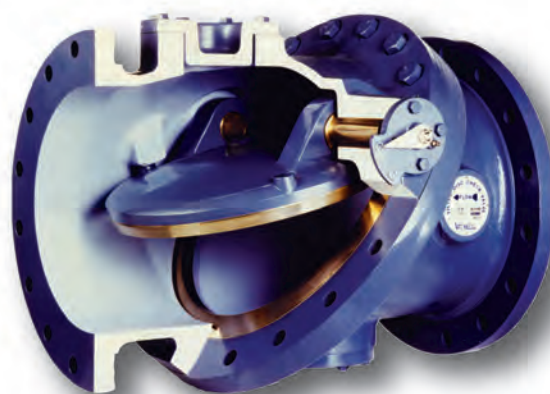


# VAL-MATIC®



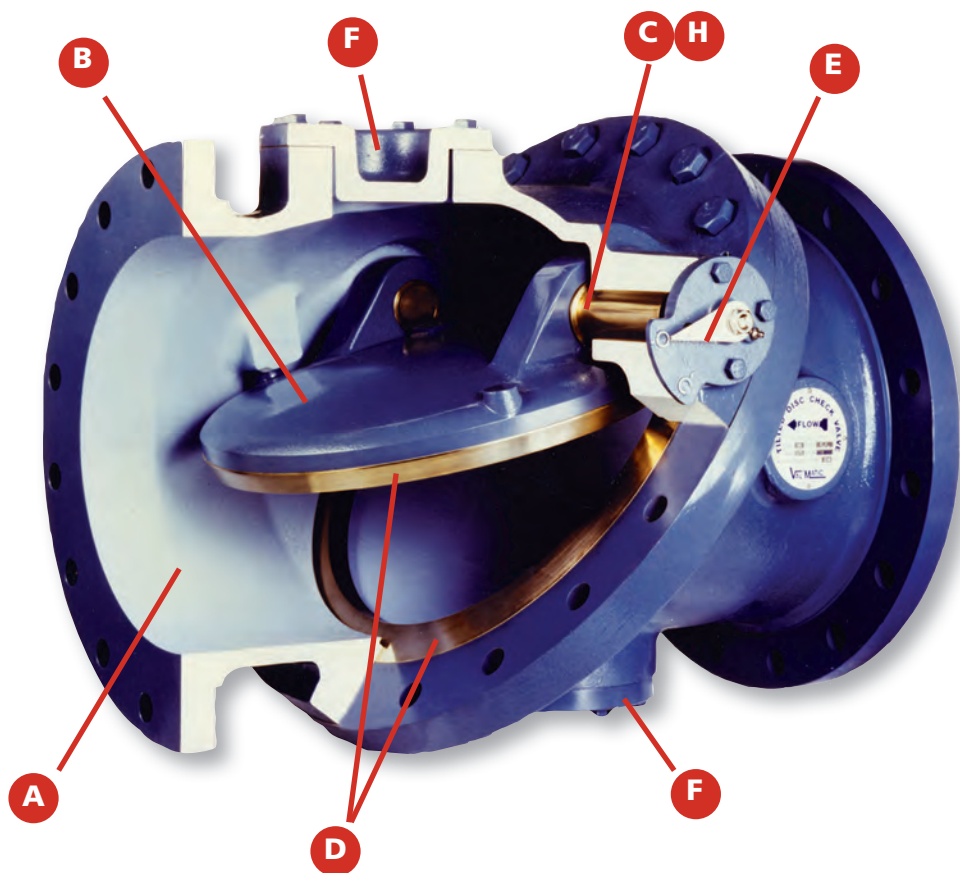
**Tilted Disc®  
Check Valve**



[www.valmatic.com](http://www.valmatic.com)

NSF/ANSI 61 & 372 Certified

# Feature Highlights



## A. Energy Efficient Body

Ultra low headloss is the result of streamlined body contouring and 140% flow area through the body seat area.

## B. Contoured Disc

The contoured disc provides ultra-low headloss and energy savings. A hydrodynamically balanced design provides lift and stabilization for variable conditions, minimum resistance to flow, and excellent flow characteristics. Contoured disc provides minimum headloss and energy savings. The disc counteraction and short 40° disc stroke results in quick closure minimizing reverse flow and surge potential.

## C. Pivot Pins and Bushings

Maximum strength is achieved by utilizing large diameter pins and bushings constructed of high tensile aluminum bronze material. These materials provide superior wear and gall resistance as a result of their high

Brinnell Hardness (BHN) and selected difference in hardness between mating parts.

## D. Triple-Offset Seating Geometry

Leak tight seating and long life are achieved at all working pressures by utilizing triple-offset seating geometry which provides excellent sealing and low wear characteristics. The offsets allow the disc edge to lift off the seat during opening without sliding or binding.

## E. Disc Position Indicator

Direct connection provides precise indication of the disc position at all times. Standard on sizes 6" and larger.

## F. Inspection Ports

The ports allow access to the upstream and downstream sides of the seat for system maintenance and serve as mounting pads for optional dashpots.

G

## Surge Control

### Bottom Mounted Oil Dashpot



### Top Mounted Oil Dashpot



Inspection port covers are contoured to be flush with body interior to minimize turbulence.

## G. Surge Control

Bottom Mounted Oil Dashpots control final stage of closing to reduce slamming associated with systems having rapid flow reversal characteristics. Top Mounted Oil Dashpots are directly connected to the disc and provide full open and close control of the valve disc to further reduce the potential for surges and water hammer.

## H. Offset Pivot

The offset pivot counteraction divides the disc by a one-third/two-third proportion which reduces slamming by providing a self-cushioning effect.



The Tilted Disc® Check Valve is the premier check valve in the Val-Matic family. It offers unrivaled versatility, reliability, and a significant cost savings over the life of the valve. While some valves are ideally suited to a specific application or orientation, the Tilted Disc® Check Valve is preferred in any number of installation configurations and a wide range of media such as raw water, cooling water, treated water and wastewater effluent.

In single pump systems or systems where only one pump is operating at a time, Tilted Disc® Check Valves are commonly used with both centrifugal and turbine pumps where flow rates are in the range of 4-20 ft/sec and pressures up to 400 PSI.

For pumping systems with multiple pumps, surge considerations, and high capacity, Tilted Disc® Check Valves with oil dashpots are ideal. Depending on the system pressure, multiple pumps can cause a rapid flow reversal upon system shut-down and the flow rate can vary constantly. The Tilted Disc® Check Valve is offered with optional top or bottom mounted oil dashpots to control disc closure in multiple pump systems even after a power failure.

In closed surge tank applications, it is critical to have a check valve close rapidly to prevent reverse flow through the pump after pump stoppage. The Tilted Disc® Check Valve with bottom mounted dashpot is the ideal solution in this application; it allows the valve to close rapidly and cushion the last 10% of travel without the need for an external power source.

Val-Matic Tilted Disc® Check Valves are used worldwide to offer superior service and features in any number of applications and environments. Further information on specific application parameters and the benefits of the Tilted Disc® Check Valve are available online at [www.valmatic.com](http://www.valmatic.com).



Tilted Disc® Check Valve with Well Service Air Valve on Vertical Turbine Pump.



Tilted Disc® Check Valve with Top Mounted Oil Dashpot.



Tilted Disc® Check Valve on Discharge of Centrifugal Pump.



Tilted Disc® Check Valve with Bottom Mounted Oil Dashpot.

# Features & Benefits

The Val-Matic Tilted Disc® Check Valve provides energy efficient operation while easily handling the most severe and demanding applications with features such as non-slam closure, wear resistance, leak tight seating, and surge control. This high performance check valve excels in any number of operating conditions and has the added benefit of extremely low headloss characteristics.

