



# Precision Control Technology

## Control-TEK Series

The Ultimate Butterfly Control Valve

### Z-Disc Control Valve

**Size:**  
2"-8"

**Temperature:**  
-30°F to +300°F

**Pressure:**  
ANSI Class 150

### Unique Design Features

- Equal Percentage flow characteristic.
- Identical flow pattern in either flow direction.
- Unaffected by fluid induced dynamic torque problems.
- Low breakaway torque.
- High flow capacity
- Space saving face-to-face dimensions.
- Tight shut off, ANSI Class VI.
- Also available in sanitary version.

Hi-Tek's unique Z-DISC design allows for the use of Butterfly Control Valves in applications never before possible.



Patented Z-DISC

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## FEATURES OF Z-DISC CONTROL VALVE

This novel rotary control valve offers four unique and special features unavailable with competitive products:

1. The distinct vane seats in an angle to the vertical axis of the valve. This assures extremely low opening torque and avoids "jumping off" the seat during start-up. It allows, "bump less" flow control practically all the way to the point of shut off.
2. The overhanging collars, cooperating with the bore of the valve, provide a gradual, exponential area increase thus creating an "equal percentage" flow characteristic. (See graph)
3. The void created by the overhang eliminates the suction effect typically experienced by flat vanes and responsible for "slamming" at certain travel positions. This vane, in contrast, offers a very low and constant dynamic torque characteristic and therefore stable control.
4. The fact that the vane is perfectly symmetrical allows for installations with flow coming from the left as well as from the right without any alterations of the flow characteristics.



The unique, patented, shape of the Z-DISC vane offers a number of distinct advantages to the user only found in expensive globe style control valves.

### Unique Design:

- Equal Percentage flow characteristic.
- Identical flow pattern in either flow direction.
- Unaffected by fluid induced dynamic torque problems.
- Low breakaway torque.
- High flow capacity
- Space saving face-to-face dimensions.
- Tight shut off, ANSI Class VI.
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### EQUAL PERCENTAGE FLOW CHARACTERISTIC

This type of flow characteristic is preferred in over 80% of all control applications. Since most systems offer hydraulic resistance in pipes, elbows, heat exchanger and the like, the pressure drop across the valve tends to decrease to the square of the flow rate. For example, if the amount of flow doubles, the pressure drop across the valve is cut down by 75%. Here is where the equal percentage flow characteristic shines. Using the above example, the available Cv, or flow area, will increase by a factor of 4 to accommodate reduction in pressure drop while only doubling the valve travel. In other words, it will accomplish a linear relationship between Flow rate and valve travel, what is called a linear "inherent flow characteristic". This in turn assures a constant "gain" of the control loop and thereby eliminates repeated controller tuning.

### UNIFORM FLOW PATTERN IN EITHER DIRECTION

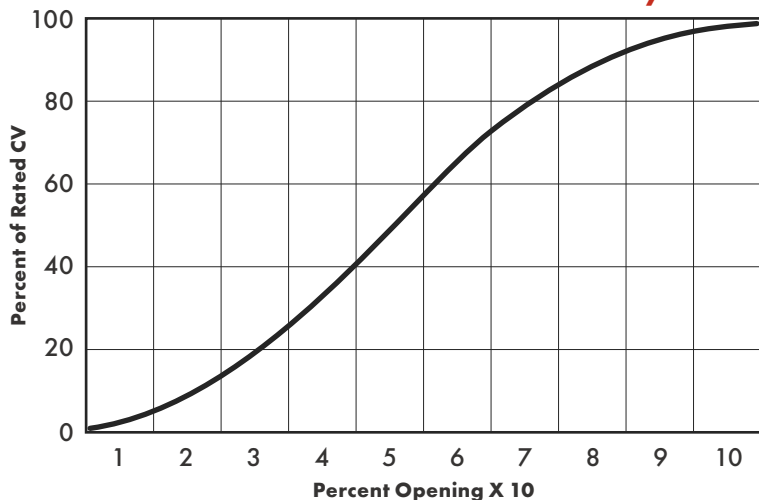
The symmetric shape of the Z-Disc vane design assures this. Hence maximum Cv, flow characteristic and torque are exactly identical whether you flow from the right or from the left.

