



*A Butterfly
Valve with
Control!*



Z-DISC
CONTROL VALVES
with Precision Control Technology

Z-DISC CONTROL VALVES

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.

They are:

- 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.
- Also available in sanitary version.

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.

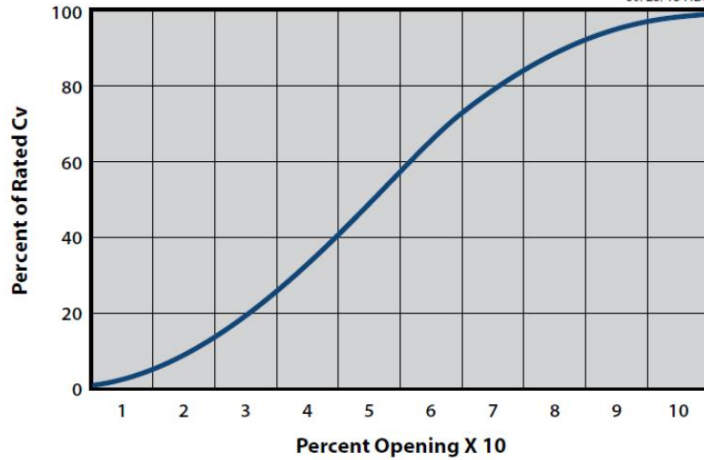
UNIFORM FLOW PATTERN IN EITHER DIRECTION

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.



FLOW CHARACTERISTIC OF STANDARD BUTTERFLY VALVE

09/25/13 HDB

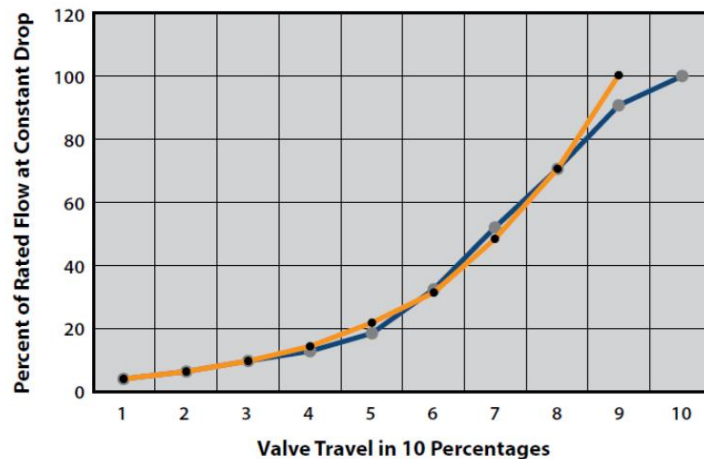


EQUAL PERCENTAGE FLOW CHARACTERISTIC

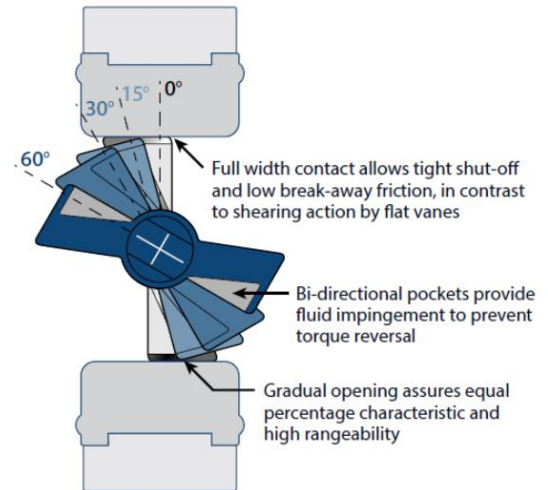
The Z-DISC's equal percentage flow characteristic fits the majority of control loop requirements.

TESTED Z-DISC FLOW CHARACTERISTIC

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



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.

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.

Z-DISC CONTROL VANE TORQUE DATA

SIZE	TO OPEN	TO CLOSE	TO CLOSE AT 100 PSI	TO CLOSE AT 180 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).

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 the 0.1% of max rated flow.

