>A19</b>	Seat Ring	NBR - Acrylonitrile-Butadiene
		CR - Chloroprene
		EPDM - Ethylene Propylene a Diene Terpolymer
		FKM - Fluor Rubber
		EU - Polyether Urethane
	Base Metal	Bronze, ASTM B584/B763
<b>A20</b>	Key	Alloy steel
<b>A21</b>	Locknut	18-8 stainless steel



## Valve Sizing and Ratings

**Cv Values (Flow in GPM of water at 1 psi pressure drop)**

**Kv Valves (Flow in m<sup>3</sup>/hr. of water at 100 kPa pressure drop)**

Valve Size	% Open									
	100	90	80	70	60	50	40	30	20	10
<b>2"</b> <b>50mm</b>	<u>100</u> 87	<u>85</u> 74	<u>67</u> 58	<u>51</u> 44	<u>37</u> 32	<u>25</u> 22	<u>16</u> 14	<u>10</u> 9	<u>5</u> 4	<u>1.8</u> 1.6
<b>2.5"</b> <b>65mm</b>	<u>170</u> 147	<u>145</u> 125	<u>114</u> 99	<u>87</u> 75	<u>63</u> 54	<u>43</u> 37	<u>27</u> 23	<u>16</u> 14	<u>8</u> 7	<u>3.1</u> 2.6
<b>3"</b> <b>80mm</b>	<u>290</u> 251	<u>247</u> 214	<u>194</u> 168	<u>148</u> 128	<u>107</u> 93	<u>73</u> 63	<u>46</u> 40	<u>28</u> 24	<u>22</u> 19	<u>9</u> 7.8
<b>4"</b> <b>100mm</b>	<u>530</u> 458	<u>451</u> 390	<u>355</u> 307	<u>270</u> 234	<u>196</u> 170	<u>133</u> 115	<u>85</u> 74	<u>50</u> 43	<u>24</u> 21	<u>9.5</u> 8.2
<b>5"</b> <b>125mm</b>	<u>860</u> 744	<u>731</u> 632	<u>576</u> 498	<u>439</u> 380	<u>318</u> 275	<u>215</u> 186	<u>138</u> 119	<u>82</u> 71	<u>39</u> 34	<u>15</u> 13
<b>6"</b> <b>150mm</b>	<u>1270</u> 1100	<u>1080</u> 934	<u>851</u> 736	<u>648</u> 561	<u>470</u> 407	<u>318</u> 275	<u>203</u> 176	<u>121</u> 105	<u>57</u> 49	<u>23</u> 20
<b>8"</b> <b>200mm</b>	<u>2550</u> 2200	<u>2170</u> 1880	<u>1710</u> 1480	<u>1300</u> 1130	<u>944</u> 817	<u>638</u> 552	<u>408</u> 353	<u>242</u> 209	<u>115</u> 99	<u>46</u> 40
<b>10"</b> <b>250mm</b>	<u>4020</u> 3480	<u>3420</u> 2960	<u>2690</u> 2330	<u>2050</u> 1770	<u>1490</u> 1290	<u>1005</u> 869	<u>643</u> 556	<u>382</u> 330	<u>181</u> 157	<u>72</u> 62
<b>12"</b> <b>300mm</b>	<u>6090</u> 5270	<u>5180</u> 4480	<u>4080</u> 3530	<u>3110</u> 2690	<u>2250</u> 1950	<u>1520</u> 1320	<u>974</u> 843	<u>579</u> 501	<u>274</u> 237	<u>110</u> 95
<b>14"</b> <b>350mm</b>	<u>7070</u> 6120	<u>6010</u> 5200	<u>4740</u> 4100	<u>3610</u> 3120	<u>2620</u> 2270	<u>1770</u> 1530	<u>1130</u> 977	<u>672</u> 581	<u>318</u> 275	<u>127</u> 110
<b>16"</b> <b>400mm</b>	<u>9550</u> 8260	<u>8120</u> 7020	<u>6400</u> 5540	<u>4870</u> 4210	<u>3530</u> 3050	<u>2390</u> 2067	<u>1530</u> 1320	<u>907</u> 785	<u>430</u> 372	<u>172</u> 149
<b>18"</b> <b>450mm</b>	<u>12100</u> 10500	<u>10300</u> 8910	<u>8110</u> 7020	<u>6170</u> 5340	<u>4480</u> 3880	<u>3030</u> 1970	<u>1940</u> 1680	<u>1150</u> 995	<u>545</u> 471	<u>218</u> 189
<b>20"</b> <b>500mm</b>	<u>15100</u> 13100	<u>12800</u> 11100	<u>10100</u> 8740	<u>7700</u> 6660	<u>5590</u> 4840	<u>3780</u> 3270	<u>2420</u> 2100	<u>1430</u> 1240	<u>680</u> 588	<u>272</u> 235
<b>24"</b> <b>600mm</b>	<u>23100</u> 20000	<u>19600</u> 17000	<u>15500</u> 13400	<u>11300</u> 9780	<u>8550</u> 7400	<u>5780</u> 5000	<u>3700</u> 3200	<u>2200</u> 1900	<u>1040</u> 900	<u>416</u> 360
<b>30"</b> <b>750mm</b>	<u>37200</u> 32200	<u>31600</u> 27300	<u>24900</u> 21500	<u>19000</u> 16400	<u>13800</u> 11900	<u>9300</u> 8045	<u>5950</u> 5150	<u>3530</u> 3050	<u>1670</u> 1440	<u>670</u> 580
<b>36"</b> <b>900mm</b>	<u>53300</u> 46100	<u>45300</u> 39200	<u>35700</u> 30900	<u>27200</u> 23500	<u>19700</u> 17000	<u>13300</u> 11500	<u>8530</u> 7380	<u>5060</u> 4380	<u>2400</u> 2076	<u>960</u> 830