## Energy Efficiency - Cost Savings

The Tilted Disc Check Valve conserves energy and provides the lowest operating cost, because it provides the lowest pressure loss characteristics of any check valve available today. Ultra-low headloss is the result of streamlined body contouring and a hydrodynamically designed disc, (Figure 1) in combination with a 140% flow area through the body seat. The energy savings realized by using a 30" Tilted Disc Check Valve instead of a conventional swing check valve may result in a 40 year energy cost savings of \$189,232 (See page 10).

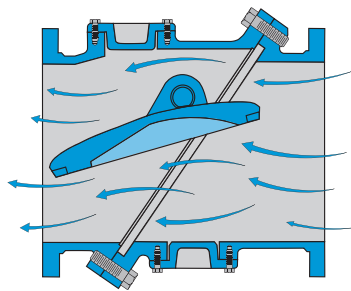


Figure 1

## Non-Slam Closing - System Protection

The non-slam closing characteristics of the Tilted Disc Check Valve are achieved by utilizing a short disc stroke, unique disc counteraction, and fixed pivot pins without stem packing. The short disc stroke, resulting from the angled seat design, is only 40° as compared to the approximate 80° to 90° stroke found in a conventional swing check valve (Figure 2). This short stroke reduces the closing time of the valve disc. The reduced closing time minimizes flow reversal and water hammer normally associated with the sudden stopping of reverse flow.

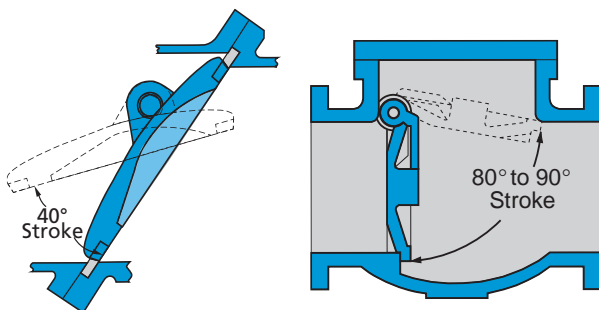


Figure 2

The disc counteraction is the result of an offset pivot, which divides the disc into approximately a one-third/two-thirds proportion (Figure 3). This allows the two-thirds of flow that passes below the pivot to be counteracted by the one-third that passes above the pivot. This counteraction reduces slamming by providing a self-cushioning effect not found in conventional swing check valves.

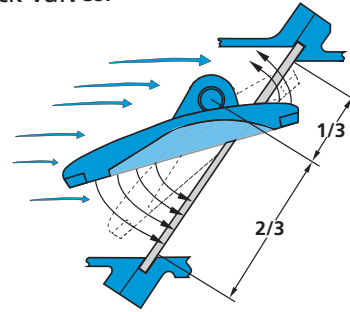


Figure 3

Finally, while conventional swing check valves have rotating stems with packing, the Tilted Disc Check Valve's disc rotates freely on fixed pins. This provides low inertia and friction to accelerate disc closure.

## High Performance Triple Offset Seating

Leak tight seating and long life are achieved by utilizing triple offset seating geometry. The disc pivot is offset from both the face of the seat (1) and the centerline of the seat (2). These offsets, together with the inclined offset of the conical seat (3), provide non-binding, self-releasing seating (Figure 4). The offsets allow the disc edge to lift off the seat during opening without sliding or binding (Figure 5).

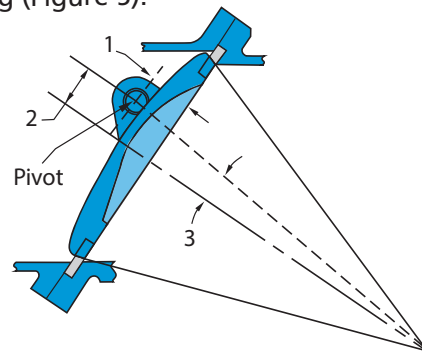


Figure 4

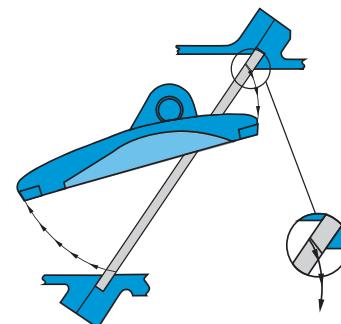


Figure 5

# Features & Benefits

## Wear Resistance - Long Life

Extended valve life is the result of excellent wear resistance through advanced features including disc stabilization, triple offset seating, and a meticulous selection of materials of construction for mating surfaces. Different grades of aluminum bronze are used for the disc edge and seat and the pivot pins and bushings to provide a significant difference in hardness, thereby reducing wear and galling. The hydrodynamic design of the disc shape provides lift and disc stabilization during flow (See Figure 1). Tests conducted by an independent laboratory showed the disc to be extremely stable during both low and high flow conditions, thereby minimizing wear associated with disc flutter.

## Proof of Design Testing

To demonstrate the excellent seating and wear resistant qualities of the Tilted Disc Check Valve, an extensive full-scale cycle test was conducted and witnessed by an independent engineering consulting firm. After more than 100,000 cycles, the Val-Matic Tilted Disc Check Valve had less than 10% of the allowable leakage for new valves as called for in the testing sections of AWWA and MSS standards.

## Surge Control

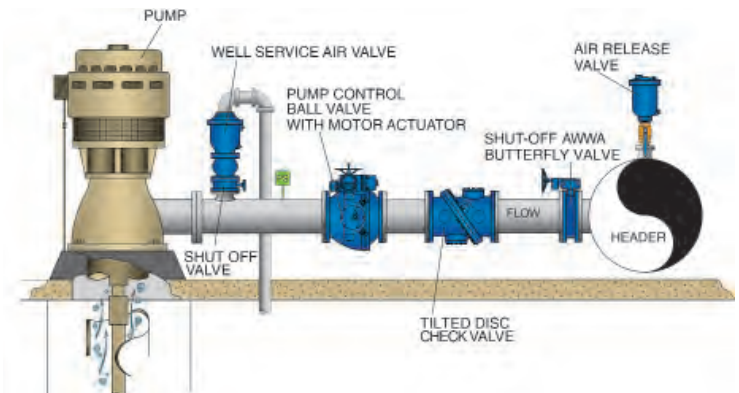
The dashpot configurations include high pressure oil cylinders and full rated disc connections. With oil dashpots, the disc is precisely controlled using flow control valves to regulate the flow of oil out of the cylinder, as opposed to an air cushion which only produces a minimal dampening effect due to the compressibility of air.

To select the proper valve configuration, several criteria must be considered. The number of pumps and the static head will affect how rapidly the water column will reverse when a pump is stopped. The type of pump control will affect the required closing characteristics of the valve. Typical types of control include on-off, soft-start, variable speed, and electrically operated control valves. The length of the piping system is used to estimate surges from changes in flow velocity. The type of surge relief system dictates the required closing time for the valve. Surge tanks require a quick-closing valve to prevent the loss of stored water back through the pump. The criteria listed above are used to select the best valve configuration as follows:

### Base Valve

The base valve will provide non-slam closure in low service pumping applications. Base valves are typically used when the static head is less than 100 feet in single or multiple pump application. A common application is the filter backwash pumps in a water treatment plant.

On very long systems, a power operated control valve is sometimes used. The control valve is electrically wired to the pump control and is programmed to slowly open and close to gradually change the flow rate in the system over a 30-300 second period. However, after a power outage, the control valve may not be capable of closing rapidly enough to prevent back spinning of the pump or loss of water from a surge tank. In these cases, a Tilted Disc Check Valve is often installed downstream of the control valve (See Base Valve Application Figure).



