



## White Paper

# Swing-Flex® Check Valve Proof of Performance Test Report

### Table of Contents

Project Scope . . . . .	2
Conclusions . . . . .	3
System Parameters . . . . .	4
System History Report . . . . .	5
Test Report . . . . .	6

## Project Scope

### **Manufacturer:**

Val-Matic Valve & Mfg. Corp.  
905 Riverside Drive  
Elmhurst, IL 60126'

### **Product:**

Val-Matic Swing Flex® Check Valve  
Size 6", Model 506 with ANSI 125 LB. Flanges,  
Cast Iron Body and Cover, Nylon and Steel  
Reinforced Buna-N Disc.

### **Service:**

Over five years in abrasive and corrosive power plant bottom ash recovery service. See System Parameters (Page 4) for flow conditions and additional information.

### **Test Description:** (See Page 6 for Third Party Test Report)

1. Seat leakage test.
2. Inspection and evaluation of the disc, body and seat.

### **Purpose of Test**

To evaluate if, after five years in extremely severe service, the valve will still seat drop tight at low and high pressure.

### **Test Procedure:**

See Page 6 for Independent Test Procedure.

## Test & Evaluation Conclusions

### Leakage Test Conclusions:

At 55 PSI, valve seating was drop tight with no leakage observed. At 200 PSI only two drops of liquid were observed.

### Inspection and Evaluation Conclusions:

Disc: There was minimal wear visually observed on the top of the "O" Ring Seal.

Body: The body showed signs of minor surface corrosion.

Seat: The seat experienced minor pitting on the upstream edge.

### Conclusion:

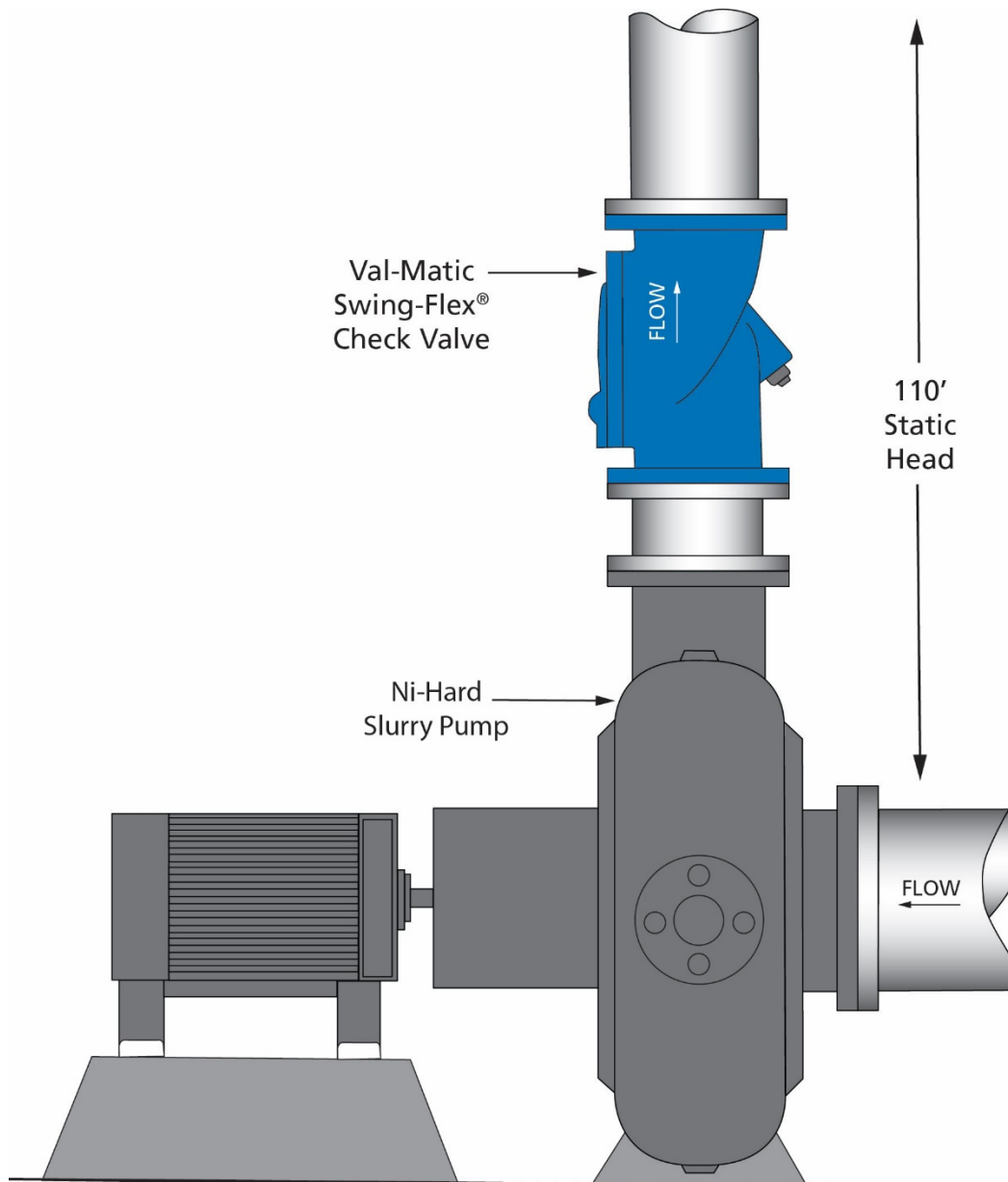
Given the five years of severe service to which the valve was subjected, it was found to be in excellent condition.

