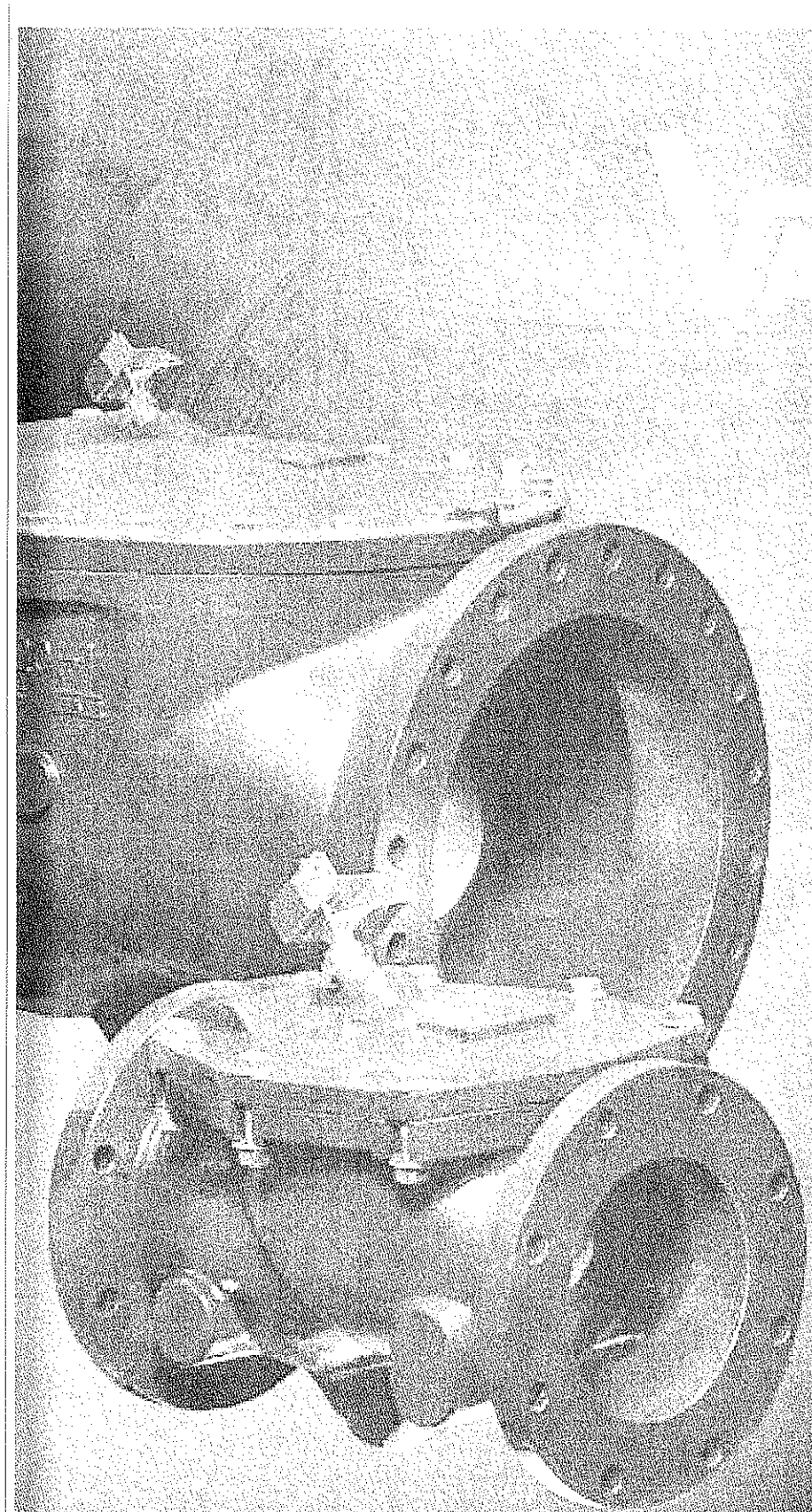
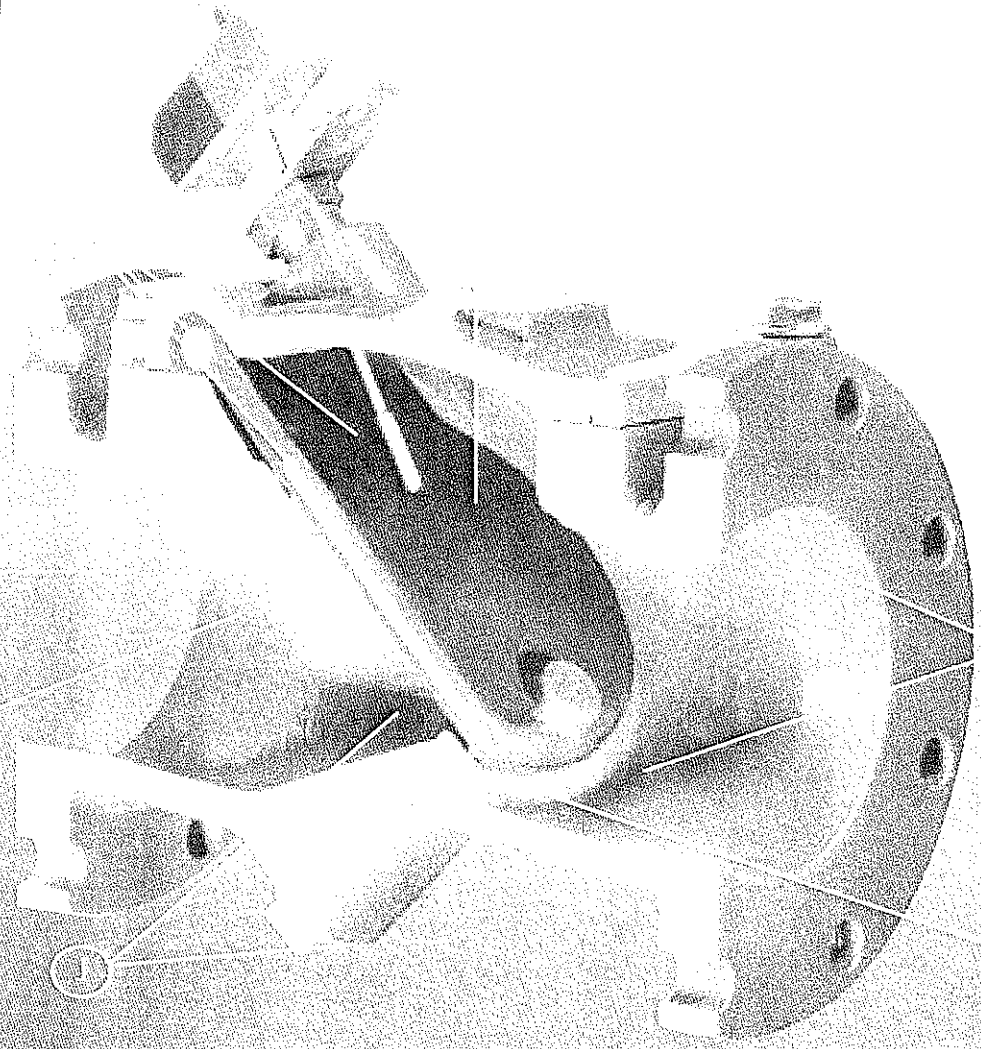
BULLETIN 500