### Pressure Ratings

175 psi CWP (1600kPa CWP). 2–20": Zero-leakage shutoff to 175 psi CWP pressure differential with higher pressure on flat side of disc; zero-leakage tight shutoff to 100 psi pressure differential with higher pressure on curved side of the disc.  
24–36": Zero-leakage shutoff to 175 psi CWP pressure differential with higher pressure on either side of the disc.

### Pipeline Velocity Range

DeZURIK BRS resilient seated butterfly valves can be used at pipeline velocities up to 20 feet per second (6 meters per second). For applications greater than 20 feet per second, contact DeZURIK.

### Valve Weights

Valve Size	Wafer		Lugged	
	Lbs.	Kg.	Lbs.	Kg.
2" (50mm)	8	4	10	5
2.5" (65mm)	10	5	12	6
3" (80mm)	11	5	14	6
4" (100mm)	18	8	21	10
5" (125mm)	22	10	26	12
6" (150mm)	28	13	33	15
8" (200mm)	42	19	52	24
10" (250mm)	59	27	72	33
12" (300mm)	99	45	125	57
14" (350mm)	120	54	155	70
16" (400mm)	180	82	255	116
18" (450mm)	250	113	330	150
20" (500mm)	331	150	446	202
24"*(600mm)	640	290	795	361
30"*(750mm)	990	449	1335	606
36"*(900mm)	1585	719	2125	964

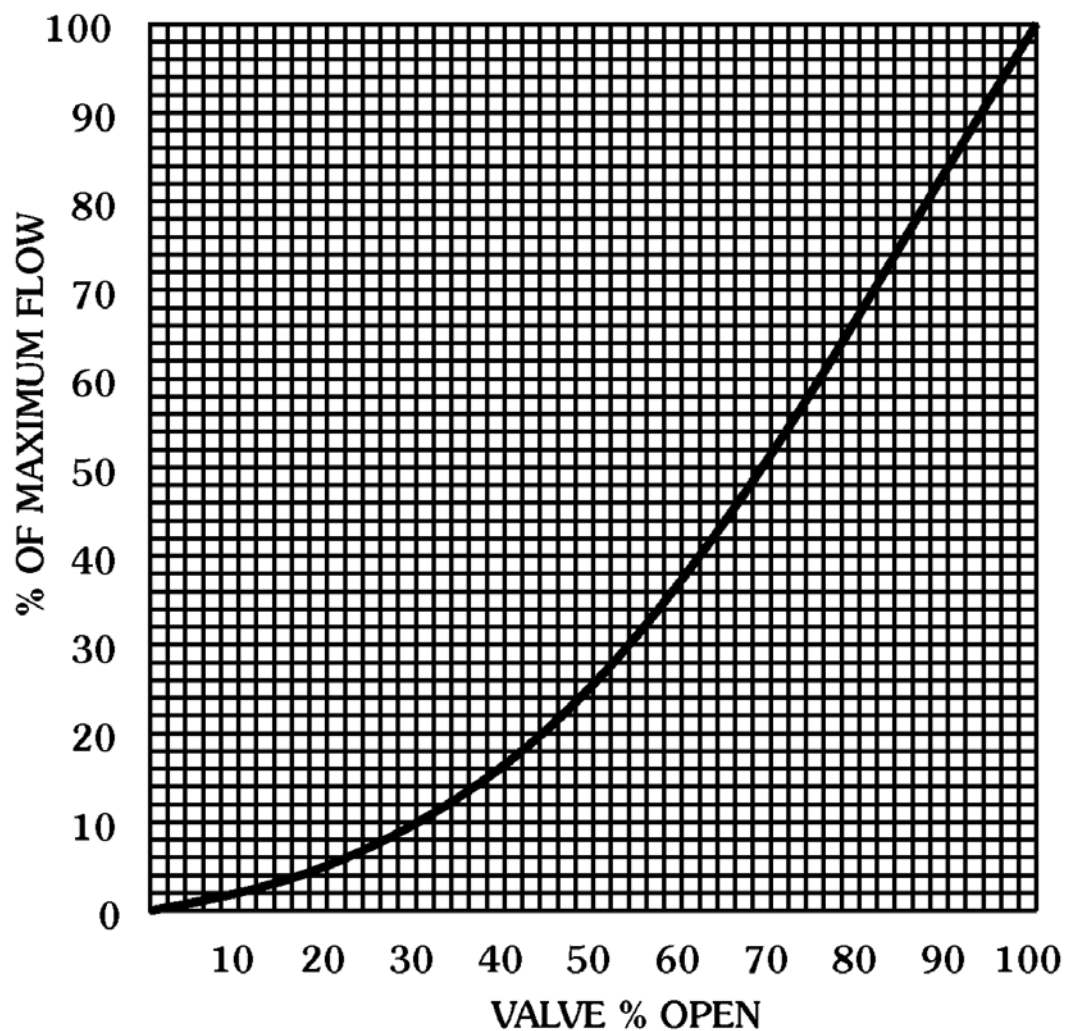
\*Add to valve weights above if valve has bronze disc.