Based on inspection and testing, it is believed that the valve would continue to function satisfactorily for an extended period of time.

# Swing-Flex® Check Valve Proof of Performance Test Report

## System Parameters

The valve was installed in a coal burning, 220 MWT power station, in a bottom ash recovery system. The system has been in service for 15 years. Flow conditions through the valve are as follows: The valve is mounted in a vertical flow up position just off an 800 GPM Ni-Hard horizontal slurry pump (Figure 1). Head is 110 feet, temperature varies from 110°-130° Fahrenheit. The media is light bottom ash suspended in recovery water. It is extremely aggressive, as it is not only very abrasive, but also corrosive due to the acidic nature of the water. The system is typically in service 24 hours a day and cycles approximately 30 times a day.



**FIGURE 1. Vertical Flow Up with Horizontal Slurry Pump**

# Swing-Flex® Check Valve Proof of Performance Test Report

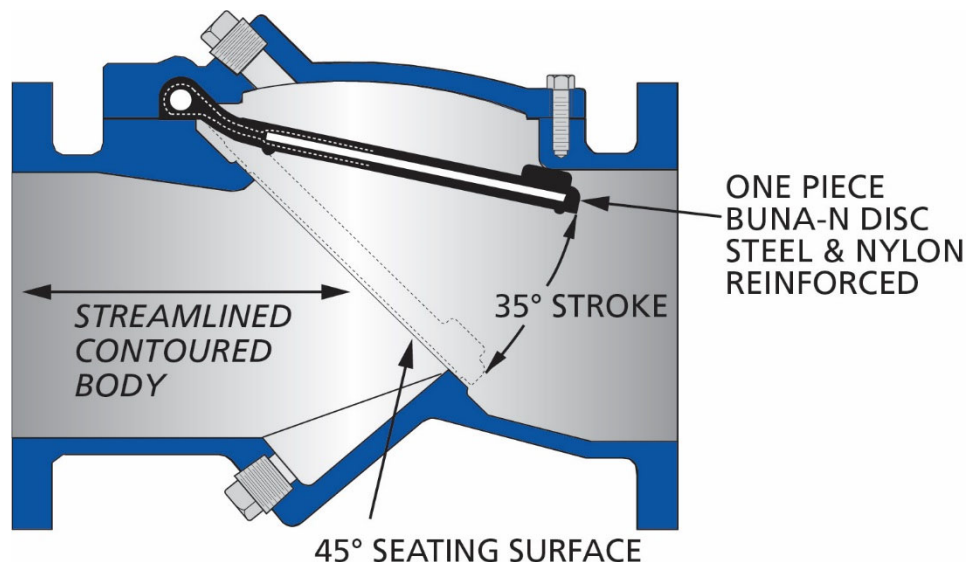
## System History

The original installation utilized a "duckbill" type check valve. The valve is designed with a rubber "duckbill" sleeve inside the valve body. The "duckbill" pinches off at the downstream end of the body, allowing flow in one direction only. These valves failed in as little as two weeks of service. Failure was due to the duckbill being abraded by the bottom ash, as well as the duckbill being turned inside out due to the dynamics created by the 110 feet of head.