ATIC®



EFFICIENCY & RELIABILITY THROUGH SIMPLICITY OF DESIGN

Swing-Flex® Check Valve



A. 100% FLOW AREA
For improved flow characteristics and lower head loss, the Val-Matic Swing-Flex® Check Valve provides 100% unrestricted flow area.

B. REINFORCED DISC
The one piece precision molded disc is steel and nylon reinforced to provide years of trouble free performance. It is backed by a 25 year warranty for the flex portion of the disc. (Tested for proof of design - see page 5.)

C. ONE MOVING PART
The Memory-Flex™ disc, the only moving part, assures long life with minimal maintenance. No packing or O-rings, mechanical hinges, pivot pins or bearings to wear out.

D. 100% ACCESS PORT
Full size top access port allows removal of disc without removing valve from line. Access cover includes a drilled and tapped port for installation of optional disc position indicator.

E. DROP TIGHT SEATING
The synthetic reinforced disc with its integral O-ring type seal design assures positive sealing at high and low pressures.

F. NON-SLAM CLOSURE
"Short Disc Stroke" combined with Memory-Flex™ Disc Action reduces potentially destructive water hammer.

G. BACKFLOW ACTUATOR (Not Shown)
Body is drilled and tapped for installation of optional backflow actuator (see options).

H. NOZZLE DESIGN
The streamlined full flow body combined with smooth streamlined contouring allows passage of large solids minimizing the potential for clogging.

I. MECHANICAL DISC POSITION INDICATOR - (Optional)
Provides clear indication of the valve's disc position. Can also be provided with a SCADA compatible limit switch for off site monitoring (see options).

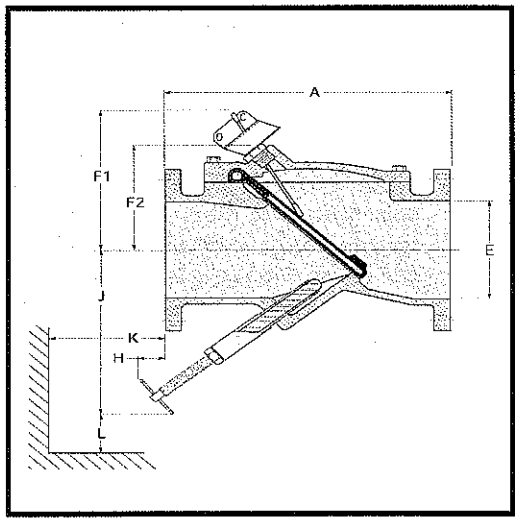
J. FUSION BONDED EPOXY
Fusion Bonded Epoxy (FBE) is provided standard on the interior and exterior of the valve. The FBE is ANSI/NSF 61 certified. Other coatings are available on request.