24" (600mm) - 35lbs (15.9 kg), 30" (750mm) - 75lbs(34.0 kg),

36" (900mm) - 135 lbs (61.2 kg)

## Flow Characteristic

### Inherent Flow Characteristics



### Applicable Standards

<b>ANSI B16.1</b>	Conforms to ANSI Class 125 flange drilling, material, testing and exceeds the wall thickness.
<b>ANSI B16.5</b>	Conforms to ANSI Class 150 flange drilling.
<b>ANSI B16.104</b>	Exceeds Class VI shutoff requirements.
<b>AWWA Class 75B</b>	Diameter of stainless steel shaft meets AWWA Class 75B standard.
<b>AWWA Class 150B</b>	Body wall thickness exceeds the AWWA Class 150B standard for butterfly valves.
<b>AWWA C504</b>	The welded nickel edge on the 4–36" cast iron disc conforms to AWWA C504.
<b>MSS SP-25</b>	Markings and identification conform to the requirements.
<b>International Flange Drilling</b>	<p>Metric 10 bar flange drilling (W110 and L110) conforms to NP10 requirements of International Standard ISO 2084, to the 10 bar requirements of British Standard 4504 and to the NP10 requirements of German Standard DIN 2532.</p> <p>Ten bar flange drilling (W1J1 and L1J1) conforms to Japanese Industrial Standard JIS B2210.</p>

## Ordering

To order, simply complete the valve order code from the information shown. An ordering example is shown for your reference.

<b>BRS</b>	<b>6,</b>	<b>W1,</b>	<b>CI,</b>	<b>NBR,</b>	<b>NBR,</b>	<b>CI-</b>	<b>S4</b>	<b>*</b>
Valve Style	Valve Size	End Style	Body Material	Seat Material	Shaft Seal	Disc Material	Shaft Material	Actuator Code
							Trim Combination	

### Valve Style

Give size code as follows:

BRS = Butterfly Rubber Seated - Includes flange seals thru 20"

### Valve Size

Give size code as follows:

2 = 2" (50mm)	12 = 12" (300mm)
2.5 = 2.5" (65mm)	14 = 14" (350mm)
3 = 3" (80mm)	16 = 16" (400mm)
4 = 4" (100mm)	18 = 18" (450mm)
5 = 5" (125mm)	20 = 20" (500mm)
6 = 6" (150mm)	24 = 24" (600mm)
8 = 8" (200mm)	30 = 30" (750mm)
10 = 10" (250mm)	36 = 36" (900mm)

### End Connection

Give end connection code as follows:

#### Lugged

L1 = ANSI Class 125
L110 = Lugged DIN 10 or BS 4504/10
L116 = Lugged DIN 16 or BS 4504/16
L1D = Lugged B.S.D.
L1E = Lugged B.S.E.
L1J1 = Lugged JIS 10

#### Wafer

W1 = ANSI Class 125
W110 = Wafer DIN 10 or BS 4504/10
W116 = Wafer DIN 16 or BS 4504/16
W1D = Wafer B.S.D.
W1E = Wafer B.S.E.
W1J1 = Wafer JIS 10

Other end connections available upon request.

