![Val-Matic logo]

White Paper

Features and Performance Comparison of the Val-Matic® Swing-Flex® Check Valve to Traditional Swing Check Valves

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Specifiers Check List
Val-Matic Swing-Flex® Check Valve
vs.
The Traditional Swing Check

Feature	Val-Matic Swing-Flex®	Traditional Swing Check
Low Head Loss/Non-Slam Closing	Yes	No[1]
Backflow Capability	Yes	Yes
Rubber Lining Capability	Yes	No
Number of Wear Parts	1	10-15
Low Maintenance	Yes	No
Open/Closed Indication	Yes	Yes
Optional SCADA Compatible Signal Switch	Yes	No
Positive Shut-Off	Yes	No[2]
Competitively Priced	Yes	Yes
Independent 1,000,000 Cycle Test	Yes	No
Twenty-Five Year Disc Warranty[3]	Yes	No
Water /Wastewater Service	Yes	Yes
Sludge Service	Yes	Yes
Abrasive Service	Yes	No[4]
Corrosive Service	Yes[5]	No
Vertical Flow-up Service	Yes	Yes
Full Top Access Cover	Yes	Yes
Full Flow Area	Yes	Yes[1]

1. By placing sufficient weight on the lever and thereby reducing the valve stroke, non-slam closure is achievable, however, reducing the stroke places the disc in the flow which results in a substantial increase in head loss.
2. Swing-Flex® supplied standard with bubble-tight shut off per ANSI/AWWA Standard C508, paragraph 5.2.2.4. Traditional Swing checks supplied standard with metal to metal seating and have an allowable leakage rate of one fluid ounce per hour per inch of nominal valve size per ANSI/AWWA C508 paragraph 5.2.2.3.
3. The Val-Matic warranty and its remedies are available for 25 years, covering the flex portion of the disc.
4. Abrasives will cause excessive wear to bronze trim, causing premature failure.
5. When specified with optional rubber lining.

The following check valve papers are available from Val-Matic: Design and Selection Criteria of Check Valves, Swing-Flex® Cycle Test Report, Swing-Flex® Proof of Performance Test Report and Tilted Disc® Check Valve Hydrostatic and Cycle Test Report. Please contact Val-Matic for complimentary copies.

The most commonly used check valve in our industry is the traditional Swing Check Valve (with or without weight or spring and lever). The technology behind this valve is Nineteenth Century vintage and has it roots in the early Roman aqueducts. One hundred years of technological advances have brought about the electric light, the automobile, the telephone, and a technically advanced check valve, the Swing-Flex®. Superior design and performance features make the Swing-Flex® the clear choice in Municipal/Industrial Water and Wastewater applications. It is specified with confidence for sludges, slurries, corrosives, abrasives and vertical flow up applications.

The following compares the design features of the traditional Swing Check to a Swing- Flex® Check Valve.

- Both valves are of the Swing Check Valve type.

- Both valves are of the full body flanged type.

- Both valves have 100% unrestricted flow area.

- Both valves have full top access covers.

- Both valves offer back flow capabilities.

    The traditional swing check valve utilizes its lever for back flow operations. It is performed by supporting the lever with a board, bar etc. during back flow. The Swing-Flex® has a back-flow device designed specifically for this purpose.

- Both valves offer open/close indication.

    The traditional swing check uses the lever as a visual means for open/close indication. The Swing-Flex® offers a state of the art, SCADA compatible signal switch and a "check light" package that clearly indicates open/close operations. This same switch can be used in conjunction with SCADA systems and/or tied into the pump control panel.

Up to this point, both valves are fairly equal. However, from this point on, there are significant differences.

- Both valves claim non-slam closing action.

    The methods by which each achieve non-slam closure are quite different as are the resulting effects on closure and flow efficiency.

- Closing action of traditional Swing Check Valves with lever and weight.

    Due to the long, 65 - 90-degree disc stroke, traditional Swing Check valves have a propensity to slam. The valves disc, if allowed to close on its own, will typically not close prior to reverse flow taking place. This leads to line surges caused by the sudden termination of reverse flow when the disc is slammed into the closed position. The way

to minimize slamming and resultant surges is to move the disc from the open to closed position as rapidly as possible. This is the function of a swing checks weight and lever. The increased weight shortens the disc stroke by not allowing the disc to reach its full open position as well as increasing the closing speed of the disc. The faster closing time minimizes flow reversal, thereby reducing water hammer created by the sudden stopping of reverse flow.