**Base Valve Application**

## Bottom Mounted Oil Dashpot

Dashpots are used on high service pumping applications where there is a propensity for rapid flow reversal. The dashpot consists of a hydraulic cylinder and snubber rod which contacts the disc during closing. The dashpot controls the last 10% of valve closure to prevent slamming of the disc and reduce water hammer.

The valve is effective on shorter length systems with static heads up to the valve rating. The dashpot is also used on longer systems where rapid flow reversal occurs due to the use of surge tanks or in multiple pump systems.

## Top Mounted Oil Dashpot

The top mounted oil dashpot controls both the full opening and full closing stroke of the valve. Also, the last 10% of travel of valve closure is independently controlled by an adjustable hydraulic cylinder cushion. With the top mounted oil dashpot, the disc is mechanically linked to a hydraulic cylinder and linkage is designed to withstand the full thrust of the disc when subjected to full system pressure.

Valves equipped with top mounted oil dashpots have been used in extreme service applications up to the full flow and pressure rating of the valve. When there is insufficient space to provide a straight run of pipe between the pump and the valve, the top mounted dashpot will control the disc movement and prolong the life of the valve.

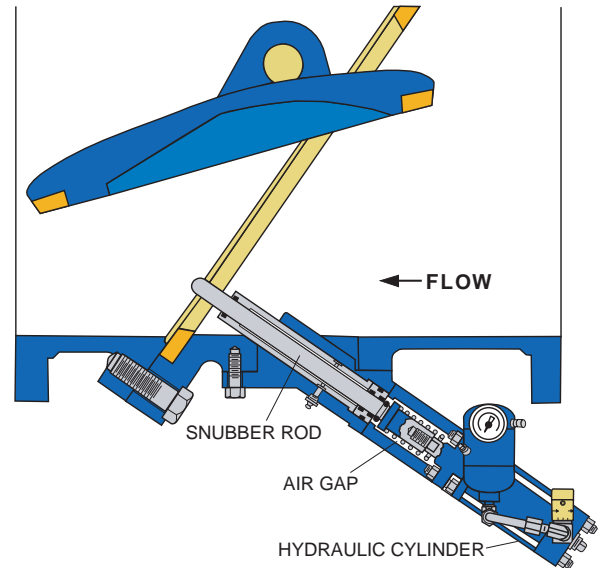


# Principle of Operation

## Bottom Mounted Oil Dashpot

Bottom Mounted Oil Dashpots (BMOD) reduce the water hammer potential associated with systems having rapid flow reversal characteristics. These critical conditions are normally found in piping systems which have high shut-off heads, and/or use surge tanks. BMOD's are not directly connected to the disc, allowing the valve disc to open freely without restriction and close freely for 90% of its travel. During the remainder of its travel, the disc will contact the dashpot snubber rod. Once contact is made, the final 10% of disc movement is cushioned to an adjustable rate best suited for the application.

The BMOD is a self-contained oil operated system which has an air gap between the system media and the dashpot cylinder. This air gap prevents any possibility of the pressurized hydraulic fluid from entering the valve housing and contaminating the system media. The BMOD is installed in the bottom inspection port of the Tilted Disc Check Valve and is available on valve sizes 6" and larger. When necessary, the unit can also be field installed.



## Sequence of Operation

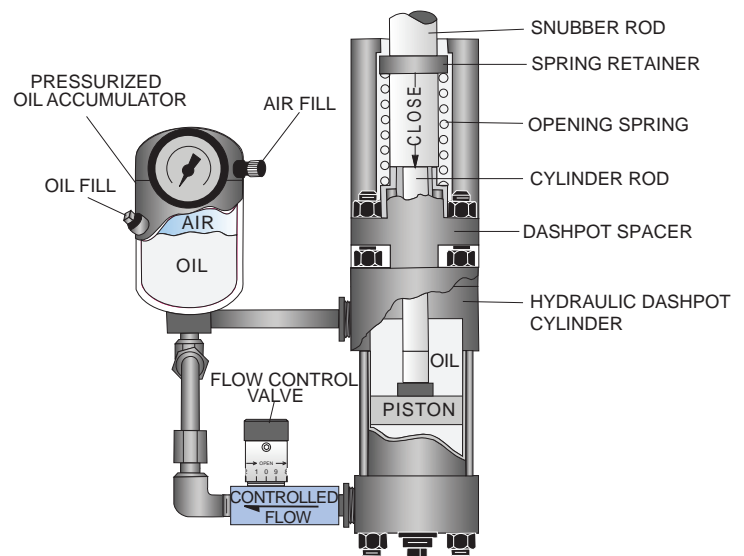
The last 10% of closing of the check valve can be controlled by an optional hydraulic dashpot cylinder to prevent slamming where rapid flow reversals are expected. The cylinder rod pushes against a snubber rod, which in turn makes contact with the valve disc. Both sides of the hydraulic cylinder are connected to a pressurized oil accumulator, which is held at the maximum line pressure plus 50 psi. Since the cylinder piston has a greater pressure area opposite the rod end, the air pressure in the accumulator will tend to extend the rod past the seat to control the last 10% of disc closure. The opening spring is also designed to extend the rod in case air pressure is lost.

### Opening Stroke:

When the water system pump is started, the water pressure will force the check valve disc open. The air pressure in the accumulator and the spring will extend the cylinder and snubber rod into the valve port.

### Closing Stroke:

When the water system pump is stopped, the weight of the disc and reverse flow of water will force the check valve disc closed, thereby striking the snubber rod. The snubber rod will push on the cylinder rod in the direction shown and force oil through the adjustable flow control valve. The flow control valve will control the speed of closure for the last 10% of valve travel in typically 1 to 5 seconds.

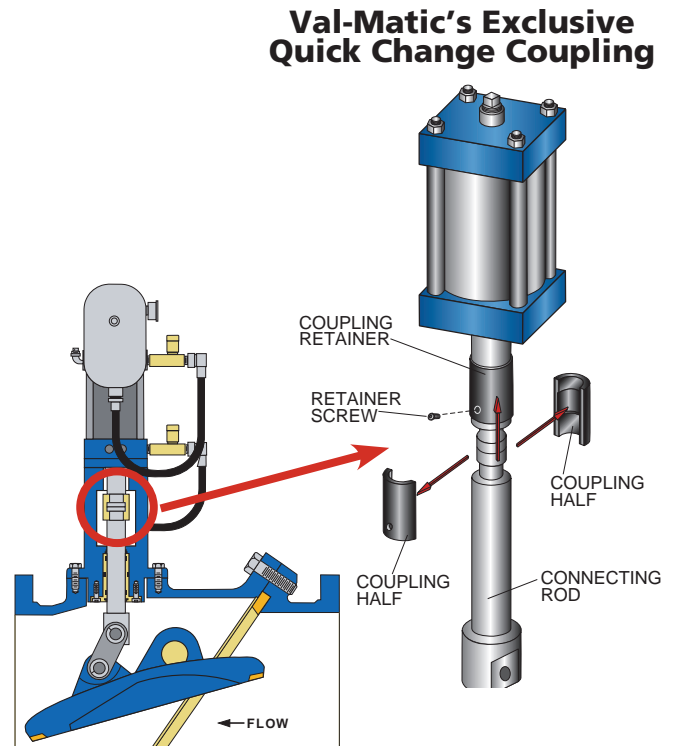


# Principle of Operation

## Top Mounted Oil Dashpot

The Top Mounted Oil Dashpot (TMOD) is directly connected to the disc and provides full control of the valve disc to further reduce the potential for surges and water hammer. The unit provides single stage adjustable speed control of the disc's travel to the open position, thereby reducing system pressure surges upon pump start-up. Two stage control is provided during valve closure, reducing the water hammer and surges associated with rapid flow reversal systems. The first stage controls 90% of the disc closure, while the second stage controls the final, critical 10% of closure. All controls are independent of each other and can be field adjusted to best suit the application. For example, the first stage of closing can be at a slower rate than the opening rate, with the final 10% of closure at an even slower rate.