### Body Material

Give body material code as follows:

CI = Cast Iron
DI = Ductile Iron

### Seat Material

Give seat material code as follows:

#### 2-20" Valves

XNBR = Carboxylic-Acrylonitrile Butadiene 0 to 180°F (-18 to 83°C)
NBR = Acrylonitrile Butadiene to 180°F (83°C)
CR = Chloroprene, to 180°F (83°C)
EPDM = Terpolymer of Ehtylene Propylene & a Diene - 20 to 250°F (-28 to 122°C)
EU = Polyether Urethane, to 130°F (54°C)

#### 24-36" Valves

CR = Chloroprene, to 180°F (83°C)
NBR = Acrylonitrile Butadiene to 180°F (83°C)
EPDM = Terpolymer of Ehtylene Propylene & a Diene - 20 to 250°F (-28 to 122°C)
EU = Polyether Urethane, to 130°F (54°C)
FKM = Fluoro Rubber, to 300°F (149°C)

### Shaft Seal

Give shaft code as follows:

#### 2-20" Valve Sizes-Standard:

NBR = Acrylonitrile Butadiene to 180°F (83°C) For use with all seats except CSM & EPDM
EPDM = Terpolymer of Ehtylene Propylene & a Diene - 20 to 250°F (-28 to 122°C) For use with EPDM Seat only

#### 24-36" Valve Sizes:

NBR = Acrylonitrile Butadiene to 180°F (83°C) For use with all seats except KFM and EPDM
T = PTFE, to 500°F (260°C)

### Trim Combination

#### Disc Material

Give disc material code as follows:

#### Standard 2-36":

BZ = Bronze (must use S4 shaft)
DI = Ductile Iron (must use S4 shaft) 2-4" are electroless nickel plated 5-36" have welded nickel edge
S2 = 316 stainless steel (must use S2 shaft)

#### Undercut Discs 2-20":

For 25 psig uni-directional shutoff. Contact DeZURIK for up to 100 psi shutoff. Larger sizes on application.

BZU = Undercut Bronze (must use S4 shaft)
DIU = Undercut Ductile Iron (must use S4 shaft) 2-4" are electroless nickel plated 5-36" have welded nickel edge
S2U = Undercut 316 stainless (must use S2 shaft)

#### Shaft Material:

Give shaft material code as follows:

S2 = 316 stainless steel. Use with 316 stainless steel discs.
S4 = 416 stainless steel. Use with bronze, cast iron and ductile iron discs.

Note: The limiting factor in valve selection is the temperature limit of the shaft seal or seat.

### Options

#### Flange Seals

##### Standard:

= leave field blank for carbon steel flange seals(set of 2)

##### Special:

FS = 316 stainless steel flange seals (set of 2)

## Actuators

### Lever Actuators

#### Ten Position Levers

A 10-position dial provides positive latching in open, closed and eight intermediate positions. A pointer indicates position of disc plus a notch in the handle allows use of a padlock to prevent unauthorized valve operation. An optional adjustable memory stop is available to allow the valve to be closed and reopened to the same position.

#### Infinite-Position Levers

Throttling position is adjustable with infinite-position levers. Tightening the threaded shaft against the dial plate holds the disc in any desired position. A graduated dial indicates the disc position. Available with optional adjustable memory stop.

#### Ordering

To order, add lever code to basic valve identification. Handwheel actuators are recommended for valves above 6" (150mm) and where water hammer may occur due to a sudden valve closure.

##### Ordering Example:

BRS,6,W1,DI,NBR,DI-S4\*LT

#### Memory Stop

An adjustable memory stop is available which allows return of the valve to preset open position after shutoff. Order the memory stop as part of complete valve by adding "ST" after the actuator code.

##### Ordering Example:

BRS,6,W1,DI,NBR,DI-S4\*LT,ST

#### Manual Gear Actuators

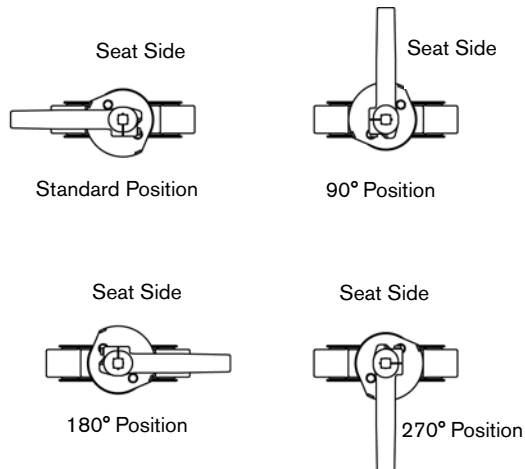
Manual gear actuators are available in cast iron construction. They feature sintered bronze bearings on each end of the input shaft for durability and performance.