- Negative side effects of this design.

    There are two negative side effects caused by the lever and weight design.

    First, the added weight forces the disc into the flow creating an obstruction in the natural flow path, causing the fluid to be diverted around the disc. A substantial increase in headloss will be realized as a result of the increased turbulence and reduction in flow area.

    The second negative affect is disc oscillation. This occurs because the added weight won't allow the disc to reach the full open position and stabilize against the body stop. The disc is left to oscillate in the flow leading to premature wear and eventual valve failure.

- Closing action of the Val-Matic Swing-Flex® Check Valve.

    The "Swing-Flex®" achieves non-slam closure by shortening the stroke without any inherent negative side effects.

    A short stroke is designed into the valve by utilizing a 45-degree angled seat. The resulting 30-degree stroke is less than half the stroke of a typical swing check valve. The disc speed is also increased by the inherent memory flex action of the reinforced encapsulated disc. The result of these design features is reduced closing time with non-slam closure.

    Disc stabilization is provided by the short disc stroke and streamlined body contour which assures that the disc will be stabilized against the body stop in all but very minimal flows.

- Swing-Flex® offers low maintenance and reliability.

    o Swing-Flex® Maintenance.

    Ease of maintenance is provided by utilizing only one moving part, the reinforced encapsulated disc. There are no pivot pins, bearings, mechanical hinges, linkage mechanisms, packing, or sheer pins to contend with, only the Memory-Flex™ disc.

- o   Swing-Flex® Reliability.

    Reliability is provided by producing a disc that contains heavy steel reinforcement in the central disc area and the pivot, along with heavy duty, double wrapped nylon reinforcement in the flex portion of the disc.

    A "Proof of Design" test was conducted on the valve to confirm the disc reliability. The valve was cycle tested one million times by an independent, third party testing laboratory. At the conclusion of the test, the independent test laboratory certified that the valve disc showed no evidence of wear, cracking or tearing and the valve remained drop tight during hydrostatic testing (test report available on request).

    Based on this proven design, Val-Matic has applied its warranty for <u>25 years</u> to the flex portion of the valve's disc.

- Swing-Flex® offers drop tight seating as standard.

    Traditional Swing check valves can be supplied with metal to metal seating (standard) or resilient seating (optional). They are built to comply with either MSS Standard SP-71 or ANSI/ AWWA Standard C508.

    MSS Standard SP-71 states the following under paragraph 7.3:

    7.3 The maximum permissible leakage rate shall be 40 milliliters per hour, per inch of nominal valve size.

    ANSI/ AWWA C508 states the following under paragraph 5.2.2.3:

    5.2.2.3 Maximum permissible leakage shall be 1 fl. oz (30mL) /hour/ inch of the nominal valve-size or inside seat-ring diameter in metal-to- metal seated valves.

    ANSI/AWWA C508 under paragraph 5.2.2.4 goes on to state:

    5.2.2.4 Maximum Resilient seated valves shall show no leakage past the seat. This applies to low (.43 PSI) as well as high (200 PSI) pressures.

    The Swing-Flex® exceeds the metal to metal seated requirements and fully complies with the Resilient Seated valve requirements of the ANSI/AWWA Standard at both high and low pressures.

- Only Swing-Flex® offers rubber lining for corrosive service.

    Rubber lining of a traditional swing check valve is not a viable option due to the number of moving parts. The Swing-Flex® was designed for it. The cast iron bodies of both the traditional Swing Check and the Swing-Fie are fine in typical industrial/municipal water

and wastewater flow streams. But when the flow stream is highly corrosive, protection of the cast iron is a necessity. When lined, the body of the Swing-Flex® is totally encapsulated leaving no exposed metal. The body lining capability coupled with the totally encapsulated disc provides a valve well suited for corrosive applications.

- Only Swing-Flex® offers a smooth flow path and rubber lining for abrasive service.

  Due to the smooth flow path of the Swing-Flex® the cast iron body holds up much better than the traditional swing check body. This has been independently proven in highly abrasive fly ash applications where traditional swing checks have been replaced by unlined Swing-Flex® check valves. (Third party report available on request).

  For application where the smooth flow path alone will not suffice, a wide variety of lining materials are available.