Tilted Disc Check Valves with dashpots are not intended to replace system surge control equipment, but rather to further minimize the slamming and water hammer associated with conventional swing check valves. The TMOD is a self-contained oil operated system that has an air gap spacer between the system media and dashpot. The air gap prevents any possibility of the hydraulic fluid from entering the system and contaminating the line media. TMOD's are available for all valve sizes 6" and larger. Val-Matic's Exclusive Quick Change Coupling is provided to facilitate removal of the cylinder should it be necessary without removal of the valve from the line.



## Sequence of Operation

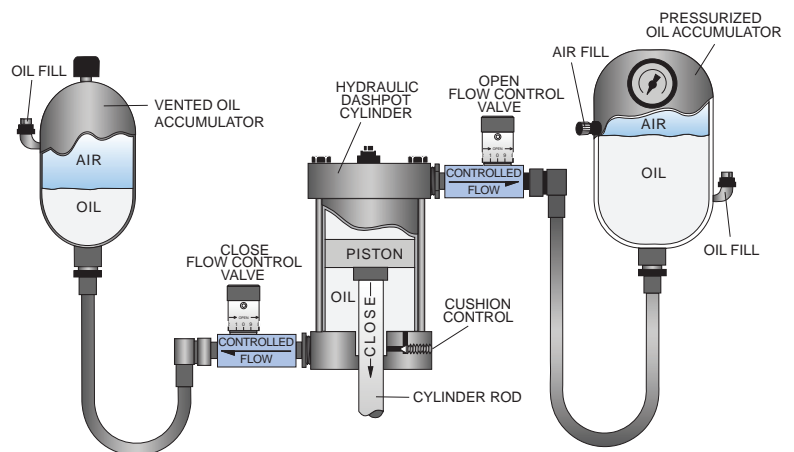
The opening and closing of the check valve can be controlled by an optional hydraulic dashpot cylinder to reduce valve slamming and control surges. The cylinder rod extends out the bottom of the cylinder and is connected to the disc of the check valve. When the check valve disc is opened or closed by the forces of the flowing water in the pipeline, the cylinder rod is stroked in the dashpot cylinder in two stages. In the first stage, two flow control valves are set to independently control the opening and closing times, typically 5 to 30 seconds. In the second stage, a cylinder hydraulic cushion will control the last 10% of closure in 1 to 5 seconds.

### Opening Stroke:

When the water system pump is started, the water column will force the check valve disc open, thereby pushing the cylinder rod upward. The oil over the cylinder piston will become pressurized and flow through the open flow control valve and into the pressurized oil accumulator typically in 5-30 sec. Oil will also be drawn into the lower portion of the cylinder through the check valve portion of the close flow control valve and the vented oil accumulator.

### Closing Stroke:

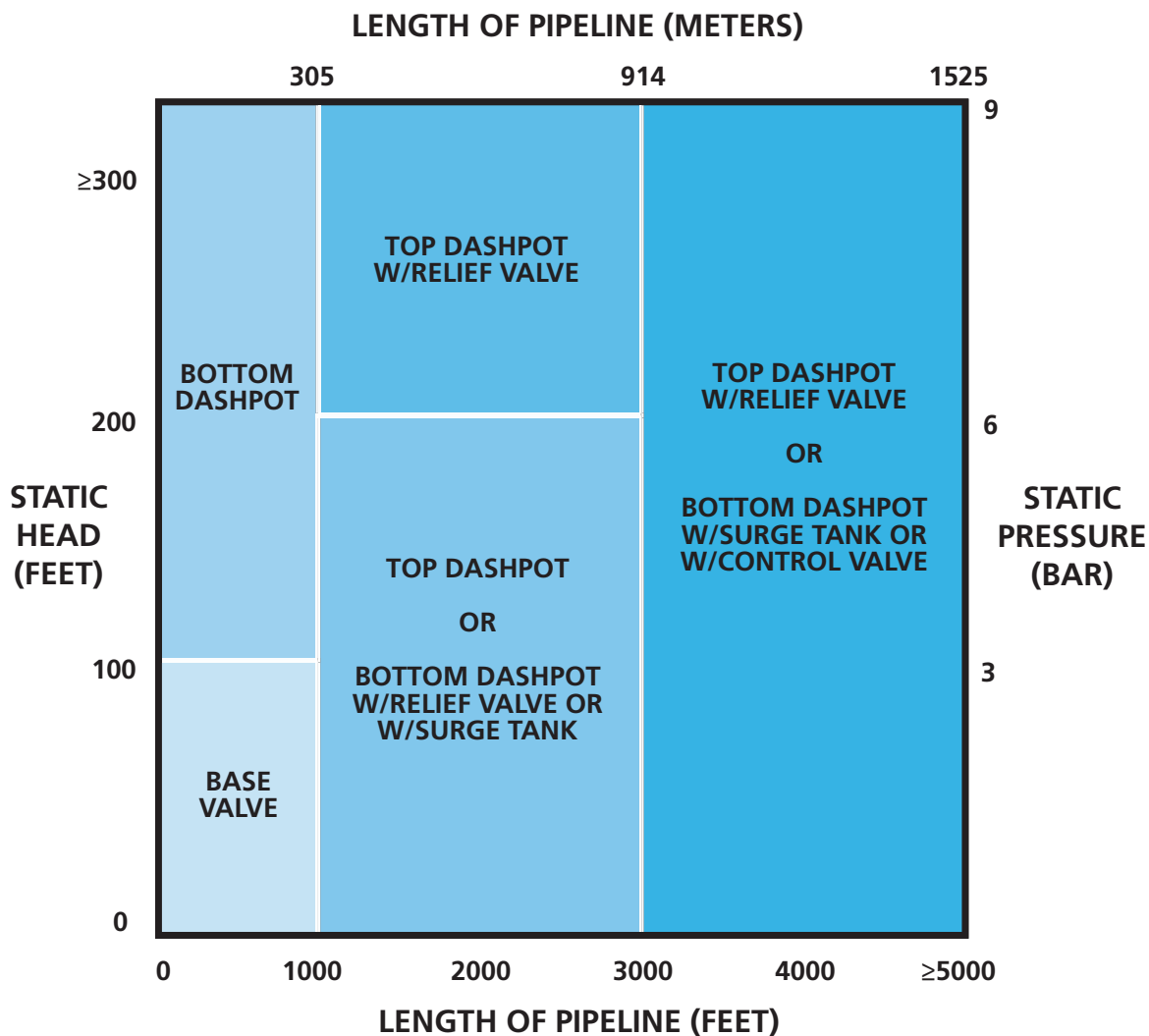
When the water system pump is stopped, the weight of the disc and reverse flow of the water will force the check valve disc closed, thereby pulling the cylinder rod down. The oil under the cylinder piston will become pressurized and flow through the close flow control valve and into the vented oil accumulator typically in 5-30 sec. Oil will also flow into the top of the cylinder from the pressurized oil accumulator through the check portion of the open flow control valve. The pressurized oil accumulator is maintained at 20% of the water line pressure to assist in valve closure.



### Final 10% of Closure:

During the last 10% of closure, the larger diameter portion of the cylinder rod enters a cushion chamber in the lower head of the dashpot cylinder. The speed of closure during the last 10% of closure can be controlled further using the cushion control adjustment screw located on the cylinder head, typically 1 to 5 seconds.