#### Lever Actuator Sizing

Lever Style	Size Range	Order Code
10 Position Lever	2-6" (50-150mm)	LT
	8-12" (200-300mm)	LT
Infinite Position Lever	2-6" (50-150mm)	LI

#### Mounting

Lever actuators can be mounted on standard, 90°, 180°, and 270° clockwise from standard. Specify mounting positions other than standard below the valve and actuator identification.



## PowerRac® Cylinder Actuators

PowerRac® double-acting and spring-return actuators feature a proven rack-and-pinion design. PowerRac® provides high torque output throughout the full stroke for accurate control.



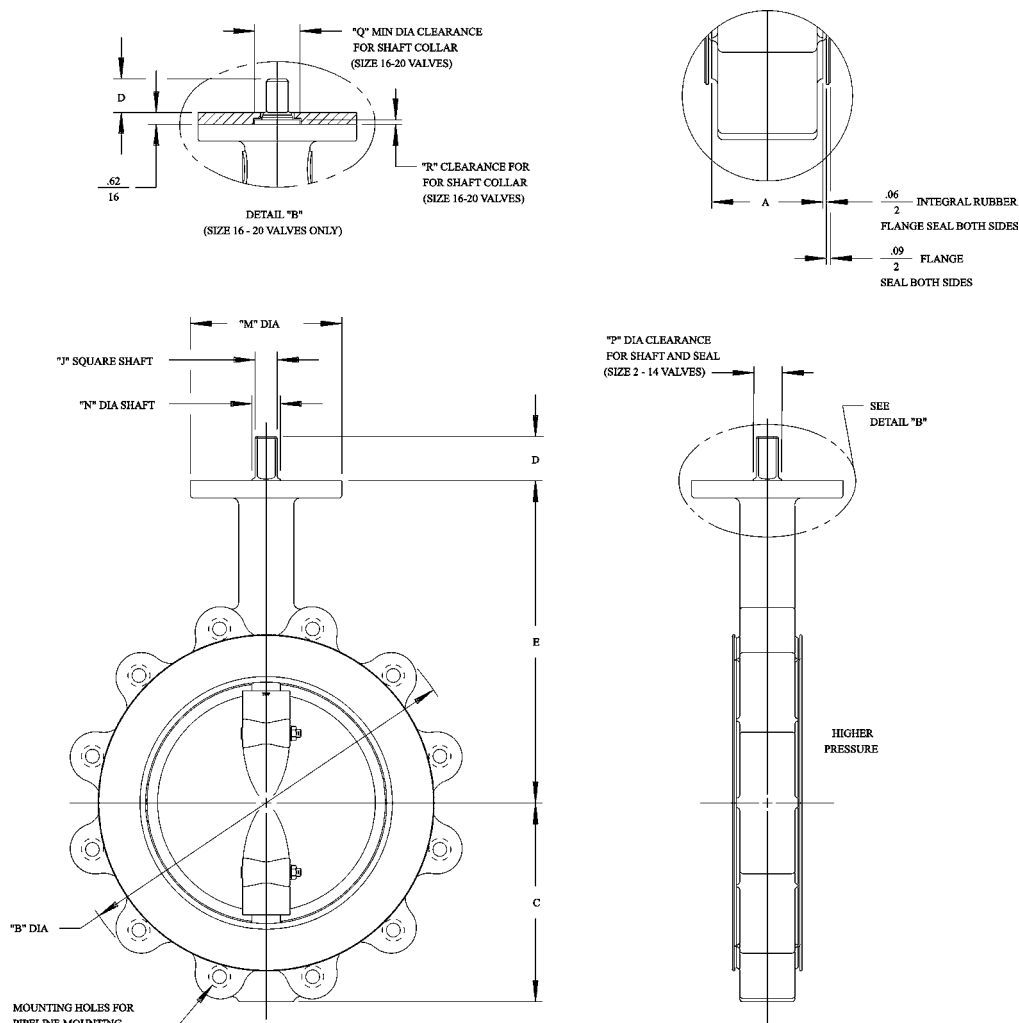
## Spring Diaphragm Actuators

DeZURIK spring-diaphragm actuators feature all steel, cast iron and stainless steel construction with no aluminum parts to corrode in caustic environments. The output shaft is supported at the top and bottom with bronze bearings that absorb side thrust and ensure smooth, efficient throttling control. Diaphragm actuators provide on-off or modulating control with either spring-to-open or spring-to-close operation. All diaphragm actuators feature external position indication and are available with safety lockout devices.



## Compak Cylinder Actuators

Compak actuators are a versatile rack-and-pinion design and are available as double-acting or spring-return units. The compact, modular design allows the actuator to be mounted for a low profile assembly. Compak actuators are matched to each valve's torque requirements to ensure that the most economical valve and actuator package is specified.

