LUMOS & ASSOCIATES

Carson City • El Dorado Hills • Fallon • Lake Tahoe • Reno www.LumosInc.com

Carson City
308 N. Curry Street, Suite 200
Carson City, Nevada 89703
775.883.7077

September 22nd, 2023

Ms. Kelly Wooldridge
Elko City Clerk
1751 College Avenue
Elko, Nevada 89801

Subject: Addendum No. 3 to the Bid Form and Plans for the City of Elko Exit 298 Lift Station and Force Main Project

Dear Ms. Wooldridge:

Lumos would like to advise all bidders on the project of three approved equals.

1. The dry-pit sewer pumps detailed in Spec Section 22 13 43:
    a. Flygt N80 Concertor Pump is considered an approved equal.
2. 6" Check Valves on Sheet C4.0:
    a. Val-Matic Swing-Flex® Check Valves are considered an approved equal.
3. 8" Full Port Flanged Ball Valves per Specification Section *221300 Part 2.5.C. – Ball Valves, 3-Inch to 16-Inch* which list carbon steel bodies with a type 316SS ball:
    a. Val-Matic 4000 Series AWWA Rubber Seated Ball Valve is considered an approved equal.

If you have any questions, please do not hesitate to contact me at 916-980-8228.

Sincerely,

Cami L. Jackson, P.E.
Project Manager

CC: Dale Johnson, City of Elko Utilities Director
Jonathan Lesperance, P.E., Group Manager
Mara Quiroga, P.E., Senior Engineer

Attachments:

Attachment A – Flygt N80 Concertor Technical Details

Attachment B – B&K Valves Information Packet

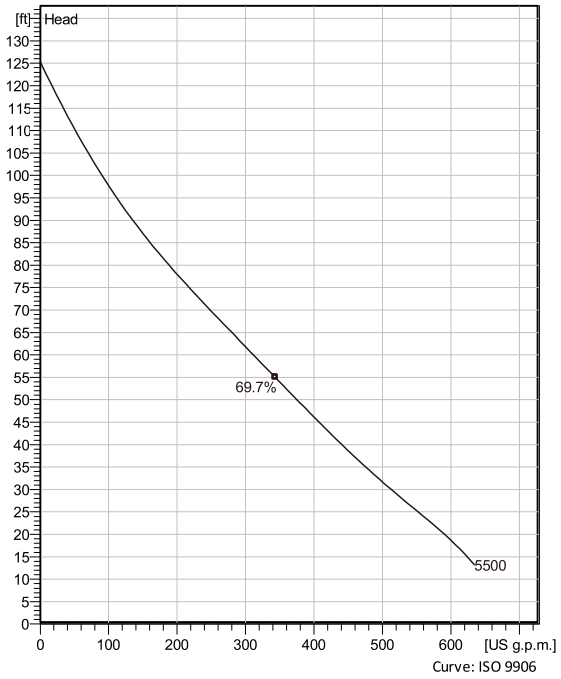
Attachment A – Flygt N80 Concertor Technical Details

Concertor N80-5500

The most intelligent wastewater pump on the market. Suitable for customers operating traditional on/off pump stations who want to benefit from re-settable pump performance, clog detection and pump cleaning, soft start, constant power and motor protection.

Technical specification

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Configuration

Motor number
N6020.181 18-08-1AZ-D 7.5hp

Installation type
T - Vertical Permanent, Dry

Impeller diameter
170 mm

Discharge diameter
3 inch

Pump information

Impeller diameter
170 mm

Discharge diameter
3 inch

Inlet diameter
110 mm

Maximum operating speed
800-2905.7 rpm

Number of blades
2

Max. fluid temperature
40 °C

Materials

Impeller
Hard-Iron ™

Project	Xylect-21122117	**Created by**	Aaron Terry		
Block		**Created on**	9/12/2023	**Last update**	9/12/2023

Concertor N80-5500

Technical specification

Motor - General

Motor number N6020.181 18-08-1AZ-D 7.5hp	**Phases** 3~	**Rated speed** 800-2906 rpm	**Rated power** 7.5 hp
ATEX approved No	**Insulation class** H	**Rated current** 8 A	**Type of Duty** S1
Frequency 60 Hz	**Rated voltage** 460 V	**Motor efficiency class** IE4 according to IEC/TS 60034-30-2 Ed. 1	

Motor - Technical

Power factor - 1/1 Load 0.95	**Motor efficiency - 1/1 Load** 90.0 %	**Nominal speed - 1/1 Load** 2300 rpm
Power factor - 3/4 Load 0.95	**Motor efficiency - 3/4 Load** 91.0 %	**Nominal speed - 3/4 Load** 2070 rpm
Power factor - 1/2 Load 0.95	**Motor efficiency - 1/2 Load** 91.0 %	**Nominal speed - 1/2 Load** 1840 rpm

Starting current
8 A

Project	Xylect-21122117	**Created by**	Aaron Terry		
Block		**Created on**	9/12/2023	**Last update**	9/12/2023

Concertor N80-5500

Monitoring and Control equipment

Project	Xylect-21122117	**Created by**	Aaron Terry		
Block		**Created on**	9/12/2023	**Last update**	9/12/2023