Swing-Flex® is a registered trademark of Val-Matic Valve and Manufacturing Corporation.
*US Patent 6,152,173 US Patent 6,050,294

INSTALLATION DIMENSIONS AND CONSTRUCTION

VALVE SIZE	MODEL #	A	E	F1	F2	H	J	K	L
2	502A	8	2	N/A	3 3/8	-1/2	6 3/4	7/8	1 1/2
2 1/2	525A	8 1/2	2 1/2	N/A	3 3/8	-1/2	7	5/8	1 1/2
3	503A	9 1/2	3	7 5/8	5 1/8	-3/8	7 1/2	3/4	1 3/4
4	504A	11 1/2	4	8 1/4	5 3/4	1 1/2	7 1/4	2 5/8	2 5/8
6	506A	15	6	9 3/8	6 7/8	2	12	6 1/4	3 1/4
8	508A	19 1/2	8	11	8 3/8	2	15 3/4	7 1/2	4 1/4
10	510A	24 1/2	10	13 3/8	10 3/4	4	20 3/8	8	5 1/4
12	512A	27 1/2	12	15	12 1/2	3 1/2	22 1/2	10	6 1/2
14	514A	31	14	17 5/8	13	4	26 1/4	11 5/8	7 1/2
16	516A	32	16	18 7/8	14 1/4	4 5/8	30	13 1/4	8 5/8
18	518A	36	18	20	15 1/4	5 1/4	33 3/4	15	9 3/4
20	520A	40	20	21 3/8	16 7/8	5 7/8	37 1/2	16 5/8	10 7/8
24	524A	48	24	23 7/8	19 1/4	7	45	20	13
30	530	56	30	27 5/8	23	-5/8	41 1/4	12	6
36	536	63	36	31	27 3/8	-6 1/8	43 1/2	8	6

Dimensions "L" and "K" represent the clearance required to remove backflow actuator.



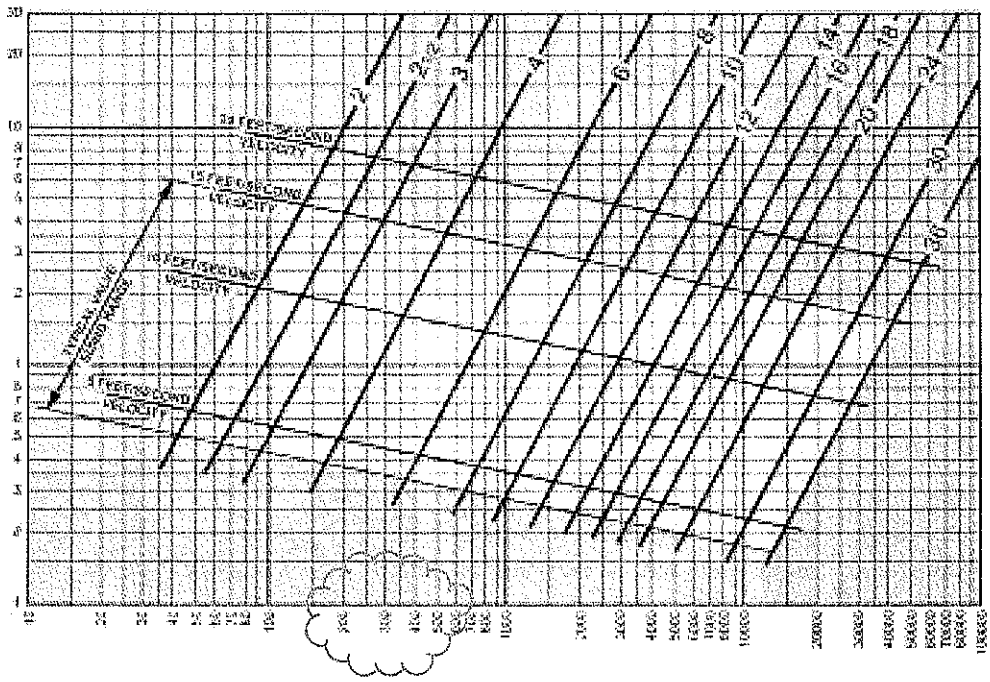
*Dimension "E" represents nominal valve size.
Note: Flanged ends conform to ANSI B16.1 Class 125.

MATERIALS OF CONSTRUCTION			
Component		Standard	Optional
Body and Cover		Ductile Iron ASTM A536 Grade 65-45-12	Stainless Steel, Bronze
Disc		Buna-N (NBR), ASTM D2000-BG	Viton (FKM), ASTM D2000-HK
Coatings	Interior	Fusion Bonded Epoxy*	Rubber Lining
	Exterior	Fusion Bonded Epoxy*	Consult Factory

Consult factory for additional material and coating options.
*ANSI/NSF 61 Certifications

ANSI MAXIMUM PRESSURE-TEMPERATURE RATING		
Maximum Non-Shock Working Pressure (P.S.I.) ANSI Class 125		
Temperature °F	2" - 24"	30" - 36"
100°	250	150
150°		
200°	235	135
Hydrostatic Test Pressures	375	230

HEAD LOSS CHART



FLOW OF WATER IN GALLONS PER MINUTE

Consult factory for Digester Gas Service

Flow Tests performed by the Utah Water Research Laboratory of Utah State University.