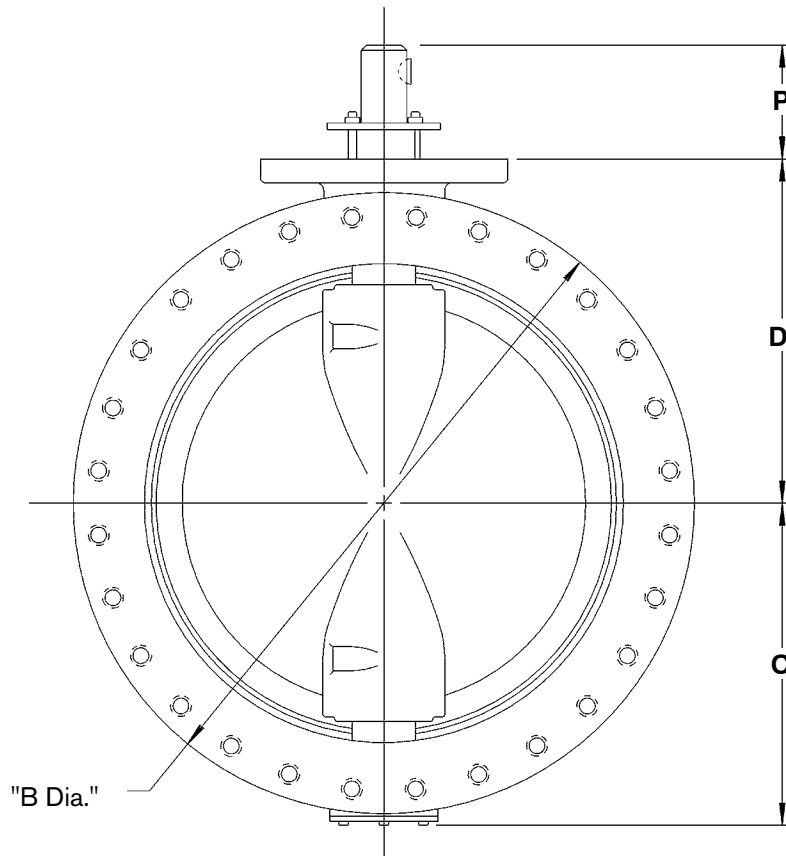


## Basic Valve 2–20" (50–500mm)

Dimensions																
Valve Size	A	B		C	D	E	J-Square		M	N Diameter		P		Q	R	
		Lugged	Wafer				Inches	mm		Inches	mm	Inches	mm		Inches	mm
<b>2"</b> <b>50mm</b>	<u>1.56</u> 40	<u>6.00</u> 152	<u>4.06</u> 103	<u>2.94</u> 75	<u>1.75</u> 44	<u>5.50</u> 140	<u>.405</u> .403	<u>10.29</u> 10.24	<u>4.00</u> 102	<u>.499</u> .497	<u>12.67</u> 12.62	<u>.500</u> .530	<u>12.70</u> 13.46	–	–	–
<b>2.5"</b> <b>65mm</b>	<u>1.75</u> 44	<u>6.75</u> 171	<u>4.81</u> 122	<u>3.19</u> 81	<u>1.75</u> 44	<u>6.12</u> 155	<u>.405</u> .403	<u>10.29</u> 10.24	<u>4.00</u> 102	<u>.499</u> .497	<u>12.67</u> 12.62	<u>.500</u> .530	<u>12.70</u> 13.46	–	–	–
<b>3"</b> 80mm	<u>1.75</u> 44	<u>7.25</u> 184	<u>5.31</u> 135	<u>3.50</u> 89	<u>1.75</u> 44	<u>6.50</u> 1650	<u>.405</u> .403	<u>12.67</u> 12.62	<u>4.00</u> 102	<u>.499</u> .497	<u>12.67</u> 12.62	<u>.500</u> .530	<u>12.70</u> 13.46	–	–	–
<b>4"</b> <b>100mm</b>	<u>2.00</u> 51	<u>8.75</u> 222	<u>6.81</u> 173	<u>4.12</u> 105	<u>1.75</u> 44	<u>7.12</u> 181	<u>.499</u> .497	<u>15.84</u> 15.80	<u>4.00</u> 102	<u>.622</u> .620	<u>15.80</u> 19.00	<u>.625</u> .655	<u>15.88</u> 16.64	–	–	–
<b>5"</b> <b>125mm</b>	<u>2.06</u> 52	<u>10.00</u> 254	<u>7.68</u> 195	<u>4.75</u> 121	<u>1.75</u> 44	<u>7.12</u> 181	<u>.624</u> .622	<u>15.84</u> 15.80	<u>4.00</u> 102	<u>.748</u> 0746	<u>19.00</u> 18.95	<u>.750</u> .780	<u>19.05</u> 19.81	–	–	–
<b>6"</b> <b>150mm</b>	<u>2.06</u> 52	<u>11.00</u> 279	<u>8.68</u> 220	<u>5.50</u> 140	<u>1.75</u> 44	<u>8.62</u> 219	<u>.624</u> .622	<u>17.42</u> 17.37	<u>4.00</u> 102	<u>.748</u> .746	<u>19.00</u> 18.95	<u>.750</u> .780	<u>19.05</u> 19.81	–	–	–