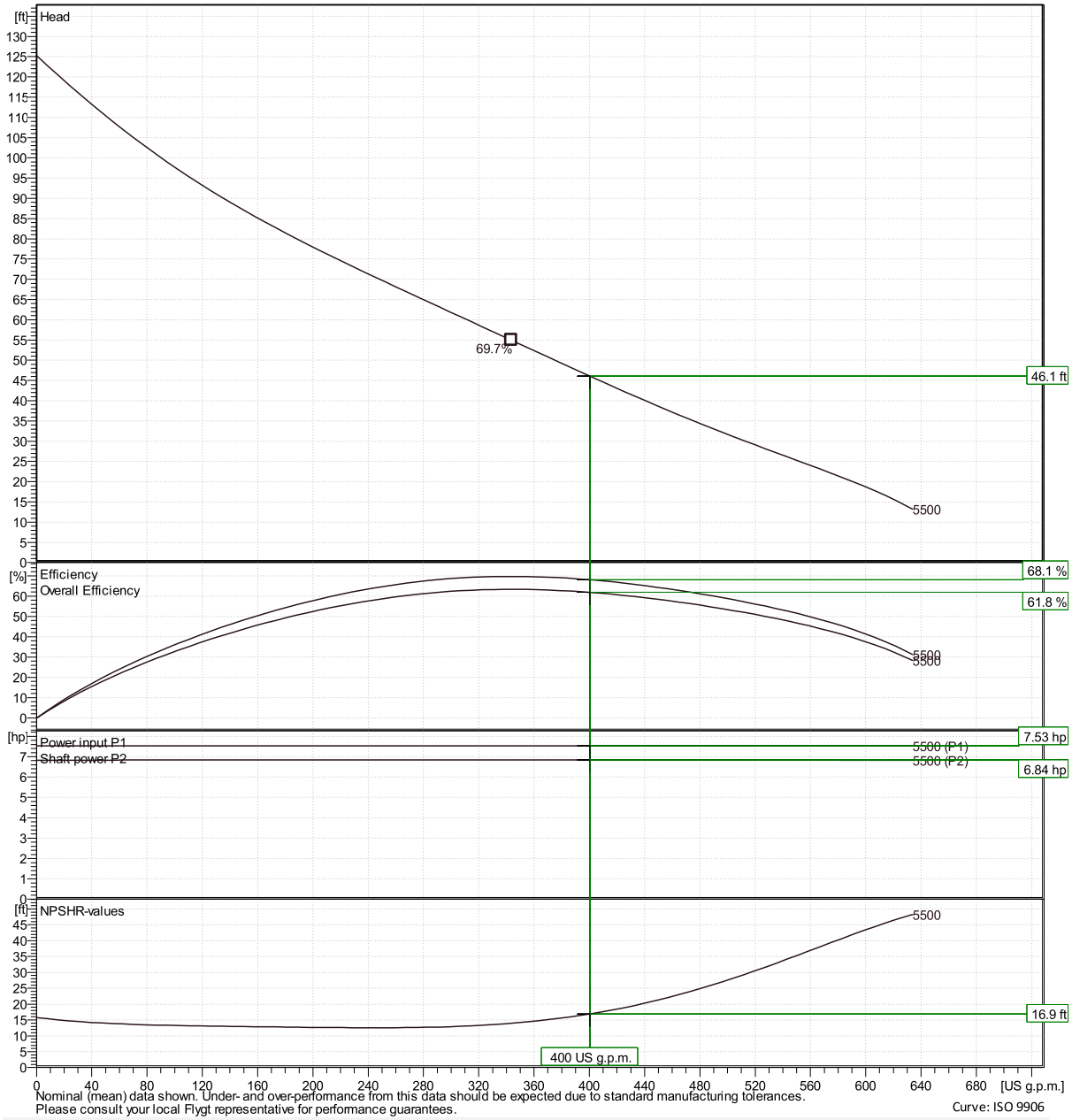
Concertor N80-5500

Performance curve

Duty point

Flow	Head
400 US g.p.m.	46.1 ft

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

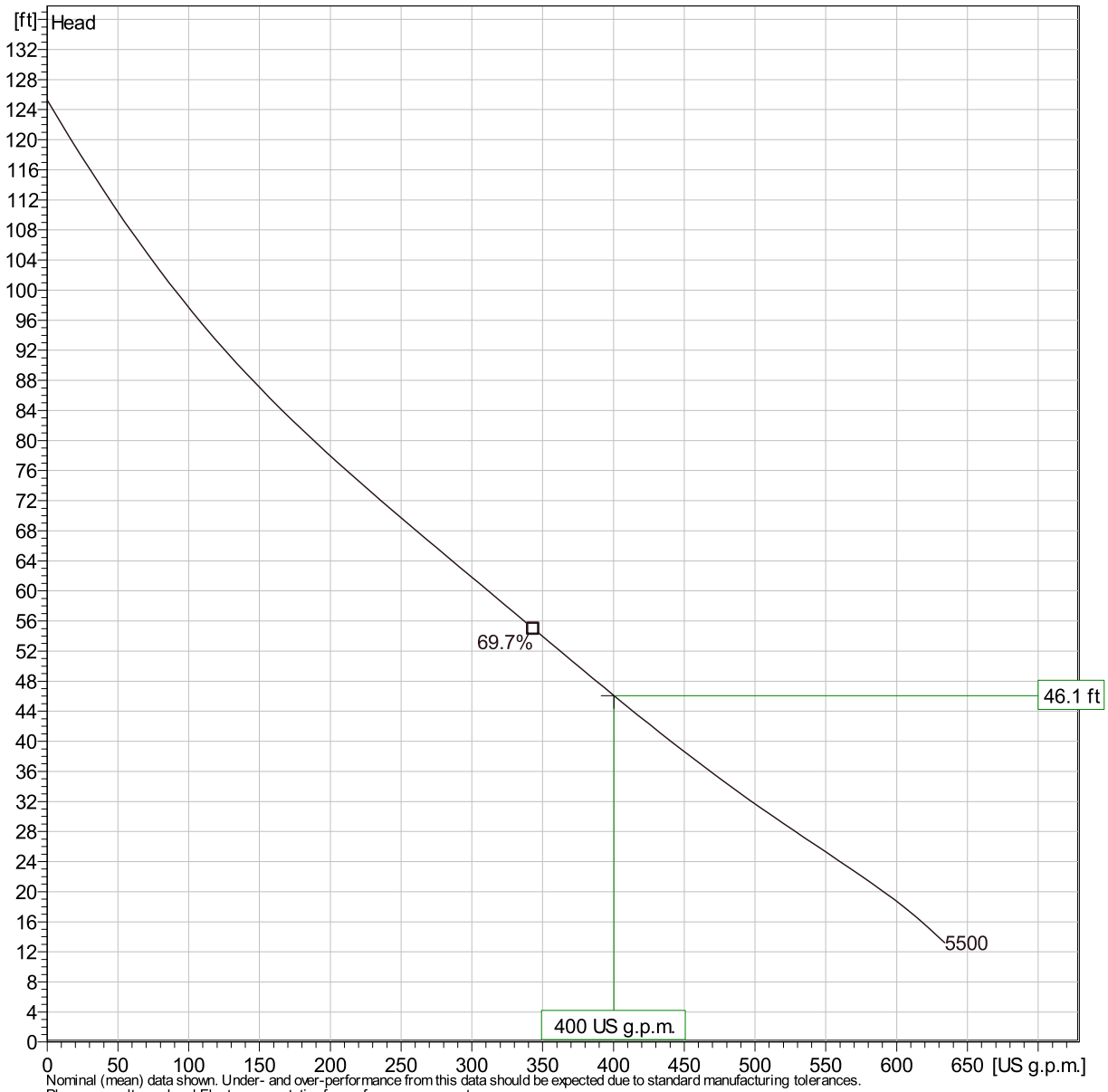
Curve: ISO 9906

Project	Xylect-21122117	**Created by**	Aaron Terry	**Last update**	9/12/2023
Block		**Created on**	9/12/2023		