### Biography of Dr. Hans D. Baumann, P.E.

Hans D. Baumann, PhD, P.E. is widely recognized as one of the foremost experts in control valve design and related technologies He is credited with over 200 U.S. and worldwide patents. Dr. Baumann serves as the primary technology consultant in the Design and development of the Z-DISC Control Vane technologies.

# Valve Flow Coefficients & Technical Data

## Flow Characteristic of Standard Butterfly Valve

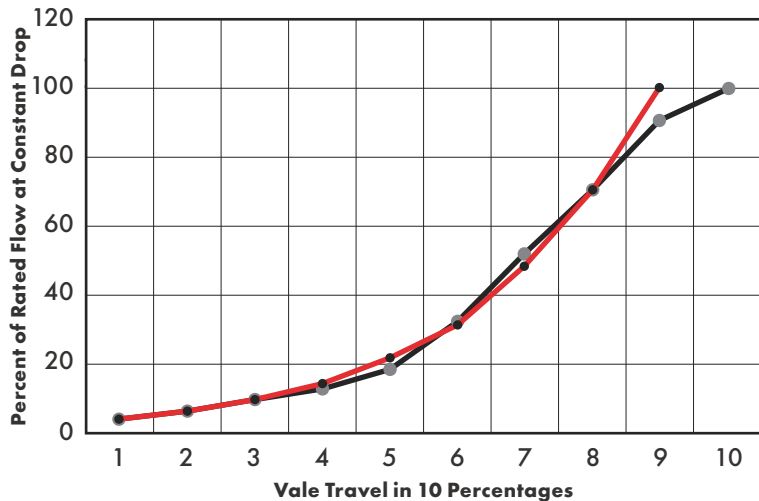


## Equal Percentage Flow Characteristic

The Z-DISC's equal percentage flow characteristic fits the majority of control loop requirements.

## Comparison Ideal to Tested Characteristic

- Characteristic Base on Test Data
- Ideal Equal Percentage Characteristic per ISA

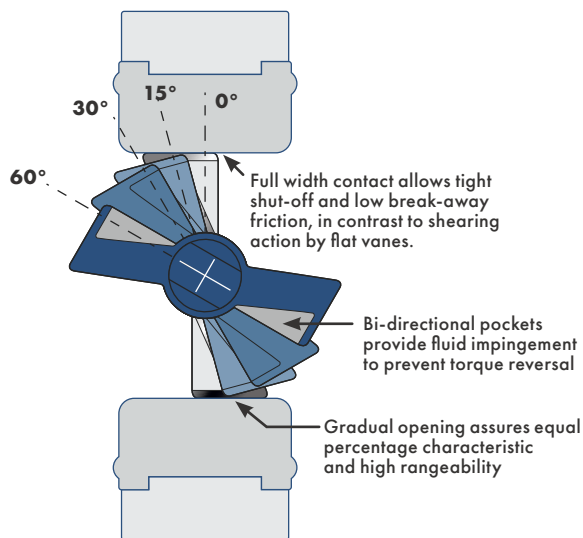


## V-Port Ball Valve Options

Our Flo-Tite Division offers a complete line of Ball Control Valves as well as segmented type.

Contact us at: 910.738.8904 or email us at sales@flotite.com

## Z-Disc Control Type Butterfly Valve with Liner



## UNAFFECTED BY FLUID INDUCED DYNAMIC TORQUE PROBLEMS

Conventional butterfly valves are subject to severe reversing dynamic torque, effecting the stability of the operating system. This is caused by suction effects by the fluid passing over that half of the vane pointing downstream (much like an aircraft wing). Such torque peaks typically at 70° after which the torque reverses suddenly. Such effects are eliminated in the Z-DISC vane by having a rim intersecting and stopping a jet from producing suction. Thus, it can open all the way to 90° with a low and stable operating torque thereby avoiding actuator instability.

## HIGH FLOW CAPACITY

With near 90° opening at rated travel, this valve offers a Cv, of flow capacity, that exceeds that of equally sized Globe valves by up to two and a half times.