SAMPLE SPECIFICATIONS

The check valve shall be of the ***Swing-Flex***® full body flanged type, with a domed access cover and only one moving part - the valve disc.

The valve body shall have full flow equal to nominal pipe diameter at any point through the valve. The seating surface shall be on a 45° angle to minimize disc travel. The top access port shall be full size, allowing removal of the disc without removal of the valve from the pipeline and shall include a port for installation of an optional mechanical position indicator.

The disc shall be of one piece construction, precision molded with an integral O-ring type sealing surface and contain steel and nylon reinforcements in both the ***Memory Flex***™and central disc areas. The flex portion of the disc shall be warranted for 25 years. Non-slam closing characteristic shall be provided through a short 35° disc stroke and a ***Memory-Flex***™ disc return action.

A mechanical indicator shall be provided when specified to provide disc position indication on valves 3" and larger. The indicator shall have continuous contact with the disc under all operating conditions to assure accurate disc position indication.

A limit switch will be provided when specified to indicate open/closed position to a remote location. The mechanical type limit switch shall be activated by the external position indicator. The switch shall be rated for NEMA 4, 6, or 6P and shall have U.L. rated 5 amp, 125, or 250 VAC contacts.

Backflow capabilities shall be available by means of an optional screw type backflow actuator. Both the disc position indicator and backflow actuator shall be capable of installation without special tools.

The valve body and cover shall be ASTM A536 Grade 65-45-12, Class B Ductile Iron. The disc shall be Buna-N (NBR), ASTM D2000-BG.

The interior and exterior of the valve shall be coated with an ANSI/NSF 61 approved Fusion Bonded Epoxy.

The valve shall be proof of design cycle tested 1,000,000 times with no signs of wear or distortion to the valve disc or seat and shall remain drop tight at both high and low pressures. The test results shall be independently certified.

The manufacturer shall have a minimum of five years experience in the manufacture of flexible disc type check valves.

The valve shall be Val-Matic ***Swing-Flex***® series 500 and shall be designed, manufactured and tested in accordance with ANSI/AWWA Standard C508.

INDEPENDENT PROOF OF DESIGN TEST

In the case of the Val-Matic ***Swing-Flex***® Check Valve, we have taken quality assurance one step further by having the valve cycle tested. Utilizing an eight-inch ***Swing-Flex***® with optional signal switch, the valve was cycled over 1,000,000 (one million) times.

To place one million cycles in perspective, it would take an average of 100 cycles per day for more than 27 years to equal the 1,000,000 cycles. Upon conclusion, PSI/Pittsburgh Testing Laboratory Division reported the following results:

1. After 1,000,000 cycles the valve's disc showed no signs of fatigue or stress cracks.

2. After 1,000,000 cycles the valve seating areas showed no signs of wear or distortion. The valve seating remained drop tight during the low and high pressure hydrostatic tests.

3. After 1,000,000 cycles the signal switch continued to function as designed.

Copies of the PSI/Pittsburgh Testing Laboratory Division report are available upon request.

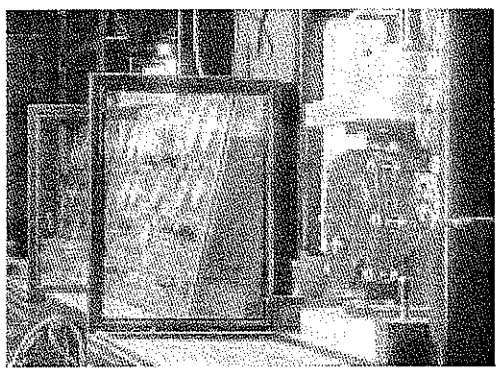
QUALITY ASSURANCE

Val-Matic's Quality Assurance is the sum of imaginative design, solid engineering, careful manufacturing and dedicated people.

These all combine to ensure total customer satisfaction. We recognize the need for, and encourage, individual pride and the self-satisfaction, which is gained in producing reliable and quality valves.

This quality attitude permeates through the corporation from the president to our newest employee.

Testing (right) is the backbone of our quality assurance. Every Swing-Flex® Check Valve is 100% tested including a seat test to assure drop tight sealing and hydrostatic testing to assure the integrity of the casting.



Swing-Flex® Valve at test.

EFFICIENCY.... RELIABILITY .....BY DESIGN!

Efficiency and reliability through simplicity of design is the key to the superior performance and long life of the Val-Matic ***Swing-Flex***® Check Valve.

ENERGY EFFICIENT BY DESIGN

The streamlined contour of the ***Swing-Flex***® body provides 100% flow area with no restrictions at any point through the valve (Figure 1.) Flow tests performed by an independent laboratory have shown that this unique body design produces minimal head loss through the valve. Flow and head loss charts, developed from the test data, are shown on Page 4.

DISC STABILIZATION BY DESIGN

In the full open position, the disc is stabilized by using body contouring to ease the direction of flow towards the disc assuring long disc life (Figure 1).