Concertor N80-5500

Duty Analysis

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

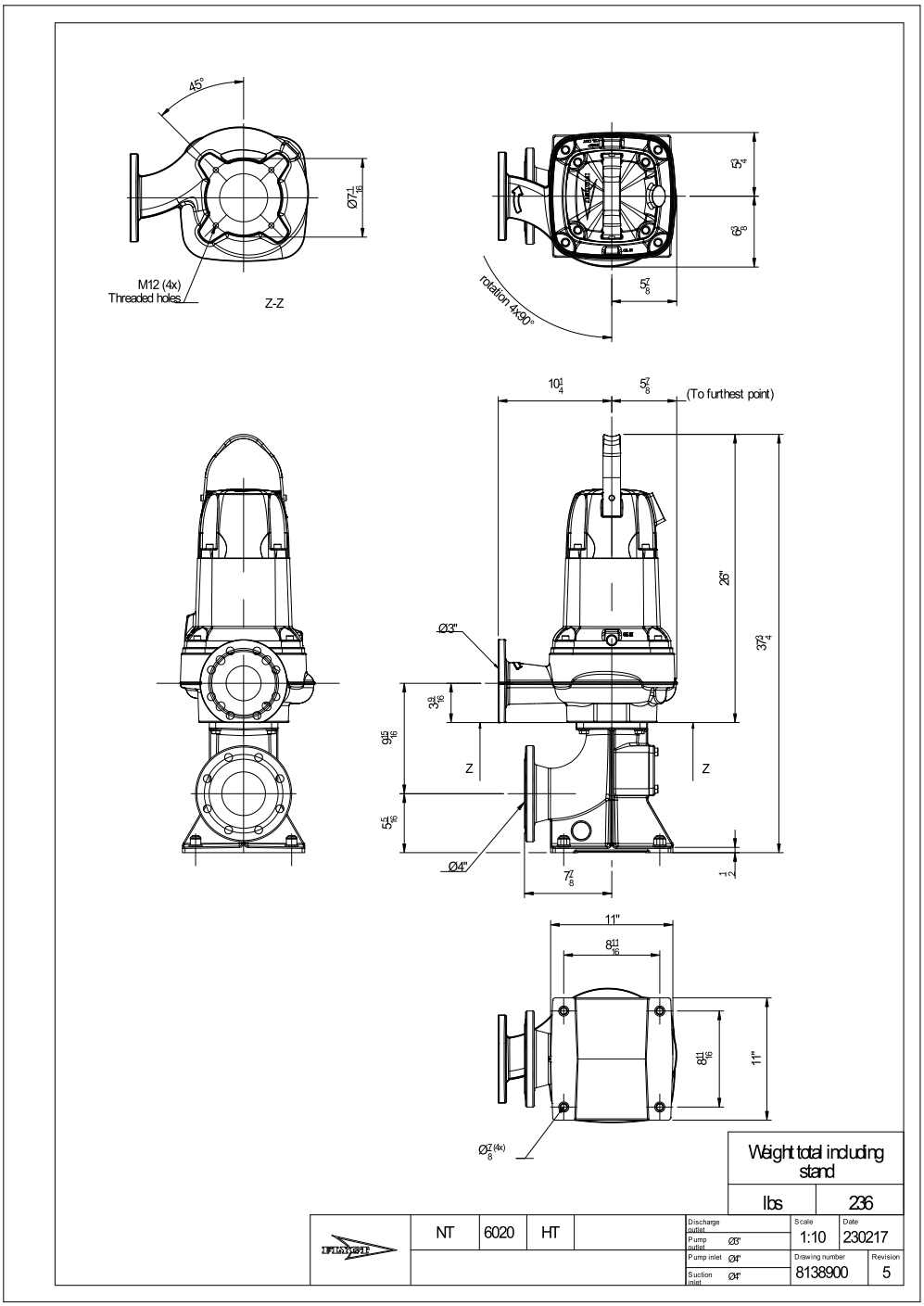
Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
	US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft

Project		**Created by**	Aaron Terry		
Block	Xylect-21122117	**Created on**	9/12/2023	**Last update**	9/12/2023

Concertor N80-5500

Dimensional drawing



Project	Xylect-21122117		**Created by**	Aaron Terry	
Block			**Created on**	9/12/2023	**Last update** 9/12/2023

Attachment B – B&K Valves Information Packet

Josh Coyne
B&K Valves & Equipment, Inc.
(916) 677-9798 mobile
(866) 999-3955 fax
jcoyne@bkvalves.com

Date: **9/21/2023**

To: **City Clerk – City of Elko**

Subj: **Exit 298 Sewer Lift Station & Force Main Bid Questions**

Good Day,

This information packet concerns the two types of Val-Matic valves per our email, which are as follows:

Check Valves
Val-Matic Model 500A Swing-Flex® Check Valve, Class 125 Flange Drilling, Ductile Iron Construction, Reinforced Buna-N Disc, NSF61 Fusion Bonded Epoxy Lining and Coating

Ball Valves
Val-Matic 4000 Series AWWA C507 Rubber Seated Ball Valve, Class 125 Flange Drilling, Cast Iron Construction, Buna-N Resilient Seat, NSF61 Fusion Bonded Epoxy Lining and Coating

Additional information including catalog sheets, material of construction, and dimensional data are included within for reference. Please contact us at any time should you need any additional information to assist in your consideration of these valves for use on this project.

Thank you.

Respectfully,

Josh Coyne
B&K Valves and Equipment
C(916) 677-9798
jcoyne@bkvalves.com

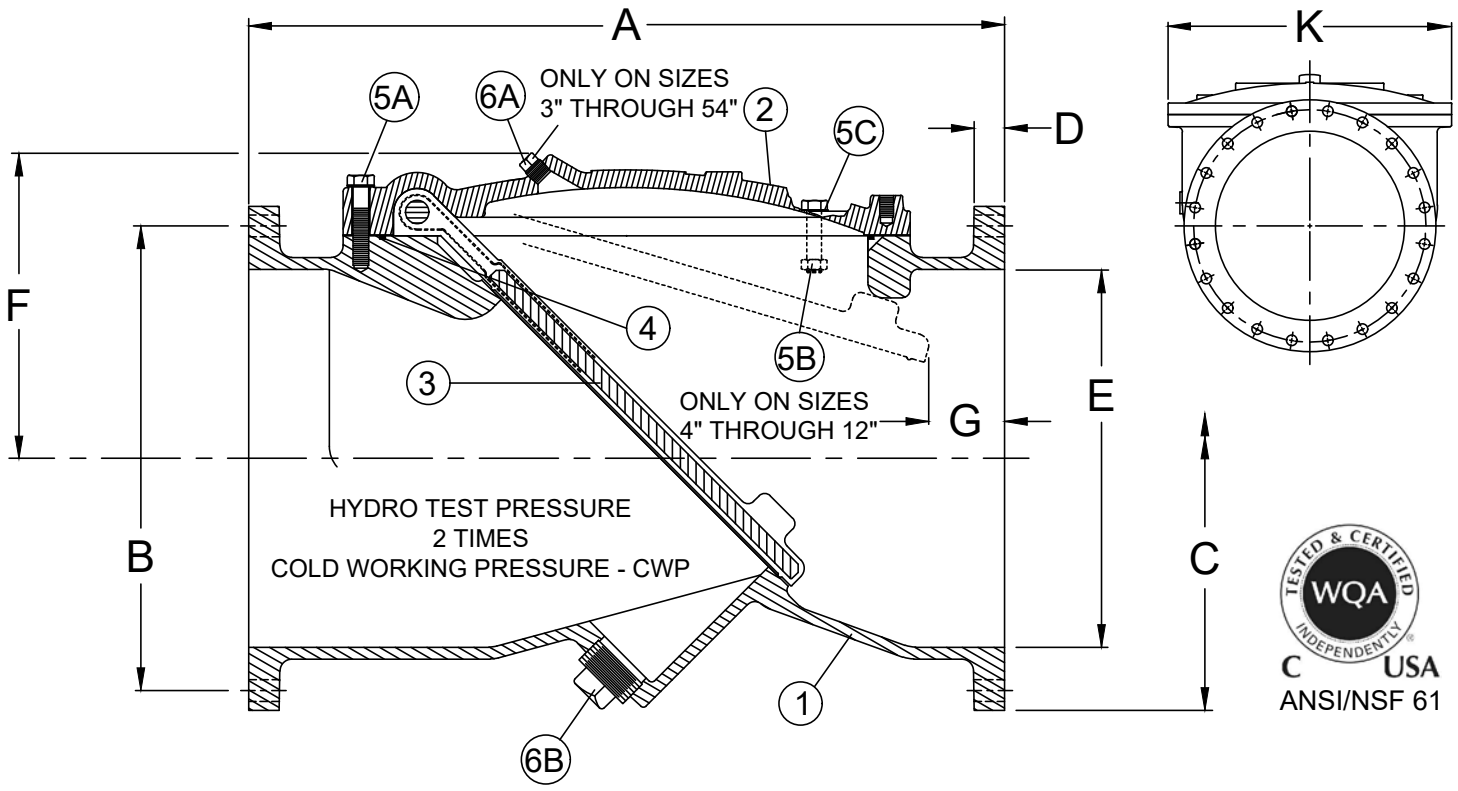
VAL-MATIC®

SWING FLEX® CHECK VALVE

Swing-Flex® Check Valves

www.valmatic.com

Designed and Manufactured
to AWWA C508
NSF/ANSI 61 Certified
NSF/ANSI 372 Certified