<b>8"</b> <b>200mm</b>	<u>2.50</u> 64	<u>13.38</u> 340	<u>10.94</u> 278	<u>6.69</u> 170	<u>1.75</u> 44	<u>11.62</u> 295	<u>.686</u> .684	<u>22.20</u> 22.15	<u>6.00</u> 152	<u>.873</u> .871	<u>22.17</u> 22.12	<u>.875</u> .905	<u>22.22</u> 22.99	–	–	–
<b>10"</b> <b>250mm</b>	<u>2.50</u> 64	<u>16.00</u> 406	<u>13.31</u> 338	<u>7.88</u> 200	<u>1.75</u> 44	<u>12.75</u> 324	<u>.874</u> .872	<u>23.77</u> 23.72	<u>6.00</u> 152	<u>1.123</u> 1.121	<u>28.52</u> 28.47	<u>1.125</u> 1.155	<u>28.58</u> 29.34	–	–	–
<b>12"</b> <b>300mm</b>	<u>3.00</u> 76	<u>18.88</u> 480	<u>16.06</u> 408	<u>9.06</u> 230	<u>1.75</u> 44	<u>14.25</u> 362	<u>.936</u> .934	<u>30.15</u> 30.02	<u>6.00</u> 152	<u>1.252</u> 1.250	<u>31.80</u> 31.75	<u>1.254</u> 1.284	<u>31.85</u> 32.61	–	–	–
<b>14"</b> <b>350mm</b>	<u>3.00</u> 76	<u>20.88</u> 530	<u>17.68</u> 449	<u>10.00</u> 254	<u>1.75</u> 44	<u>14.50</u> 368	<u>1.187</u> 1.182	<u>30.15</u> 30.02	<u>8.31</u> 211	<u>1.496</u> 1.494	<u>38.00</u> 37.94	<u>1.498</u> 1.528	<u>38.05</u> 38.81	–	–	–
<b>16"</b> <b>400mm</b>	<u>3.50</u> 89	<u>23.50</u> 597	<u>20.19</u> 513	<u>11.75</u> 298	<u>1.75</u> 44	<u>15.75</u> 400	<u>1.187</u> 1.182	<u>30.15</u> 30.02	<u>8.31</u> 211	<u>1.485</u> 1.465	<u>37.72</u> 37.21	–	–	<u>2.44</u> 62	<u>.250</u> .252	<u>6.35</u> 6.40
<b>18"</b> <b>450mm</b>	<u>4.25</u> 108	<u>25.12</u> 638	<u>21.56</u> 548	<u>12.81</u> 325	<u>1.75</u> 44	<u>16.62</u> 422	<u>1.499</u> 1.493	<u>38.07</u> 37.92	<u>8.31</u> 211	<u>1.850</u> 1.840	<u>47.24</u> 46.74	–	–	<u>2.81</u> 71	<u>.312</u> .314	<u>7.92</u> 7.98
<b>20"</b> <b>500mm</b>	<u>4.25</u> 108	<u>27.50</u> 699	<u>23.81</u> 605	<u>14.06</u> 357	<u>1.75</u> 44	<u>18.88</u> 480	<u>1.749</u> 1.744	<u>44.42</u> 44.30	<u>8.31</u> 211	<u>2.225</u> 2.205	<u>56.52</u> 56.00	–	–	<u>3.19</u> 81	<u>.312</u> .314	<u>7.92</u> 7.98