NON-CLOGGING BY DESIGN

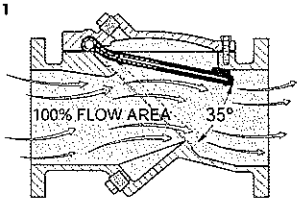
Clog resistant performance is achieved by maintaining an unobstructed 100% flow area, smooth streamlined body contouring and the simplicity of one moving part. The entrapment or hang-up of solids and stringy materials is minimized by the elimination of mechanical devices in the valve design. The standard 4" Swing-Flex® is designed to pass a 3" solid.

NON-SLAM CLOSING BY DESIGN

The non-slam closing characteristic of the ***Swing-Flex***® Check Valve is achieved by utilizing a "Short Disc Stroke" in conjunction with the unique "***Memory-Flex***™ action" of the valve's disc. The 35° stroke, a result of the angled seat, is less than half the typical 80° to 90° stroke of a conventional swing check valve. (Figures 1 & 2) The feature is similar to that found in high performance tilted disc check valves.

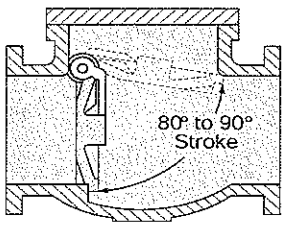
VAL-MATIC SWING-FLEX® VALVE

Figure 1



CONVENTIONAL SWING CHECK VALVE

Figure 2



The short disc stroke and "***Memory-Flex***™ action" (Figure 1) serve to reduce the closing time of the valve. This reduced closing time minimizes flow reversal and the resultant water hammer normally associated with the sudden stoppage of reverse flow.

RELIABILITY BY DESIGN

Operational reliability is achieved by utilizing just one moving part, the ***Memory-Flex***™ disc. Extended life is -- designed into the disc by the inclusion of steel and nylon reinforcements. The steel and nylon are precision molded into the disc, providing a tough, durable disc with a 25-year warranty*. (Figure 3)

Unlike a conventional horizontal swing check valve, the ***Swing-Flex***® has no packing or O-rings, mechanical hinges, shafts, pivot pins, or bearings to wear out (Figure 3.) Upon conclusion of a 1,000,000 (one million) cycle test, an independent testing laboratory reported that the valve had no visible signs of wear and remained drop tight. (See Page 5.)

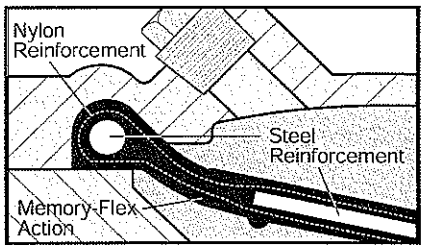


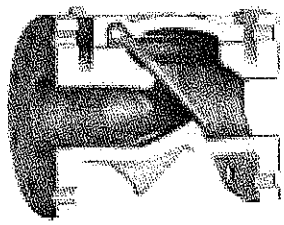
Figure 3

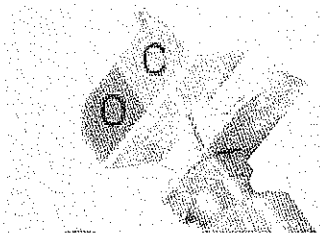
POSITIVE SHUT OFF BY DESIGN

The ***Memory-Flex***™ disc with its integral O-ring type seal design assures drop tight seating at both high and low working pressures. Each and every valve is tested to this standard. A certified report is available upon request.

OPTIONAL ACCESSORIES

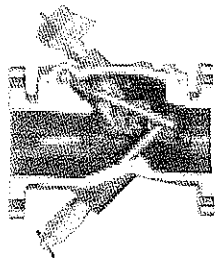
RUBBER LINING -- Unlike conventional swing check valves, the ***Swing-Flex***® Check Valve is designed to accept synthetic or natural rubber lining. Body lining coupled with synthetic ***Memory-Flex***™ discs makes the ***Swing-Flex***® ideally suited for systems containing abrasive or corrosive fluids.