## SPACE SAVING FACE TO FACE DIMENSIONS

With a face to face dimensions of less that 15% of that of equally sized globe valves. Z-DISC control valves reduce pipe length and together with their low weight are much easier to install and to maintain.

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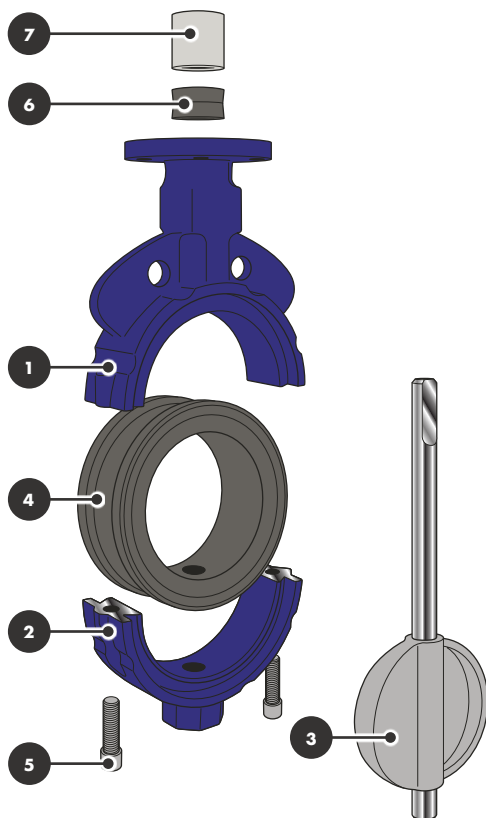
## Z-Disc Control Vane Cv

Size	Rated Cv	Min Cv	Face-to-Face
2"	71	1	1.625
3"	180	2	1.750
4"	320	4	2.000
6"	720	8	2.125
8"	1280	15	2.500

Consult Factory for larger sizes.

### Very Low Break Away Friction

Opening of a conventional flat vane causes a shearing effect when squeezing out of the rubber liner. This creates high break away torque and typically leads to loop instability at low flow rates. The Z-DISC vanes unique shape gently compresses the liner bore upon shut off at an angle. The result is a very gentle opening where the only torque experienced is that caused by friction between the inner rim and the adjacent rubber. This allows effective control at flow rates of less than 0.1% of max rated flow.



## Z-Disc Control Vane Torque Data

Size	To Open	To Close	To Close at 100 PSI	To Close at 150 PSI
2"	5	10	36	57
3"	17	34	92	138
4"	40	82	200	295
6"	136	172	488	568
8"	320	450	1000	1450

All torque in inch-pounds (unlubricated)

### Specifications

**Rating:** Class 150

**Operating Temperature:** -30 F° to +300 F°

**Rated Travel:** 70° (Vane 88° OPEN)

**Rangeability:** 100:1 (From 5° OPEN)

**Seat Leakage:** ANSI Class VI

### Materials of Construction

**Body:** Ductile Iron, 316 Stainless Steel

**Vane & Stem:** Type 316 Stainless Steel

**Liner:**

- NBR food grade (0°F – 212°F)
- EPDM food grade (-40°F –250°F)
- PTFE-lined EPDM (-20°F–300°F)
- PTFE-lined NBR (0°F –250°F)

**Upper Stem Bushing:** Polyester

**Stem Seal:** NBR

## Expanded View

### Bill of Materials

Number	Part	Material
1	Upper Body	<ul style="list-style-type: none"> <li>• Ductile Iron</li> <li>• 316 Stainless Steel</li> </ul>
2	Lower Body	<ul style="list-style-type: none"> <li>• Special Alloy</li> </ul>
3	Z-Disc	316 Stainless Steel
4	Liner	<ul style="list-style-type: none"> <li>NBR Food Grade (0°F–212°F)</li> <li>EPDM Food Grade (-40°F–250°F)</li> <li>PTFE Lined EPDM (-20°F–300°F)</li> <li>PTFE Lined NBR (0°F–250°F)</li> </ul>
5	Machine Bolt	316 Stainless Steel
6	Stem Seal	NBR
7	Upper Stem Bushing	Polyester

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