# Application Recommendation



The application graph illustrates the range of use for three valve configurations: 1) base valve, 2) bottom mounted oil dashpot, and 3) top mounted oil dashpot. For example, on a 2,500 ft. long water transmission main operating at 150 ft. of head, a Tilted Disc Check Valve with a top mounted oil dashpot would be selected. Or, if a surge relief system is provided, then the bottom mounted oil dashpot configuration may be used.

RECOMMENDATION FOR APPLICATION OF VAL-MATIC TILTED DISC® CHECK VALVES				
TYPE OF INSTALLATION	LENGTH	STATIC HEAD	SURGE RELIEF SYSTEM	RECOMMENDED CHECK VALVE
Single Pump	0-1000 ft.	0-100 ft.	NONE	Base Valve
Multiple Pump	0-1000 ft.	0-100 ft.	NONE	Base Valve
Single/Multiple Pump	0-1000 ft.	> 100 ft.	NONE	Valve w/BMOD
Single/Multiple Pump	1000-3000 ft.	0-200 ft.	NONE	Valve w/TMOD
Single/Multiple Pump	1000-3000 ft.	0-200 ft.	Relief Valve/Surge Tank	Valve w/BMOD
Single/Multiple Pump	1000-3000 ft.	> 200 ft.	Relief Valve	Valve w/TMOD
Single Pump	> 3000 ft.	> 50 ft.	Relief Valve	Valve w/TMOD
Single Pump	>3000 ft.	> 50 ft.	Surge Tank/Control Valve	Valve w/BMOD



# Pressure Ratings

The Val-Matic Tilted Disc® Check Valve is offered in three different flange classes: 125, 150 and 250. This chart indicates the maximum non-shock pressures for each flange class.

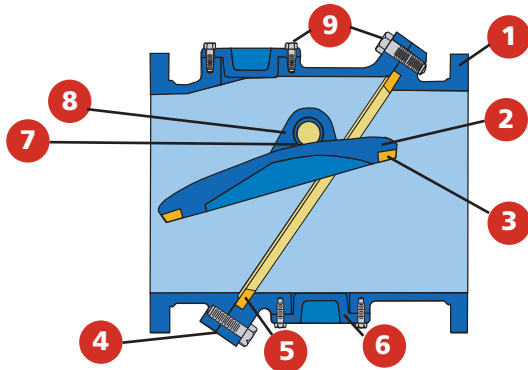
NOTE: The Ductile Iron 9600 series, Class 150 is rated for 285 PSI and can be bolted directly to flanges with 150 or 125 ANSI class drilling.

MAXIMUM NON-SHOCK PRESSURE - PSI (BAR)								
Temperature	Series 9800			Series 9700				Series 9600
	Class 125			Class 250**				Class 150**
	Cast Iron			Ductile Iron	Cast Iron	Ductile Iron		Ductile Iron
	3"-12"	14"-24"	30"-60"	3"-4", 12"	6"-10"	14"-24"	30"-60"	3"-60"
	80-300mm	350-600mm	800-1500mm	80-300mm	80-300mm	350-600mm	800-1200mm	80-1500mm
100°F	200 (13.8)	150 (10.3)	150 (10.3)	400 (27.6)		300 (20.7)	300 (20.7)	285 (19.7)
150°F								270 (18.6)
200°F	190 (13.1)	135 (9.3)	115 (7.9)	370 (25.5)		280 (19.3)	250 (17.2)	260 (17.9)
250°F	*	*	*	355 (24.5)		270 (18.6)	225 (15.5)	250 (17.2)
Hydrostatic Test Pressure	300 (20.7)	230 (15.9)	230 (15.9)	600 (41.4)		450 (31.0)	450 (31.0)	450 (31.0)

\*For service above 200°F use Series 9700 or 9600.

\*\*All Ductile Iron flanges are flat faced.

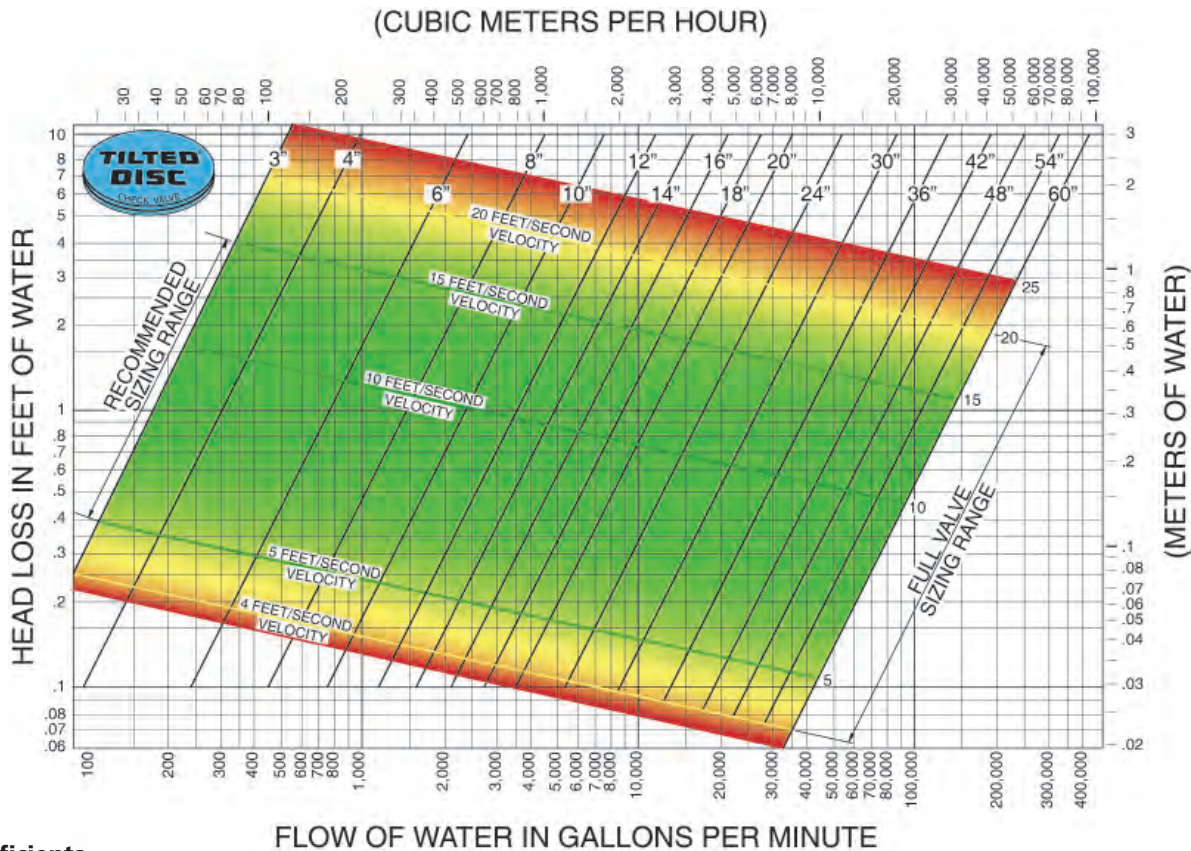
## Materials of Construction



ASSY NO.	COMPONENT	STANDARD	OPTIONAL
1	Body - Class 125 - 3" - 60" Class 250 - 6" - 10"	Cast Iron ASTM A126, Class B	Ductile Iron, Carbon Steel
	Body - Class 250 3" - 4" 12" - 48"	Ductile Iron ASTM A536 Grade 65-45-12	Cast Iron, Carbon Steel
	Body - Class 150 3" - 60"	Ductile Iron ASTM A536 Grade 65-45-12	Cast Iron, Carbon Steel
2	Disc - Class 125, 250, 150 3" - 10"	Aluminum Bronze ASTM B148, Alloy C954000	Stainless Steel
	Disc - Class 125 - 12" Class 250 - 12" - 48" Class 150 - 12" - 60"	Ductile Iron ASTM A536 Grade 65-45-12	Carbon Steel
	Disc - Class 125 - 14" - 60"	Cast Iron ASTM A126, Class B	Ductile Iron, Carbon Steel