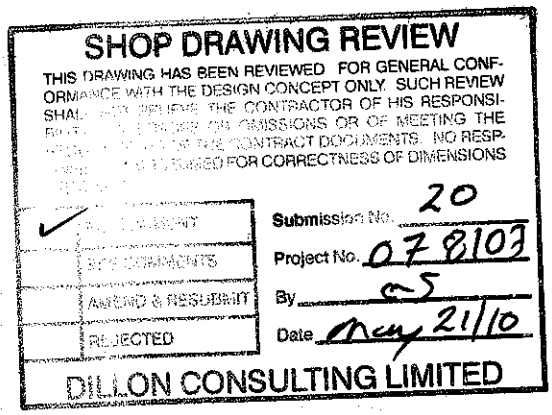


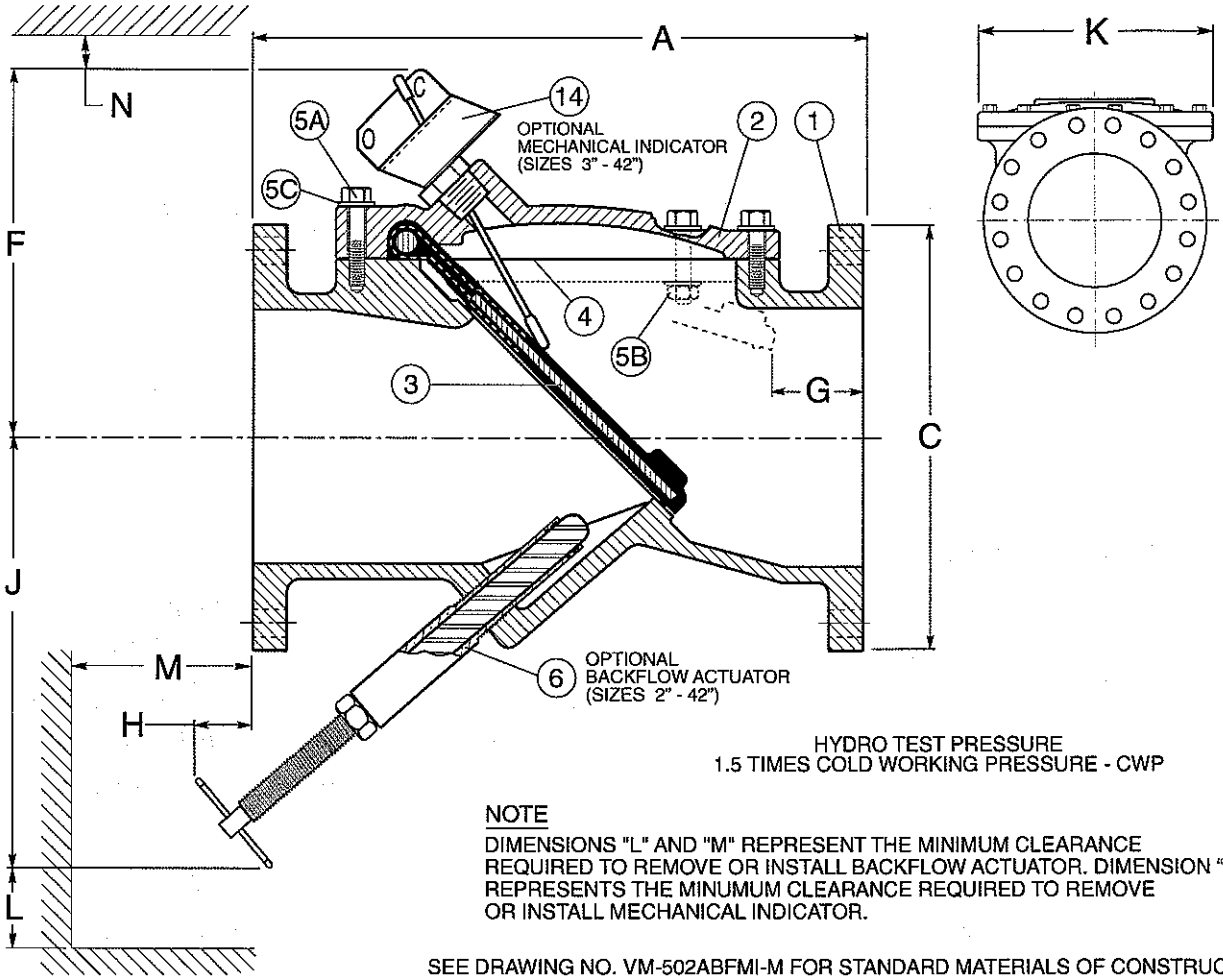
DISC POSITION INDICATOR -- The cover mounted disc position indicator provides clear indication of the valve's disc position. A SCADA compatible limit switch can also be provided. Both can be provided at the time of valve purchase or for field installation at a later date.

BACKFLOW ACTUATOR -- Available for use when manual backflow operation is required. Most commonly used for priming pumps, back flushing, draining lines, and system testing. The Val-Matic Backflow Actuator can be provided at the time of valve purchase or for field installation at a later date.



* The Val-Matic warranty and its remedies are available for 25 years covering the flex portion of the disc.


SHOP DRAWING REVIEW
THIS DRAWING HAS BEEN REVIEWED FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT ONLY. SUCH REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY FOR ERRORS OR OMISSIONS OR OF MEETING THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. NO RESPONSIBILITY IS ASSUMED FOR CORRECTNESS OF DIMENSIONS
✓
NOTED COMMENTS
AMEND & RESUBMIT
REJECTED
Submission No. 20
Project No. 07 8103
By CS
Date May 21/10
DILLON CONSULTING LIMITED



HYDRO TEST PRESSURE
1.5 TIMES COLD WORKING PRESSURE - CWP

NOTE

DIMENSIONS "L" AND "M" REPRESENT THE MINIMUM CLEARANCE REQUIRED TO REMOVE OR INSTALL BACKFLOW ACTUATOR. DIMENSION "N" REPRESENTS THE MINUMUM CLEARANCE REQUIRED TO REMOVE OR INSTALL MECHANICAL INDICATOR.