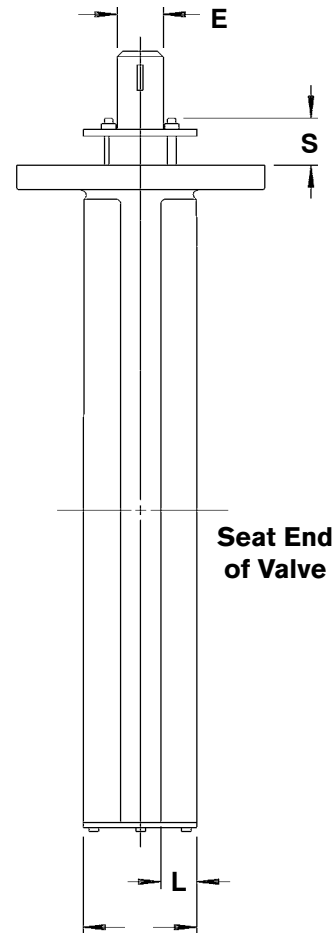
# Dimensions



## Basic Valve 24–36" (600–900mm)

Valve Size	A	B		C	D	E	P	S
		Lugged	Wafer					
24" 600mm	6.25 159	32.00 813	26.50 673	17.62 448	20.00 508	2.50 64	6.62 168	1.50 38
30" 750mm	7.38 187	38.75 984	33.00 838	20.38 518	21.88 556	3.00 76	6.62 168	1.38 35
36" 900mm	9.00 229	46.00 1168	39.50 1003	24.12 613	26.25 667	3.62 92	6.62 168	1.38 35

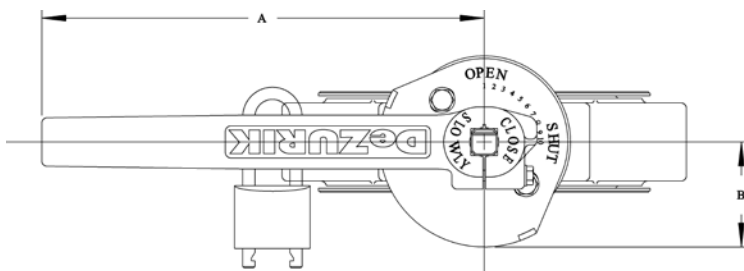
Inches  
millimeter



## 10 - Position Lever

Dimensions			
Valve Size	A	B	C
<b>2-6"</b> <b>50-150mm</b>	$\frac{10.25}{260}$	$\frac{2.44}{62}$	$\frac{1.62}{41}$
<b>8-12"</b> <b>200-300mm</b>	$\frac{22.00}{550}$	$\frac{3.38}{86}$	$\frac{1.81}{46}$

Inches  
millimeter



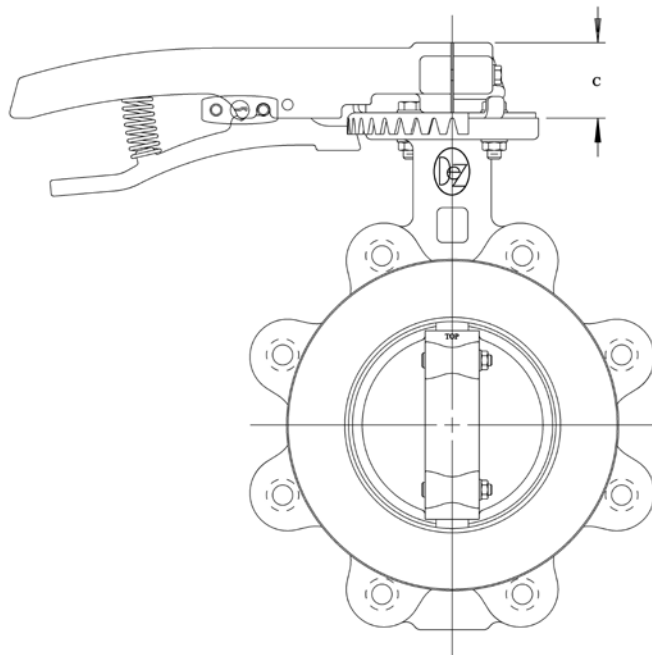
## Infinite - Position Lever

Dimensions			
Valve Size	A	B	C
<b>2-6"</b> <b>50-150mm</b>	$\frac{10.25}{260}$	$\frac{2.44}{62}$	$\frac{1.62}{41}$

Note: All dimensions are subject to change without notice. Request certified drawings for use in preparing piping layouts.

## Actuator Dimensions

Refer to the appropriate actuator bulletin for dimensional information.



## Sales and Service

For information about our worldwide locations, approvals, certifications and local representative:

Web Site: [www.dezurik.com](http://www.dezurik.com) E-Mail: [info@dezurik.com](mailto:info@dezurik.com)




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*DeZURIK reserves the right to incorporate our latest design and material changes without notice or obligation. Design features, materials of construction and dimensional data, as described in this bulletin, are provided for your information only and should not be relied upon unless confirmed in writing by DeZURIK. Certified drawings are available upon request.*

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# Appendix D

## Pictures



Knife gate to  
isolate suction side  
of pumps installed  
in 2013

The image shows a complex industrial pump assembly. A large orange pipe runs horizontally across the foreground. A red valve with a handwheel is mounted on this pipe. To the right, a vertical pump assembly is visible, featuring a blue handwheel and a yellow tag. A blue hose is coiled on the floor. The background consists of wooden walls and other industrial equipment.

To bottom of Secondary  
Clarifier





This is the butterfly valve that isolates the secondary clarifier installed in 1990