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

DRAWING DEPICTS 24" SIZE TO SCALE

ANSI CLASS 125

VALVE SIZE	MODEL NO.	CWP (PSI)	A	B	C	D	E	F	G	K	BOLT SIZE	NO. OF BOLTS	NO. BOLTS TAPPED
2	502A	250	8.00	4.75	6.00	0.69	2.00	3.38	1.63	5.18	5/8	4	--
2 1/2	525A	250	8.50	5.50	7.00	0.75	2.50	3.38	1.63	5.18	5/8	4	--
3	503A	250	9.50	6.00	7.50	0.81	3.00	5.13	1.63	7.50	5/8	4	--
4	504A	250	11.50	7.50	9.00	0.75	4.00	5.75	2.13	8.25	5/8	8	--
6	506C	250	14.00	9.50	11.00	0.75	6.00	6.88	1.63	11.13	3/4	8	--
8	508A	250	19.50	11.75	13.50	0.88	8.00	8.38	2.88	16.00	3/4	8	--
10	510A	250	24.50	14.25	16.00	1.18	10.00	10.75	3.13	21.00	7/8	12	--
12	512A	250	27.50	17.00	19.00	1.25	12.00	12.50	3.43	24.00	7/8	12	--
14	514A	250	31.00	18.75	21.00	1.38	14.00	13.00	3.63	23.25	1	12	--
16	516C	250	36.00	21.25	23.50	1.43	16.00	14.25	5.25	25.25	1	16	--
18	518C	250	40.00	22.75	25.00	1.56	18.00	15.25	5.13	28.25	1 1/8	16	--
20	520A	250	40.00	25.00	27.50	1.68	20.00	16.88	3.50	30.63	1 1/8	20	--
24	524A	250	48.00	29.50	32.00	1.88	24.00	19.25	5.00	36.00	1 1/4	20	--
30	530A	250	56.00	36.00	38.75	2.13	30.00	23.00	5.75	45.88	1 1/4	28	--
36	536A	250	63.00	42.75	46.00	2.38	36.00	27.38	3.88	55.00	1 1/2	32	8
42	542A	250	70.00	49.50	53.00	2.63	42.00	36.88	0.13	60.18	1 1/2	36	10
48	548A	250	76.00	56.00	59.50	2.75	48.00	40.66	0.13	68.00	1 1/2	44	12
54	554A	250	87.00	62.75	66.25	3.00	54.00	43.00	2.00	75.50	1 3/4	44	12

Revised 4/12/21 (Rev 15)

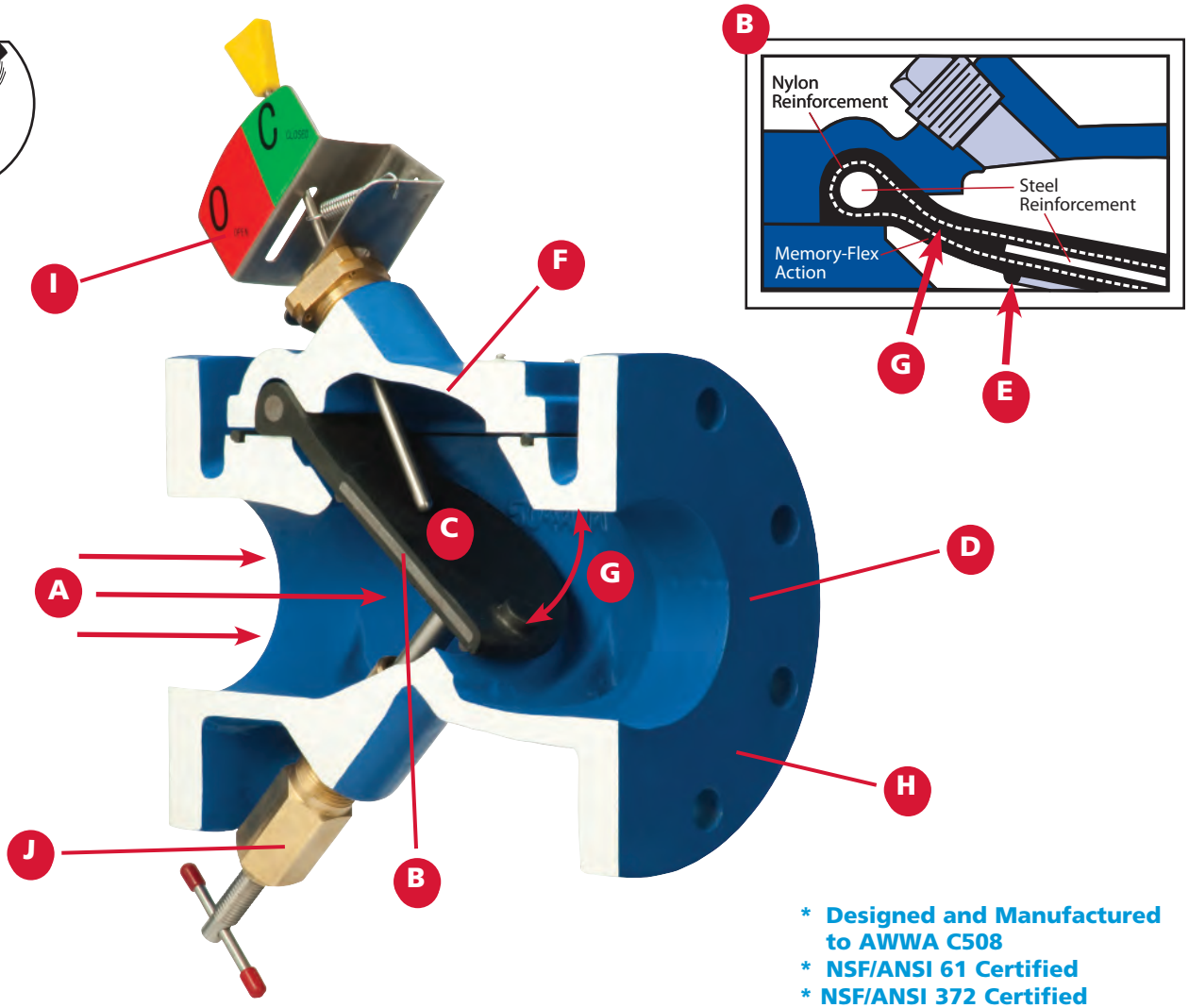
SWING-FLEX® CHECK VALVE

DATE 10-17-08

VAL-MATIC® VALVE AND MANUFACTURING CORP.