SEE DRAWING NO. VM-502ABFMI-M FOR STANDARD MATERIALS OF CONSTRUCTION.

ANSI CLASS 125

VALVE SIZE	MODEL NO.	CWP (PSI)	A	C	F	G	*H	J	K	L	M	N	BOLT SIZE	NO. OF BOLTS	SHPG. WT.
2	502ABF	250	8.00	6.00	N/A	1.63	-0.50	6.75	5.18	1.50	1.50	N/A	5/8	4	27
2 1/2	525ABF	250	8.50	7.00	N/A	1.63	-0.50	7.00	5.18	1.50	1.50	N/A	5/8	4	32
3	503ABFMI	250	9.50	7.50	7.63	1.63	-0.38	7.50	7.50	1.50	1.50	2.00	5/8	4	45
4	504ABFMI	250	11.50	9.00	8.25	2.12	3.38	10.75	8.25	2.50	2.50	2.00	5/8	8	70
6	506ABFMI	250	15.00	11.00	9.38	2.12	1.38	11.38	11.12	3.00	3.00	2.00	3/4	8	130
8	508ABFMI	250	19.50	13.50	11.00	2.88	2.00	15.75	16.00	5.75	5.75	3.25	3/4	8	250
10	510ABFMI	250	24.50	16.00	13.38	3.12	0.50	17.00	21.00	5.75	5.75	3.25	7/8	12	430
12	512ABFMI	250	27.50	19.00	15.00	3.43	3.50	22.50	24.00	6.50	6.50	4.50	7/8	12	660
14	514ABFMI	250	31.00	21.00	17.63	3.63	4.00	26.25	23.25	6.50	6.50	4.50	1	12	750
16	516ABFMI	250	32.00	23.50	18.88	3.25	4.63	30.00	25.25	6.50	6.50	4.50	1	16	900
18	518ABFMI	250	36.00	25.00	20.00	3.12	5.25	33.75	28.25	6.50	6.50	4.50	1 1/8	16	1230
20	520ABFMI	250	40.00	27.50	21.38	3.50	5.88	37.50	30.63	8.00	8.00	7.75	1 1/8	20	1750
24	524ABFMI	250	48.00	32.00	23.88	5.00	7.00	45.00	36.00	8.00	8.00	7.75	1 1/4	20	2400
30	530BFMI	150	56.00	38.75	27.63	5.75	-0.63	41.25	45.88	8.00	8.00	8.00	1 1/4	28	5110
30	530ABFMI	250	56.00	38.75	27.63	5.75	-0.63	41.25	45.88	8.00	8.00	8.00	1 1/4	28	5110
36	536BFMI	150	63.00	46.00	31.00	3.88	-.38	49.00	55.00	9.75	9.75	8.00	1 1/2	32	6700
36	536ABFMI	250	63.00	46.00	31.00	3.88	-.38	49.00	55.00	9.75	9.75	8.00	1 1/2	32	6700
42	542BFMI	150	70.00	53.00	39.12	0.12	-5.50	53.50	60.18	9.75	9.75	8.00	1 1/2	36	9110
42	542ABFMI	250	70.00	53.00	39.12	0.12	-5.50	53.50	60.18	9.75	9.75	8.00	1 1/2	36	9110

* DIMENSION "H" DOES NOT EXTEND PAST FLANGE ON VALVE SIZES 2" THRU 3", 30" THRU 42"
2" & 2 1/2" DO NOT HAVE A MECHANICAL INDICATOR BOSS.

SWING-FLEX® CHECK VALVE

DATE 11-17-08

VAL-MATIC® VALVE AND MANUFACTURING CORP.

DRWG. NO. VM-502ABFMI

SWING-FLEX® CHECK VALVE

SERIES NO. 500BFMI & 500ABFMI ANSI CLASS 125

STANDARD MATERIALS OF CONSTRUCTION

PART NO.	PART NAME	MATERIAL
1	BODY BODY	DUCTILE IRON ASTM A536, GRADE 65-45-12 (SERIES 500A) CAST IRON ASTM A126, CLASS B (SERIES 500)
2	COVER COVER	DUCTILE IRON ASTM A536, GRADE 65-45-12 (SERIES 500A) CAST IRON ASTM A126, CLASS B (SERIES 500)
3	DISC	BUNA-N W/ ALLOY STEEL & NYLON REINFORCEMENT
4	COVER SEAL (4"-12") COVER SEAL (2"-3", 14"-42")	BUNA-N COMPRESSED NON-ASBESTOS FIBER
5A	COVER BOLT	ALLOY STEEL SAE GRADE 5, PLATED
5B	COVER BOLT NUT (4"-12")	ALLOY STEEL, PLATED
5C	WASHER	ALLOY STEEL, PLATED
6	BACKFLOW ACTUATOR (OPTIONAL)	BRASS
14	MECHANICAL INDICATOR (OPTIONAL, SIZES 3"-42")	STAINLESS STEEL, TYPE 316

NOTE: ALL SPECIFICATIONS AS LAST REVISED.