The duckbill valve was replaced by a ball type check valve. The ball check failed after four months in service. Failure was due to abrasion of the ball.

The user then attempted to utilize conventional swing check type valves. These were utilized for approximately 5-6 years with valve replacement required approximately every 6-12 months. Abrasion to the discs and seats was the reason for failure.

In October of 1987 the user decided to try a Val-Matic Swing Flex type check valve (Figure 2).



**FIGURE 2. Swing-Flex® Check Valve**

The Swing Flex utilizes a one-piece steel and nylon reinforced Buna-N rubber disc. The seat is on a 45° angle minimizing disc travel and therefore minimizing slamming. The cast iron body is streamlined and contoured to allow for smooth, non-turbulent flow through the valve. The Val-Matic Swing Flex was left in service for over five years. During this period there was no maintenance required or performed on the valve at any time. In February of 1993, the valve was removed from service at the request of the manufacturer, Val-Matic Valve & Mfg. Corp. Val-Matic made the request in order to evaluate the condition of the valve after five years in the aforementioned severe service. The power station was given a new valve at no charge to replace it. The evaluation and leakage tests were performed at the manufacturer's facilities in Elmhurst, IL and witnessed by PSI, Pittsburgh Testing Laboratories, an independent testing firm.

## Independent Test Report

---



**Professional Service Industries, Inc.**

### **Observation of Performance Tests**

**Reported to:** Val-Matic Valve and  
Manufacturing Corporation  
905 Riverside Drive  
Elmhurst, Illinois 60126

**Product:** Val-Matic Swing Flex Check Valve  
Size 6", Model 506 with ANSI 125 lb. Flanges  
Cast Iron Body and Cover, Nylon and Steel  
Reinforced Buna-N Disc

**PSI No:** 150-38027-001

---

### **Scope**

On May 3, 1993 our representative, Mr. M. Schilke visited the client's facility to visually inspect and witness leakage tests as conducted on the above identified product, reported by the client to have been removed from active service after five years.

### **Test Procedure**

A hydrostatic test fixture was bolted to the downstream flange. The fixture contained a pressure line and vent line. The upstream end of the valve was left open to atmosphere.

With the valve's disc in the closed position, the downstream side of the valve was filled with water through the pressure line. The air within the valve was allowed to escape through the vent line.

A hydrostatic pressure was then applied and monitored by means of a calibrated pressure gauge.

A low pressure test of 55 psi (city water pressure) was held for five minutes. The seating was then inspected.

A high pressure test was then conducted at 200 psi for five minutes, following which the seating was again inspected.

# Swing-Flex® Check Valve Proof of Performance Test Report

## Independent Test Report

---

Val-Matic Valve and  
Manufacturing Company  
July 27, 1993  
Page Two of Two

### Results of Inspection and Leakage Tests

Low Pressure Test: At 55 psi the valve seating was drop tight with no leakage observed.

High Pressure Test: At 200 psi only two drops of liquid were observed.

Inspection of Disc: There was minimal wear visually observed on the top of the "O" ring seal.

Inspection of Body: The body showed signs of minor surface corrosion.

Inspection of Seat: The seat exhibited minor pitting on the upstream edge.

PSI Representative: M. Schilke

Respectfully submitted,

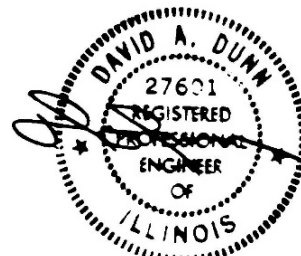
PROFESSIONAL SERVICE INDUSTRIES, INC.

Prepared by:



David A. Dunn, P.E.  
Senior Vice President

DAD/sr



Seal expires 11-30-94

## *Disclaimer*

*Val-Matic White Papers are written to train and assist design engineers in the understanding of valves and fluid systems. Val-Matic offers no warranty or representation as to design information and methodologies in these papers. Use of this material should be made under the direction of trained engineers exercising independent judgement.*