DRWG. NO. VMC-502A

Feature Highlights



* **Designed and Manufactured to AWWA C508**
* **NSF/ANSI 61 Certified**
* **NSF/ANSI 372 Certified**

A. Non-Clog Design

100% flow area for improved flow characteristics and lower headloss. Unrestricted flow area combined with smooth streamlined contouring allows passage of large solids minimizing the potential for clogging.

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.

C. One Moving Part

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

D. Body

Ductile Iron Body for 250 PSI rating.

E. Drop Tight Seating

The synthetic reinforced disc, with its integral O-ring type seal design assures positive seating at high and low pressures.

F. Domed Access Port

Full size top access port allows removal of disc without removing the valve from the line and provides flushing action over the valve disc for clog free performance. Access cover includes a drilled and tapped port for installation of optional Disc Position Indicator (I).

G. Non-Slam Closure

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

H. Fusion Bonded Epoxy

Fusion Bonded Epoxy (FBE) is the standard coating on the interior and exterior of the valve. The FBE is NSF/ANSI 61 certified.

I. Mechanical Disc Position Indicator

Provides clear indication of the valve's disc position. Can also be provided with a SCADA compatible limit switch for off site monitoring. (Optional)

J. Backflow Actuator

Body is drilled and tapped for installation of backflow actuator. Available for use when manual backflow operation is required. Most commonly used for priming pumps, back flushing, draining lines and system testing. (Optional)

Proven 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. 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 the Utah State Water Research Laboratory have shown that this unique body design produces minimal headloss through the valve. Flow and headloss charts, developed from the test data, are shown on Page 4.

In the full open position, the disc is stabilized by using smooth streamlined body contouring to direct the flow towards the disc preventing disc flutter and assuring long disc life (Figure 1). Clog resistant performance is achieved by maintaining an unobstructed 100% flow area and the use of a smooth fusion bonded epoxy coating. The entrapment or collection of solids and stringy materials is minimized by the elimination of hinge mechanisms in the valve design. The standard 4" Swing-Flex® is designed to pass a 3" solid.

Preferred Features

The Swing-Flex® Check Valve non-slam closing characteristic 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)

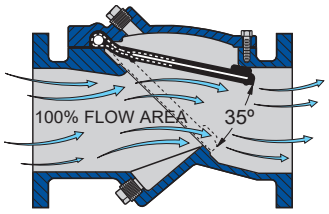


Figure 1. Swing-Flex Geometry

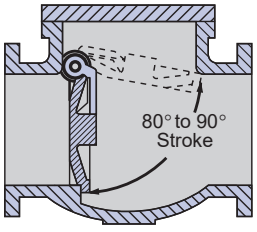


Figure 2. Conventional Geometry

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

Operational reliability is achieved by utilizing just one moving part, the Memory-Flex™ disc. The steel and nylon reinforcements are precision molded into the disc, providing a tough, durable disc with a 25-year warranty on the flex portion of the disc (Figure 3). Unlike conventional swing check valves, the Swing-Flex® has no packing, mechanical hinges, shafts, pivot pins, or bearings to wear out. The Memory-Flex™ disc with its integral O-ring type seal design assures drop tight seating at both high and low working pressures. 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.

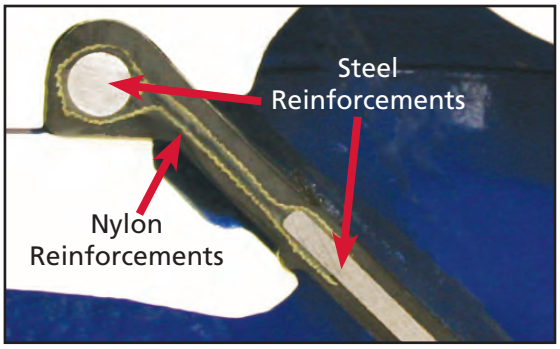


Figure 3. Reinforced Disc

Advanced Technology

Incorporating the latest in valve technology assures a high-quality valve that will provide long service. The design process utilized Solid Modeling and Finite Element Analysis (FEA) of the key structural components. Flow and headloss data was derived from flow tests, mathematical models and Computational Fluid Dynamics (CFD). Manufacturing technology uses automated process control in the foundry and ISO 9001 controlled manufacturing processes.

Product Certifications

Val-Matic Swing-Flex® check valves are certified for use in drinking water in accordance with NSF/ANSI 61 and are Certified Lead-Free per NSF/ANSI 372. Every valve is tested in accordance with AWWA C508. All valves are tested on automated hydraulic test rigs with gauges calibrated per ISO standards. All Val-Matic Valves are manufactured under a certified ISO 9001 quality management system.

Ratings/Construction

PRESSURE RATINGS

MAXIMUM PRESSURE RATINGS*		
SIZE RANGE in (mm)	**CONNECTION**	**CWP psig (Bar)**
2”- 24” (50-600 mm)	ANSI Class 125 Ductile Iron	250 (17.2)
30”- 48” (800-1200 mm)	ANSI Class 125 Cast Iron	150 (10.3)
30”- 48” (800-1200 mm)	ANSI Class 125 Ductile Iron	250 (17.2)

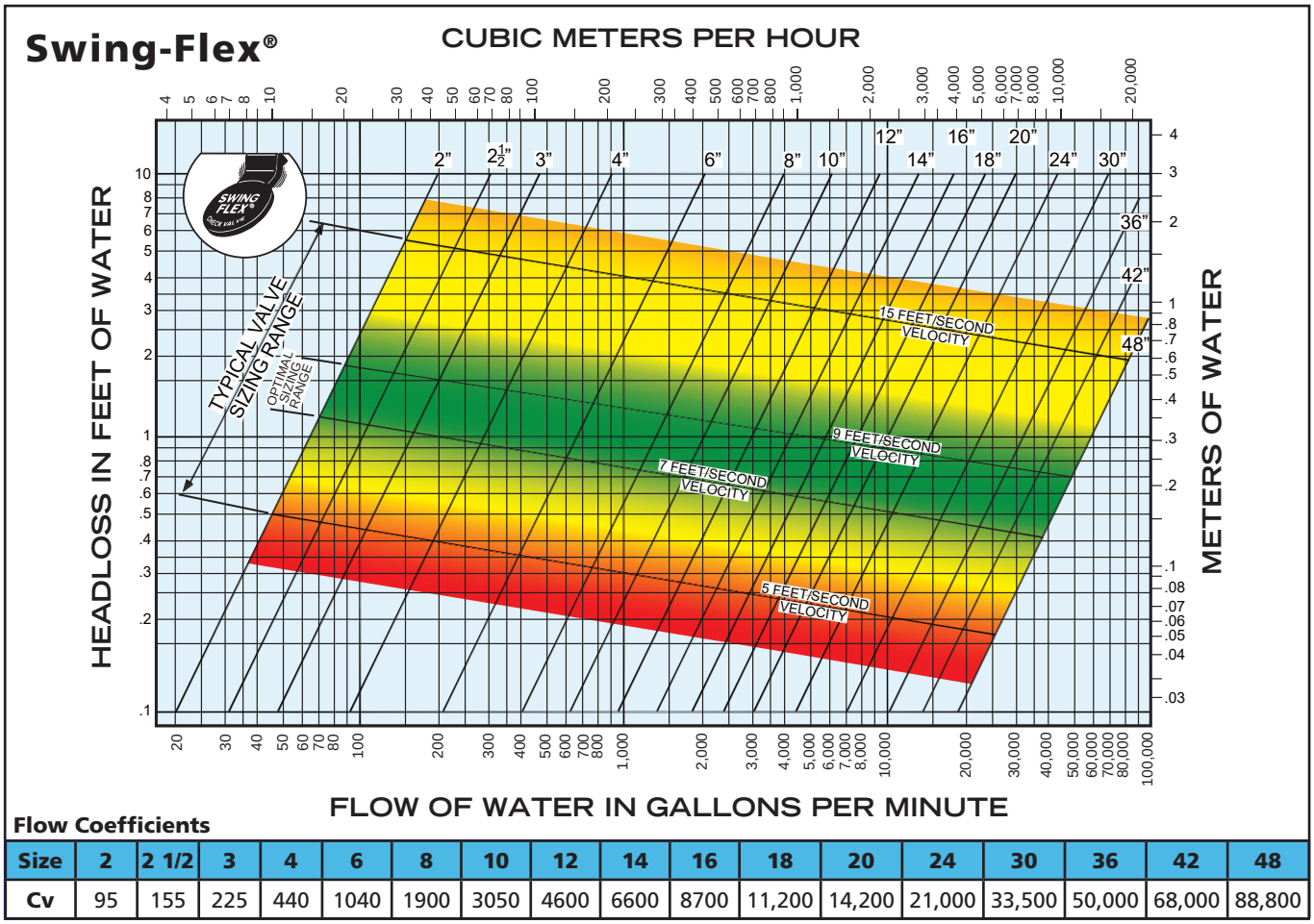
*For Critical Low Pressure Applications, such as gravity flow and digester gas, low-durometer (soft rubber) discs are available. Consult Factory.