ASSY NO.	COMPONENT	STANDARD	OPTIONAL
3	Disc Ring 3" - 10"	NA	NA
	Disc Ring 12" - 60"	Aluminum Bronze ASTM B271, Alloy C95500	Stainless Steel
4	Body O-ring	Buna-N ASTM D2000	EPDM
5	Seat Ring 3" - 10"	Aluminum Bronze ASTM B271, Alloy C95500	Stainless Steel
	Seat Ring 12" - 60"	Aluminum Bronze ASTM B271, Alloy C95400	Stainless Steel
6	Inspection Hole Cover	Cast Iron ASTM A126, Class B	Ductile Iron, Carbon Steel
7	Pivot Pin	Aluminum Bronze ASTM B505, Alloy C95500	Stainless Steel
8	Bushing 3" - 10"	NA	NA
	Bushing 12" - 60"	Aluminum Bronze ASTM B271, Alloy C95400	Stainless Steel
9	Bolts	Alloy Steel	Stainless Steel

# Headloss Chart



Flow Coefficients

Size	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54	60
Cv	248	475	1,160	2,200	3,600	5,400	7,600	10,300	13,200	16,800	25,500	42,000	63,000	90,000	119,000	155,000	195,000

## Energy Cost Savings

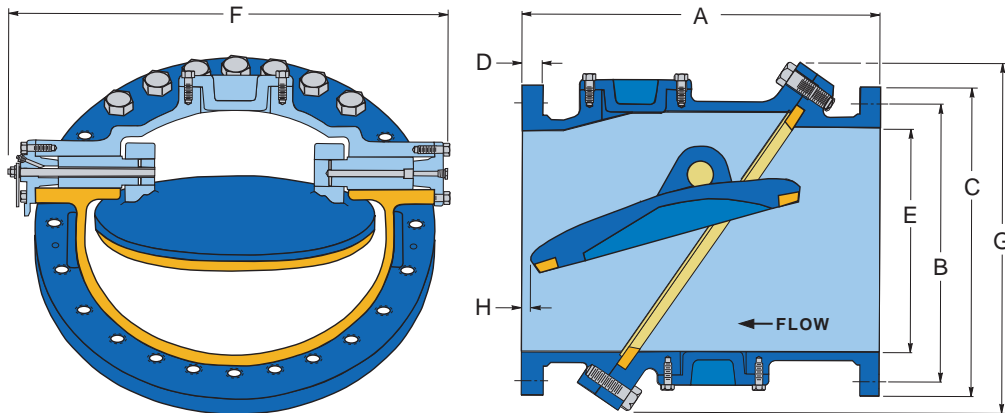
The Tilted Disc® Check Valve possesses the lowest headloss of any check valve available today, allowing the least amount of energy during system operation to be consumed. The continuous electrical energy savings that result from using the Val-Matic Tilted Disc® Check Valve can be seen in the table below for 30" valves. This information was calculated using **Val-Matic's Energy Cost Calculator** on [www.valmatic.com](http://www.valmatic.com).

Valve Type	Flow Coefficient (K)	Headloss (ft)	40-Year Energy Cost*	40-Year Tilted-Disc Energy Cost	40-Year Tilted-Disc Savings
Globe-Style Control Valve	5.70	12.8	\$1,111,980	\$122,903	\$989,077
Silent Check Valve	3.00	6.7	\$585,253	\$122,903	\$462,350
Swing Check Valve	1.60	3.6	\$312,135	\$122,903	\$189,232
Tilted Disc® Check Valve	0.63	1.4	\$122,903		

\*Assumes 50% usage, \$.08/kw-hr, 12 ft/sec, 0.8 efficiency.

# Installation Dimensions

## Tilted Disc Check Valve - Base Valve



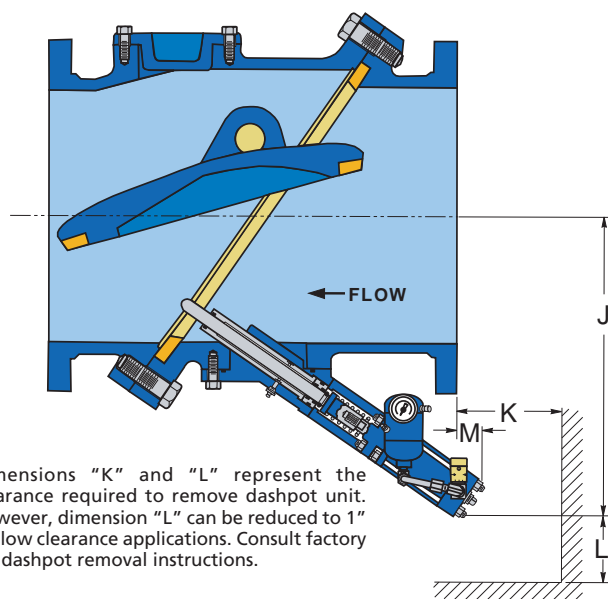
Dimensions in Inches											
Valve Size*	Model No.	ANSI Class	A	B	C	D	E	F	G	H	Valve Weights (lbs)
3	9803	125	9.50	6.00	7.50	0.94	3.00	12.00	9.00	2.25	41
	9703	250		6.63	8.25	1.13					48
	9603	150		6.00	7.50	0.94					41
4	9804	125	11.50	7.50	9.00	0.94	4.00	13.00	10.00	2.63	91
	9704	250		7.88	10.00	1.25					103
	9604	150		7.50	9.00	0.94					91
6	9806	125	15.00	9.50	11.00	1.00	6.00	16.00	13.00	2.88	168
	9706	250		10.63	12.50	1.44					213
	9606	150		9.50	11.00	1.00					168
8	9808	125	19.50	11.75	13.50	1.13	8.00	19.00	16.00	3.50	322
	9708	250		13.00	15.00	1.63					376
	9608	150		11.75	13.50	1.13					322
10	9810	125	24.50	14.25	16.00	1.19	10.00	23.00	18.00	4.50	470
	9710	250		15.25	17.50	1.88					557
	9610	150		14.25	16.00	1.19					470
12	9812	125	24.00	17.00	19.00	1.25	12.00	26.00	21.00	2.75	735
	9712	250		17.75	20.50	2.00					850
	9612	150		17.00	19.00	1.25					735
14	9814	125	30.00	18.75	21.00	1.38	14.00	29.00	25.00	4.13	997
	9714	250		20.25	23.00	2.13					1153
	9614	150		18.75	21.00	1.38					997
16	9816	125	30.00	21.25	23.50	1.44	16.00	32.00	28.00	0.75	1330
	9716	250		22.50	25.50	2.25					1535
	9616	150		21.25	23.50	1.44					1330
18	9818	125	33.00	22.75	25.00	1.56	18.00	36.00	30.00	2.50	1561
	9718	250		24.75	28.00	2.38					1893
	9618	150		22.75	25.00	1.56					1561
20	9820	125	32.00	25.00	27.50	1.69	20.00	39.00	32.00	0.50	1932
	9720	250		27.00	30.50	2.50					2302
	9620	150		25.00	27.50	1.69					1932
24	9824	125	38.00	29.50	32.00	1.88	24.00	46.00	37.00	0.50	3062
	9724	250		32.00	36.00	2.75					3646
	9624	150		29.50	32.00	1.88					3062
30	9830	125	52.00	36.00	38.75	2.13	30.00	55.00	47.00	2.75	5312
	9730	250		39.25	43.00	3.00					6038
	9630	150		36.00	38.75	2.13					5312
36	9836	125	59.50	42.75	46.00	2.38	36.00	65.00	51.00	2.00	8189
	9736	250		46.00	50.00	3.38					8893
	9636	150		42.75	46.00	2.38					8189
42	9842	125	62.50	49.50	53.00	2.63	42.00	73.00	59.00	0.00	11578
	9742	250		52.75	57.00	3.69					12919
	9642	150		49.50	53.00	2.63					11578
48	9848	125	65.00	56.00	59.50	2.75	48.00	82.00	69.00	-3.75	15926
	9748	250		60.75	65.00	4.00					17246
	9648	150		56.00	59.50	2.75					15926

\*Contact Factory for sizes larger than 48".