MATERIALS OF CONSTRUCTION	DATE 11/17/08
VAL-MATIC® VALVE AND MANUFACTURING CORP.	DRWG. NO. VM-502ABFMI-M

SWING-FLEX® CHECK VALVE
Val Matic Specification

1 Scope
1.1 This specification is intended to cover the design, manufacture, and testing of 2 in. (50 mm) through 42 in. (1000 mm) Swing-Flex® Check Valves suitable for cold working pressures of 250 psig, 150 psig for 30 in. (800mm) and larger in water, wastewater, abrasive, and slurry service.
1.2 The check valve shall be of the full body type, with a domed access cover and only one moving parts, the flexible disc.

2 Standards, Approvals and Verification
2.1 The valves shall be designed, manufactured and tested in accordance with American Water Works Association Standards ANSI/AWWA C508.
2.2 Manufacturer shall have a quality management system that is certified to ISO 9001:2000 by an accredited, certifying body.

3 Connections
3.1 Valves shall be provided with flanges in accordance with ANSI B16.1, Class 125.

4 Design
4.1 The valve body shall be full flow equal to nominal pipe diameter at all points through the valve. The 4 in. (350mm) valve shall be capable of passing a 3 in. (75mm) sphere. The seating surface shall be on a 45 degree angle to minimize disc travel. A threaded port with pipe plug shall be provided on the bottom of the valve to allow for field installation of a backflow actuator, without special tools or removing the valve from the line.
4.2 The top access port shall be full size, allowing removal of the disc without removing the valve from the line. The access cover shall be domed in shape to provide flushing action over the disc for operating in lines containing high solids content. A threaded port with pipe plug shall be provided in the access cover to allow for field installation of a mechanical, disc position indicator.
4.3 The disc shall be of one-piece construction, precision molded with an integral o-ring type sealing surface, and contain alloy steel and nylon reinforcement in the flexible hinge area. The flex portion of the disc shall be warranted for twenty-five years. Non-Slam closing characteristics shall be provided through a short 35 degree disc stroke and a memory disc return action.
4.4 The valve disc shall be cycle tested 1,000,000 times in accordance with ANSI/AWWA C508 and show no signs of wear, cracking, or distortion to the valve disc or seat and shall remain drop tight at both high and low pressures. The test results shall be independently certified.

5 Materials
5.1 The valve body and cover shall be constructed of ASTM A536 Grade 65-45-12 ductile iron or ASTM A126 class B for 30 in. (800mm) and larger. Optional body materials include ASTM A-351 Grade CF8M, stainless steel (sizes 3" through 8").
5.2 The disc shall be precision molded Buna-N (NBR), ASTM D2000-BG. Optional disc material includes viton.

6 Options:
Note: remove (when specified) to include the following options as part of the specification.
6.1 A screw-type backflow actuator shall be provided (when specified) to allow opening of the valve during no-flow conditions. Buna-N seals shall be used to seal the stainless steel stem in a bronze bushing. The backflow device shall be of the rising-stem type to indicate position. A stainless steel T-handle shall be provided for ease of operation.
6.2 A mechanical indicator shall be provided (when specified) to provide disc position indication on valves 4" and larger. The indicator shall have continuous contact with the disc under all operating conditions to assure accurate disc position indication.
6.3 A pre-wired limit switch will be provided (when specified) to indicate open/closed position to a remote location. The mechanical type limit switch shall be activated by the external position indicator. The switch shall be rated for NEMA 4, 6, or 6P and shall have U.L. rated 5 amp, 12 or 250 VAC contacts.
6.4 A bottom mounted oil dashpot (oil cushion) shall be provided when specified to provide hydraulic control of the final 10% of valve closure and reduce valve slam and water hammer normally associated with rapid flow reversal conditions on pump shut down. The dashpot shall consist of a high pressure hydraulic cylinder, adjustable external flow control valve, oil reservoir, pressure gauge, staniness steel air inlet valve, and piping designed to control the closing speed of the last 10% of travel in 1-5 seconds. A threaded brass dahpot bushing unit with a grease fitting for lubrication shall connect the cylinder to the valve and 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's stainless steel strike plate.

7 Manufacture
7.1 The manufacturer shall demonstrate a minimum of five (5) years experience in the manufacture of resilient, flexible disc check valves with air and hydraulic cushions.
7.2 All valves shall be hydrostatically tested and seat tested to demonstrate zero leakage. When requested the manufacturer shall provide test certificates, dimensional drawings, parts list drawings, and operation and maintenace manuals.
7.3 The exterior and interior of the valve shall be coated with an ANSI/NSF 61 approved fusion bonded epoxy coating.
7.4 Swing-Flex® Check Valves shall be Series #500 as manufactured by Val-Matic® Valve & Manufacturing Corporation, Elmhurst, IL. USA or approved equal.

Revised 1-3-07

SWING-FLEX® CHECK VALVE SPECIFICATION	DATE 6-6-06
VAL-MATIC® VALVE AND MANUFACTURING CORP.	DRWG. NO. VM-500A-S