AWWA Note: If the purchaser specifies a wetted component that was not tested and certified to NSF/ANSI 61, the certification may not be valid.

MATERIALS OF CONSTRUCTION

COMPONENT	STANDARD	OPTIONAL
Body 2”- 24” (50-600 mm)	Ductile Iron ASTM A536, Grade 65-45-12	ASTM A351, CF8M 316 SS 3”-12” (80-300 mm)
Body 30”- 48” (800-1200 mm)	Ductile Iron ASTM A536, Grade 65-45-12	Cast Iron ASTM A126, Class B
Disc	Buna-N w/Alloy Steel & Nylon Reinforcement	EPDM, Hypalon, Viton
Coatings	Fusion Bonded Epoxy (Int/Ext)	Rubber Lining, Glass Lining
Mechanical Indicator (Optional)	17-4 Stainless Steel, Lead-Free Bronze	-
Backflow Actuator (Optional)	T304 Stainless Steel, Lead-Free Bronze	-
Oil Cushion 6” and larger (Optional)	17-4 Stainless Steel, Lead-Free Bronze	-

Headloss Chart

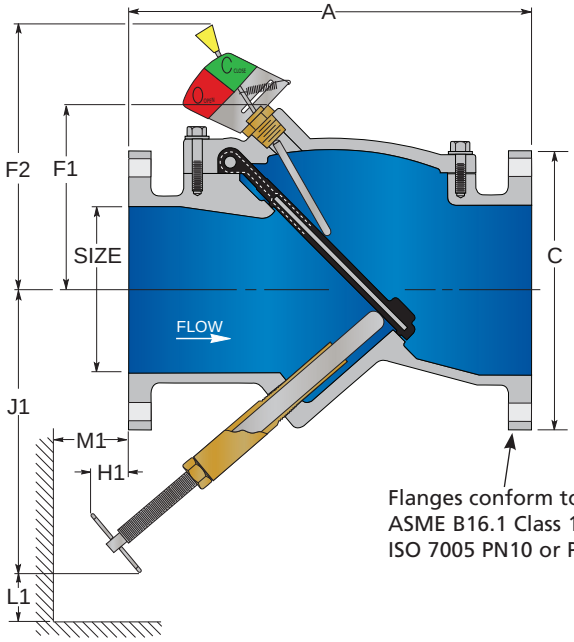


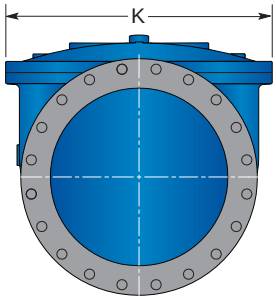
Flow Coefficients

Size	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48
Cv	95	155	225	440	1040	1900	3050	4600	6600	8700	11,200	14,200	21,000	33,500	50,000	68,000	88,800

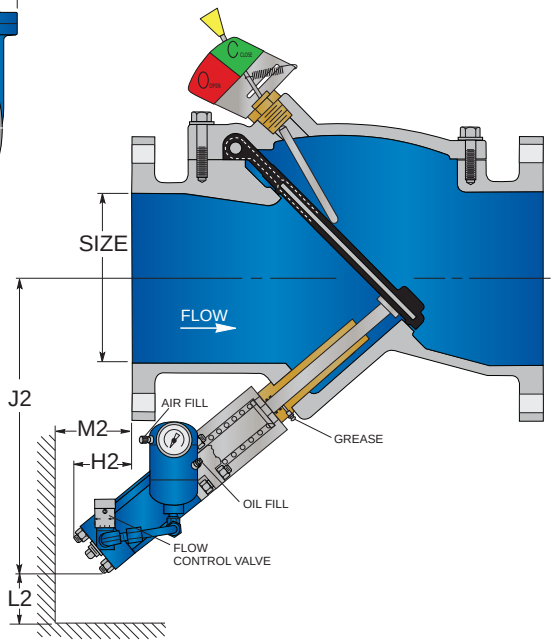
Installation Dimensions

Series 500 w/Mechanical Indicator & Backflow Actuator





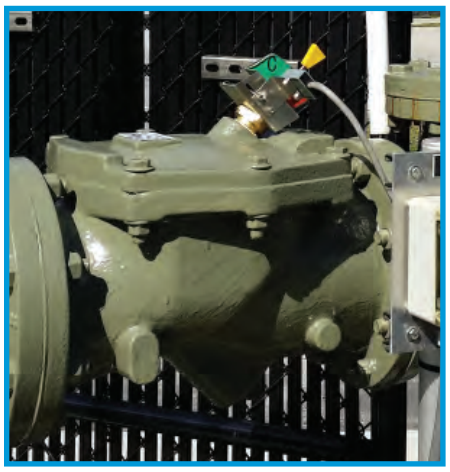
Series 500 w/Mechanical Indicator & Oil Cushion