# Installation Dimensions

## Tilted Disc Check Valve with Bottom Mounted Oil Dashpot

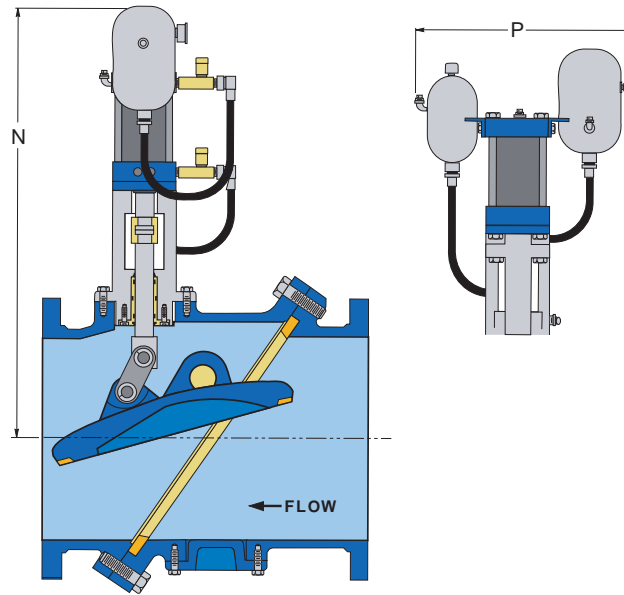


Dimensions in Inches							
Valve Size*	Model No.	ANSI Class	J	K	L	M	Valve Weights (lbs)
6	9806B	125	16.00	12.00	3.00	9.00	200
	9706B	250					245
	9606B	150					200
8	9808B	125	17.00	11.00	4.00	8.00	360
	9708B	250					414
	9608B	150					360
10	9810B	125	18.00	9.00	5.00	5.00	508
	9710B	250					595
	9610B	150					508
12	9812B	125	20.00	11.00	5.00	7.00	801
	9712B	250					916
	9612B	150					801
14	9814B	125	21.00	8.00	5.00	4.00	1063
	9714B	250					1219
	9614B	150					1063
16	9816B	125	23.00	9.00	5.00	5.00	1414
	9716B	250					1619
	9616B	150					1414
18	9818B	125	24.00	7.00	5.00	3.00	1646
	9718B	250					1978
	9618B	150					1646
20	9820B	125	25.00	8.00	6.00	3.00	2019
	9720B	250					2389
	9620B	150					2019
24	9824B	125	27.00	4.00	6.00	1.00	3156
	9724B	250					3740
	9624B	150					3156
30	9830B	125	35.00	6.00	8.00	1.00	5566
	9730B	250					6292
	9630B	150					5566
36	9836B	125	39.00	2.00	8.00	5.00	8445
	9736B	250					9149
	9636B	150					8445
42	9842B	125	43.00	5.00	8.00	5.00	11917
	9742B	250					13258
	9642B	150					11917
48	9848B	125	52.00	8.00	8.00	2.00	16262
	9748B	250					17582
	9648B	150					16262

\*Contact Factory for sizes larger than 48".

# Installation Dimensions

## Tilted Disc Check Valve with Top Mounted Oil Dashpot



Dimensions in Inches					
Valve Size*	Model No.	ANSI Class	N	P	Valve Weights (lbs)
6	9806T	125	23.00	12.00	227
	9706T	250			272
	9606T	150			227
8	9808T	125	29.00	17.00	426
	9708T	250			480
	9608T	150			426
10	9810T	125	31.00	17.00	574
	9710T	250			661
	9610T	150			574
12	9812T	125	34.00	21.00	932
	9712T	250			1047
	9612T	150			932
14	9814T	125	36.00	21.00	1195
	9714T	250			1351
	9614T	150			1195
16	9816T	125	43.00	24.00	1643
	9716T	250			1848
	9616T	150			1643
18	9818T	125	45.00	24.00	1873
	9718T	250			2205
	9618T	150			1873
20	9820T	125	53.00	28.00	2398
	9720T	250			2768
	9620T	150			2398
24	9824T	125	56.00	28.00	3537
	9724T	250			4121
	9624T	150			3537
30	9830T	125	66.00	36.00	6261
	9730T	250			6987
	9630T	150			6261
36	9836T	125	78.00	36.00	9234
	9736T	250			9938
	9636T	150			9234
42	9842T	125	89.00	43.00	12928
	9742T	250			14269
	9642T	150			12928
48	9848T	125	99.00	43.00	18081
	9748T	250			19401
	9648T	150			18081

\*Contact Factory for sizes larger than 48".

# Series 9000 Specification

## SCOPE

- 1.1 This specification covers the design, manufacture, and testing of 3 in. (80 mm) through 60 in. (1500mm) Tilted Disc Check Valves suitable for pressures up to 400 psig (2750 kPa) water service.
- 1.2 The Check valves shall be of the Tilted Disc metal seated, full body type capable of accepting optional bottom or top mounted oil dashpots.

## STANDARDS AND APPROVALS

- 2.1 The valves used in potable water service shall be certified to NSF/ANSI 61 Drinking Water System Components - Health Effects and certified to be Lead-Free in accordance with NSF/ANSI 372.
- 2.2 A 20 in. (500 mm) valve or larger shall be proof of design cycle tested through 250,000 cycles in the horizontal position and leak tested at the rated pressure. The leakage rate shall be less than 1 fluid ounce per hour per inch of valve size after the test.
- 2.3 Manufacturer shall have a quality management system that is certified to ISO 9001 by an accredited, certifying body.

## CONNECTIONS

- 3.1 The valves shall be provided with drilled flanges in accordance with ANSI B16.1 for Class 125 Cast iron flanges or ANSI B16.42 for Class 150 and 300 ductile iron flanges. Iron flanges shall be flat faced.
- 3.2 Flanged inspection ports shall be provided upstream and downstream of the valve disc for inspection or use with optional dashpots on 6 in. and larger valves.

## DESIGN

- 4.1 The valve body shall consist of two sections bolted together with a central diagonal flange inclined at an angle of 55 degrees. The inlet body section shall contain a seat ring positioned and captured by the diagonal flange. The outlet body section shall accept eccentrically located pivot pin trunnions with sealed covers and lubrication grease fittings.
- 4.2 The eccentric pivot trunnions shall be located to divide the disc into approximately 1/3 and 2/3 proportions and also allow the seating surface of the disc to rotate away from the seating surface of the seat ring without contact. Clearance shall be provided between the pivot pin and bushing when the disc is seated to prevent binding and to ensure a tight seal. The minimum pivot pin diameter shall be as shown below.