SPECIFICATIONS

Rating: ANSI 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: Cast Iron

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

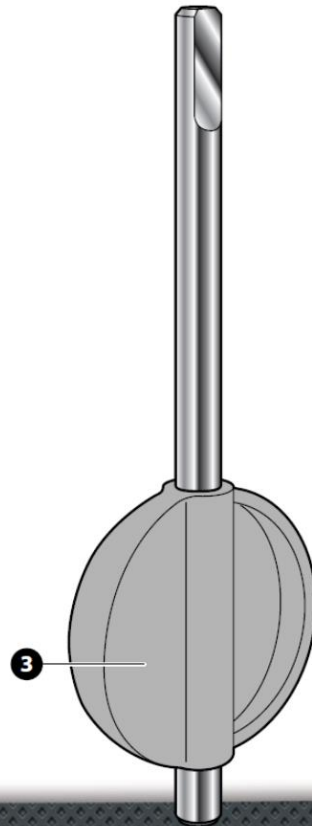
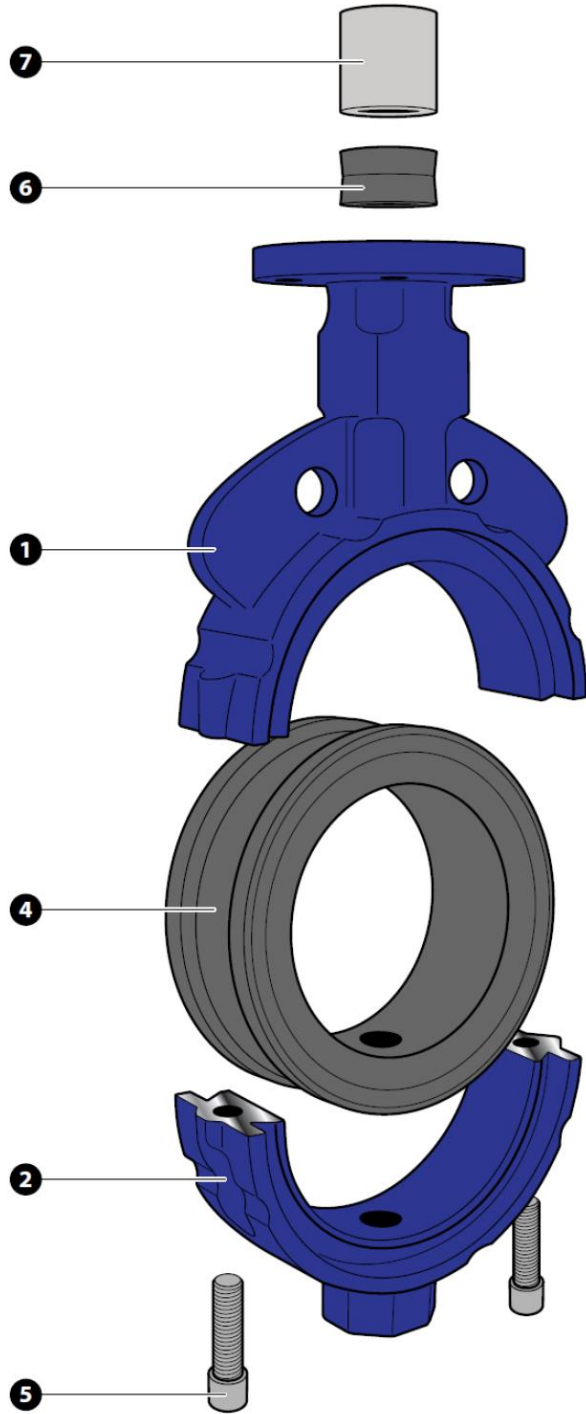
Stem Seal: NBR



Expanded View

BILL OF MATERIALS

NUMBER	PART	MATERIAL
1	Upper Body	Cast Iron
2	Lower Body	
3	Z-Disc	316 Stainless Steel
4	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)
5	Machine Bolt	316 Stainless Steel
6	Stem Seal	NBR
7	Upper Stem Bushing	Polyester



NOTES:

- Patented design.
- Teflon is a registered trademark of the E.I. DuPont de Nemours Company.

Company Overview

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 and has published 118 papers (many peer reviewed) plus articles in addition to co-authoring seven handbooks on valves, instrumentation, and noise. His book, "Control Valve Primer – A User's Guide", published by ISA, is considered the "textbook of valve selection and implementation". Lilly Engineering is proud to have Dr. Baumann serve as its primary technology consultant in the Design and development of the Z-DISC Control Vane technologies.

ABOUT LILLY ENGINEERING COMPANY, INC.

Lilly Engineering Company, Inc. was established in 1965. We are a Manufacturers Representative and stocking distributor throughout parts of Illinois, Wisconsin, Indiana and Iowa. We offer specialty products and support to the industrial manufacturing, bulk gas, steel, chemical, pharmaceutical, power, food processing and OEM markets.

We are also the Master Distributor for the complete line of Dynafluid steam and water mixing valves and Ergotech, Inc. WaterBoss™ industrial wash down nozzles and accessories.

The Z-Disc was developed in collaboration with Dr. Hans Baumann and Lilly Engineering Company, Inc. The Z-DISC Control Valve represents the latest in Control valve technology for process control applications.

Z-DISC
CONTROL VALVES



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