Dimensions in Inches																
Valve Size (in)	Valve Size (mm)	CWP (PSI)	Base Valve					with Indicator	with Backflow Actuator				with Oil Cushion			
			Model No.	A	C	F1	K	F2	H1	J1	L1	M1	H2	J2	L2	M2
2	50	250	502A	8.00	6.00	3.38	5.18	-	-0.50	6.75	1.50	1.50	-	-	-	-
2 1/2	60	250	525A	8.50	7.00	3.38	5.18	-	-0.50	7.00	1.50	1.50	-	-	-	-
3	80	250	503A	9.50	7.50	5.13	7.50	8.69	-0.38	7.50	1.50	1.50	-	-	-	-
4	100	250	504A	11.50	9.00	5.75	8.25	10.63	3.38	10.75	2.50	2.50	-	-	-	-
6	150	250	506C	14.00	11.00	6.88	11.12	11.69	1.38	11.38	3.00	3.00	5.00	16.00	4.25	9.25
8	200	250	508A	19.50	13.50	8.38	16.00	13.25	2.00	15.75	5.75	5.75	3.25	17.00	5.25	8.50
10	250	250	510A	24.50	16.00	10.75	21.00	15.63	0.50	17.00	5.75	5.75	1.25	18.00	6.25	7.25
12	300	250	512A	27.50	19.00	12.50	24.00	17.19	3.50	22.50	6.50	6.50	2.00	20.75	7.25	9.50
14	350	250	514A	31.00	21.00	13.00	23.25	18.81	4.00	26.25	6.50	6.50	0.00	22.75	7.25	7.50
16	400	250	516C	36.00	23.50	14.25	25.25	19.06	4.63	30.00	6.50	6.50	-1.00	24.25	9.00	10.25
18	450	250	518C	40.00	25.00	15.25	28.25	20.25	5.25	33.75	6.50	6.50	-1.25	25.25	8.75	7.50
20	500	250	520A	40.00	27.50	16.88	30.63	21.69	5.88	37.50	8.00	8.00	-2.75	27.00	9.50	5.25
24	600	250	524A	48.00	32.00	19.25	36.00	24.50	1.81	45.00	8.00	8.00	-9.00	27.63	9.75	0.75
30	800	150	530	56.00	38.75	23.00	45.88	27.81	-0.63	41.25	8.00	8.00	-9.50	33.63	11.25	3.00
	800	250	530A													
36	900	150	536	63.00	46.00	27.38	55.00	32.63	-0.38	49.00	9.75	9.75	-8.25	33.75	15.25	3.00
	900	250	536A													
42	1000	150	542	70.00	53.00	36.88	60.18	39.63	-5.50	53.50	9.75	9.75	-14.00	46.00	14.25	1.50
	1000	250	542A													
48	1200	150	548	76.00	59.50	40.66	68.00	43.41	-2.90	41.98	10.00	10.00	-	-	-	-
	1200	250	548A													

Installations

Swing-Flex® Check Valve installed in a Valve Vault



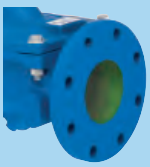
Swing-Flex® Check Valve with Limit Switch

Swing-Flex® Check Valve with Mechanical Indicator installed in a Pump Station

Swing-Flex® Check Valve with Backflow Actuator and Air Valve for Pump Discharge

Swing-Flex® Check Valve with Oil Cushion for Pump Discharge

Options/Accessories

Mechanical Disc Position Indicator	Limit Switch	Check Light	Backflow Actuator	Oil Cushion	Welded Nickel Seat	Tapped Ports	Rubber Lining	Glass Lining
Provides clear indication of the valve's disc position.	Used when applications require remote indication of valve's open/close position.	Provides remote indication from the limit switch.	Available for use when manual backflow operation is required.	Hydraulically controls the last 10% of valve closure in 1-5 seconds to reduce water hammer.	For severe and abrasive service.	Top and bottom NPT Ports for sampling, pressure testing, and removing sediment.	Interior lining suited for systems containing abrasive or corrosive fluids.	Interior lining provides a smooth, non-stick surface.
								

Specification

SCOPE

1.1 This specification covers the design, manufacture, and testing of 2 in. (50 mm) through 48 in. (1200 mm) Swing-Flex® Check Valves suitable for cold working pressures up to 250 psig (1725 kPa), in water, wastewater, abrasive, and slurry service.

1.2 The check valve shall be of the full flow body type, with a domed access cover and only one moving part, the flexible disc.

STANDARDS AND APPROVALS

2.1 The valves shall be designed, manufactured and tested to American Water Works Association Standard ANSI/AWWA C508.

2.2 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.

2.3 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 flanges in accordance with ANSI B16.1, Class 125.

DESIGN

4.1 The valve body shall be full flow area equal to nominal pipe diameter at all points through the valve. The 4 in. (100mm) valve shall be capable of passing a 3 in. (75mm) solid. 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 or oil cushion device 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 reinforced with alloy steel. The flex portion of the disc contains nylon reinforcement and 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 to provide a cracking pressure of 0.25 psig.

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.

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 gray iron for 30 in. (800mm) and larger. Optional body materials include ASTM A-351 Grade CF8M, stainless steel for sizes 3" (80 mm) through 12" (300 mm).

5.2 The disc shall be precision molded Buna-N (NBR), ASTM D2000-BG. Optional disc material includes Viton, EPDM, Hypalon.

OPTIONS

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 Lead-Free 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 3" (80 mm) 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 mechanical 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.

6.4 An oil cushion device 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 oil cushion device shall consist of a high pressure hydraulic cylinder, adjustable external flow control valve, oil reservoir, pressure gauge, stainless steel air inlet valve, and piping designed to control the closing speed of the last 10% of travel in 1-5 seconds. A threaded lead-free bronze dashpot 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.

6.5 Available linings include rubber for abrasive or corrosive fluids and glass for a smooth, non-stick surface.

6.6 A welded nickel seat is available for severe or abrasive service.

MANUFACTURE

7.1 Manufacturer shall demonstrate a minimum of five (5) years' experience in the manufacture of resilient, flexible disc check valves with 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 maintenance manuals.

7.3 The exterior and interior of the valve shall be coated with an NSF/ANSI 61 approved fusion bonded epoxy coating.

7.4 Swing-Flex® Check Valves shall be Series #500 as manufactured by Val-Matic® Valve & Mfg. Corporation, Elmhurst, IL. USA or approved equal.