Valve Size (IN)	Pin Diameter (IN)	Valve Size (IN)	Pin Diameter (IN)
3	0.562	20	2.75
4	0.625	24	3.25
6	1.125	30	3.75
8	1.375	36	4.25
10	1.625	42	4.875
12	1.875	48	5.75
14	2.125	54	6.00
16	2.375	60	6.75
18	2.50		

- 4.3 The flow area through the valve body inlet and outlet shall be equal to the nominal pipe size and gradually increase to an area 40 percent greater at the valve seat.
- 4.4 A position indicator shall be supplied on 6 in. and larger valves and visually show disc position at all times.
- 4.5 The valve disc and seat shall have a seating surface finish of 32 micro-inch or better to ensure positive seating at all pressure. The leakage rate shall not exceed one-half of the allowable rate allowed by AWWA Standard C508 or 0.5 oz (15 ml) per hour per inch (mm) of valve size.
- 4.6 6" (150 mm) and larger valves should be capable of accepting a field installed Bottom Mounted Oil Dashpot.
- 4.7 The valve flow way shall be contoured and unrestricted to provide full flow areas at all locations within the valve. Full flow shall be based on an open stroke of 40 degrees to assure stabilization of the disc when open. Cv flow coefficients shall be verified by an independent testing laboratory.

## MATERIALS

- 5.1 The valve body shall be constructed of ASTM A126 Class B cast iron for all Class 125 valves and Class 250 valves 6 to 10 in. (150mm-250mm). For 2 to 4 in. (50mm-100mm) and 12 in. (300mm) and larger Class 250 and all Class 150 valves shall be constructed of ductile iron ASTM A536 Grade 65-45-12.
- 5.2 The disc in sizes up to 10 in. (250mm) shall be one-piece construction with integral seat and constructed of ASTM B271 Alloy C95400 aluminum bronze. 12 in. (300mm) and larger discs shall be ASTM A125 Class B cast iron. Discs furnished for 12" (300mm) and larger valves with top oil dashpots shall be constructed of ASTM A536 Grade 65-45-12 ductile iron. The disc seating ring shall be ASTM B271 Alloy C95500 centrifugally cast aluminum bronze. The mating seat ring located in the body shall be ASTM B271 Alloy C95400 centrifugally cast aluminum bronze.
- 5.3 The pivot pins shall be ASTM B505 Alloy C95500 aluminum bronze and shall be guided by a bushing constructed of ASTM B505 Alloy C95400 aluminum bronze (12 in. and larger valves).



# Series 9000 Specification

## OPTIONS

- 6.1 Single or double bypass piping shall be provided when specified with piping and valves in sizes shown below.

Valve Size (IN)	By-Pass Size (IN)
6-8	1.5
10-14	2.0
16-24	3.0
30-60	4.0

- 6.2 A NEMA-4 machine tool type limit switch with DPDT contacts shall be provided when specified. The switch shall be mounted to the inspection cover and have an adjustable trip arm for sensing the closed position.
- 6.3 A bottom mounted oil dashpot shall be factory installed (12" (300 mm) and larger) in the upstream inspection port when specified to provide hydraulic control of the final 10% of valve closure and reduce water hammer normally associated with rapid flow reversal conditions on pump shut down. The dashpot shall consist of a high pressure hydraulic cylinder with a minimum bore size as shown below, adjustable external flow control valve, pressurized oil reservoir and piping designed to control the closing speed of the last 10% of travel in 1-5 seconds. A dashpot spacer which connects the cylinder to the valve shall have an air gap to prevent hydraulic fluid from entering the valve and contaminating the water system. A snubber rod fitted with O-ring seals and rod wiper scrapers shall make contact with the lower portion of the disc during closure.

Valve Size (IN)	Bore Diameter (IN)
6-10	1.50
12-14	2.00
16-24	2.50
30-36	3.25
42-48	4.00
54-60	5.00

- 6.4 A top mounted oil dashpot shall be factory installed in the downstream inspection port when specified to provide independent hydraulic control of the valve opening and closing strokes to reduce water hammer normally associated with pump operation. The dashpot shall consist of a high pressure hydraulic cylinder with a minimum bore size as shown below and with internal cushion adjustment, two external flow control valves, a pressurized oil reservoir with a minimum size as shown below, a stainless steel non-pressurized reservoir, and piping. The unit shall independently control the opening and closing stroke in the range of 5-30 seconds. Additionally, the closing stroke shall be two-stage with the

last 10% of closing travel dampened with the internal cylinder cushion. A dashpot spacer which connects the cylinder to the valve shall have an air gap to prevent hydraulic fluid from entering the valve and contaminating the water system. A connecting rod with a minimum diameter as shown below and fitted with O-ring seals and rod wiper scrapers shall be linked to an integrally cast clevis on the disc. The connecting rod shall be attached to the cylinder rod with a quick change coupling constructed of 17-4 PH stainless steel. The cylinder rod, connecting rod, and coupling shall be held in place by a coupling retainer to allow decoupling of the cylinder while the check valve is under pressure.

Valve Size (IN)	Bore Size (IN)	Reservoir Size (GAL)	Rod Diameter (IN)
6	2.50	0.1	1.000
8-10	3.25	0.3	1.375
12-14	4.00	0.6	1.750
16-18	5.00	1.1	2.000
20-24	6.00	2.5	2.500
30	7.00	6.0	3.500
36-42	8.00	6.0	4.000
48-60	10.00	10.0	5.000

- 6.5 The valve interiors and exteriors shall be coated with an NSF/ANSI 61 certified fusion bonded epoxy in accordance with AWWA C550 when specified.

## MANUFACTURE

- 7.1 The valves shall be hydrostatically tested at 1.5 times their rated cold working pressure. Additional tests shall be conducted per AWWA, ANSI, MSS or API standards when specified. When requested, the manufacturer shall provide test certificates, dimensional drawings, parts list drawings, and operation and maintenance manuals.
- 7.2 The exterior of the valve shall be coated with a universal alkyd primer. The valve interior shall be coated with an epoxy coating approved for potable water.
- 7.3 The Tilted Disc® Check Valves shall be Series 9000, 9000B (with bottom oil dashpot), or 9000T (with top oil dashpot) as manufactured by Val-Matic® Valve & Mfg. Corporation, Elmhurst, IL. USA or approved equal.



Val-Matic's quality of design and meticulous workmanship has set the standards by which all others are measured. Quality design features such as the AWWA **Ener-G® Ball Valve** with its energy efficient design, fusion bonded epoxy and adjustable resilient seating....**Cam-Centric® Plug Valves** have more requested features than any other eccentric plug valve....**American-BFV® Butterfly Valves** include a field replaceable seat without the need for special tools....**Tilted Disc® Check Valves** with high strength and wear resistant aluminum bronze trim as standard....**Silent Check Valves** featuring combined resilient/metal-to-metal seating and are **NSF/ANSI 61 & 372 Certified**....**Sure Seal Foot Valves** provided with a heavy duty stainless steel screened inlet....**Swing-Flex® and Surgebuster® Check Valves** designed with an unrestricted full flow area....**Swing Check Valves** with field

adjustable closure versatility....**Dual Disc® Check Valves** utilizing stabilized components to provide extended life....**Air Release, Air/Vacuum and Combination Air Valves** provided standard with Type 316 stainless steel trim....**VaultSafe®** family of products includes the **FloodSafe® Inflow Preventer, FrostSafe®** two-way damper and the **VentSafe®** vent pipe security cage. The **QuadroSphere® Trunnion Ball Valve** features a unique ball design with recessed surfaces creating additional flow paths to provide a self-cleaning action and reduced wear and torque.

Val-Matic is totally committed to providing the highest quality valves and outstanding service to our customers. Complete customer satisfaction is our goal. **Make the change to quality, specify Val-Matic!**



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