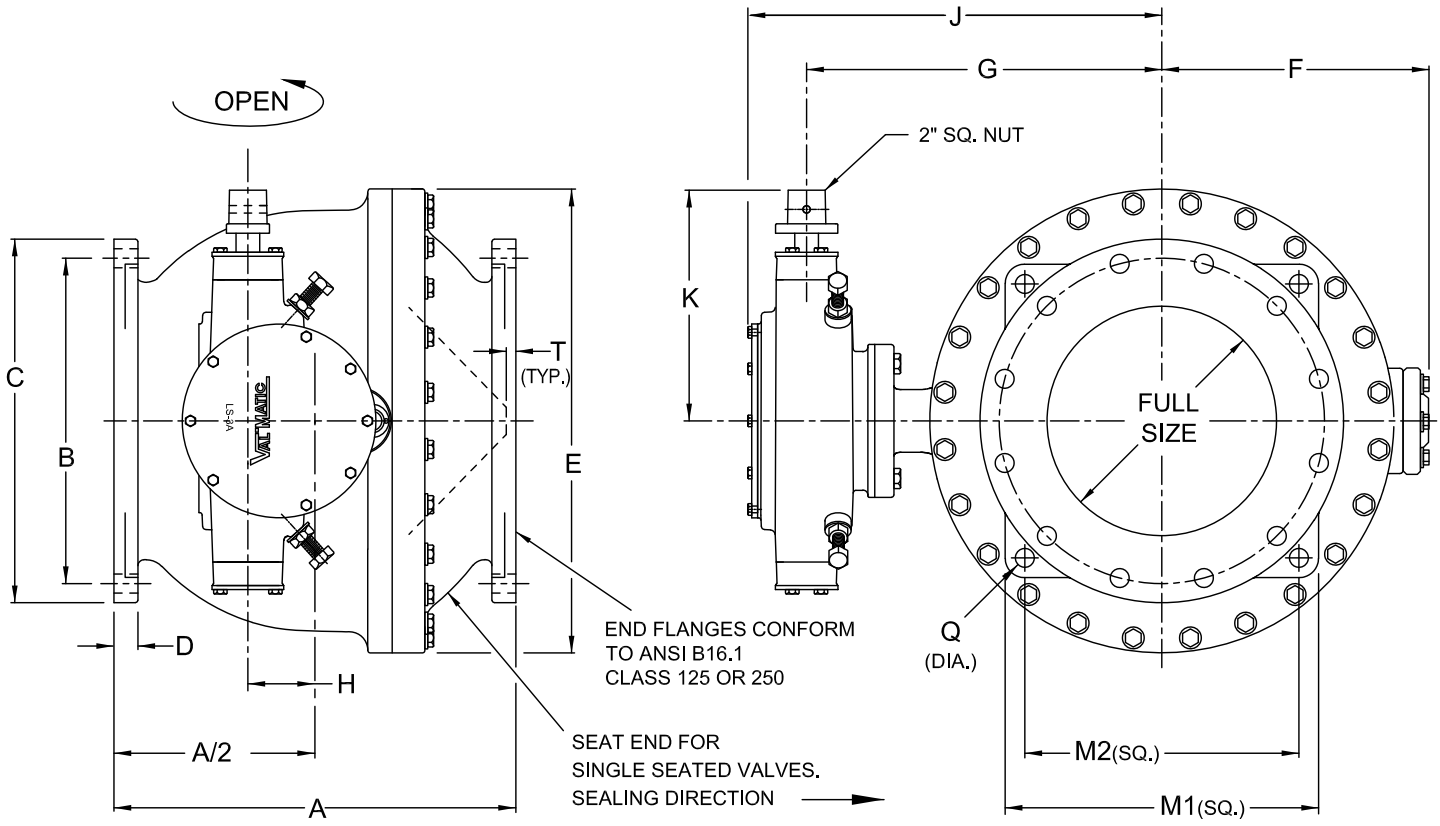
VAL-MATIC®

Ener-G Ball Valve

AWWA Rubber Seated Ball Valve

www.valmatic.com

Meets AWWA C507
NSF/ANSI 61 & 372 Certified



VALVE DEPICTS 12" 150 SIZE WITH LS-3A ACTUATOR

DIMENSIONS, INCHES

VALVE SIZE	AWWA PRESS. CLASS	A	B	C	D	E	F	G	H	J	K	M1	M2	Q	T	ACT. SIZE	TURNS TO OPEN	NO. OF BOLTS	BOLT SIZE	SHPG. WT.
4	150	12.38	7.50	9.00	0.94	13.00	7.50	10.50	1.50	12.58	7.81	8.25	7.00	0.75	2.00	LS-1A	15	8	5/8	165
	300	13.00	7.88	10.00	1.25	13.00	7.50	10.50	1.50	12.58	7.81	9.06	7.70	0.75	2.38	LS-1A	15	8	3/4	180
6	150	15.75	9.50	11.00	1.00	14.75	8.50	11.38	2.00	13.00	8.71	10.13	8.57	0.88	2.25	LS-2A	20	8	3/4	238
	300	16.00	10.63	12.50	1.44	15.00	9.50	12.38	2.00	14.63	8.71	11.31	9.63	0.88	2.38	LS-2A	20	12	3/4	284
8	150	18.00	11.75	13.50	1.13	17.75	10.38	13.63	2.00	15.88	8.71	12.00	10.34	0.88	2.00	LS-2A	20	8	3/4	386
	300	18.00	13.00	15.00	1.63	18.00	11.75	15.00	2.00	17.25	12.06	13.25	11.49	1.00	2.00	LS-3A	35	12	7/8	472
	300	18.00	13.00	15.00	1.63	18.00	11.75	16.13	3.50	19.13	12.06	13.25	11.49	1.00	2.00	LS-3A	35	12	7/8	472
10	150	19.50	14.25	16.00	1.19	21.13	12.38	16.00	3.50	18.88	12.06	14.25	12.20	1.00	1.25	LS-3A	35	12	7/8	610
	300	21.13	15.25	17.50	1.88	21.63	13.88	17.50	3.50	20.38	12.06	15.25	13.34	1.13	2.00	LS-3A	35	16	1	730
12	150	21.00	17.00	19.00	1.25	24.25	14.38	18.56	2.00	21.63	12.06	16.38	14.32	1.00	0.50	LS-3A	35	12	7/8	810
	300	24.00	17.75	20.50	2.00	24.50	16.50	20.25	3.50	23.13	12.06	17.68	15.55	1.25	0.50	LS-3A	35	16	1 1/8	980
	300	24.00	17.75	20.50	2.00	24.50	16.38	20.50	5.00	23.50	13.81	17.68	15.55	1.25	2.00	LS-4.2A	50	16	1 1/8	1033
14	150	26.25	18.75	21.00	1.38	27.50	16.38	20.00	3.50	22.88	12.06	18.50	15.82	1.13	1.63	LS-3A	35	12	1	836
	300	27.75	20.25	23.00	2.13	27.75	18.75	22.38	3.50	25.38	12.06	19.75	17.32	1.25	2.38	LS-3A	35	20	1 1/8	1025
	150	26.25	18.75	21.00	1.38	27.50	16.38	20.25	5.00	23.35	13.81	18.50	15.82	1.13	1.63	LS-4A	50	12	1	867
	300	27.75	20.25	23.00	2.13	27.75	18.75	22.63	5.00	25.63	13.81	19.75	17.32	1.25	2.38	LS-4A	50	20	1 1/8	1079
16	150	27.00	21.25	23.50	1.44	30.63	18.63	22.25	3.50	25.13	12.06	20.25	17.59	1.13	0.63	LS-3A	35	16	1	1210
	300	28.13	22.50	25.50	2.25	31.63	21.75	25.35	3.50	28.38	12.06	21.68	19.18	1.38	1.13	LS-3A	35	20	1 1/4	1475
	150	27.00	21.25	23.50	1.44	30.63	18.63	22.25	5.00	25.50	13.81	20.25	17.59	1.13	0.63	LS-4A	50	16	1	1264
	300	28.13	22.50	25.50	2.25	31.63	21.75	25.63	5.00	28.63	13.81	21.68	19.18	1.38	1.13	LS-4A	50	20	1 1/4	1552
18	150	30.00	22.75	25.00	1.56	33.88	20.38	24.38	5.00	27.38	13.81	21.75	18.74	1.25	0.63	LS-4A	50	16	1 1/8	1774
	300	31.00	24.75	28.00	2.38	34.50	23.63	27.63	5.00	30.63	13.81	23.88	20.94	1.38	1.13	LS-4A	50	24	1 1/4	2132
20	150	32.00	25.00	27.50	1.69	36.75	21.88	25.75	5.00	28.75	13.81	23.68	20.50	1.25	0.25	LS-4A	50	20	1 1/8	2375

REV 7-25-16

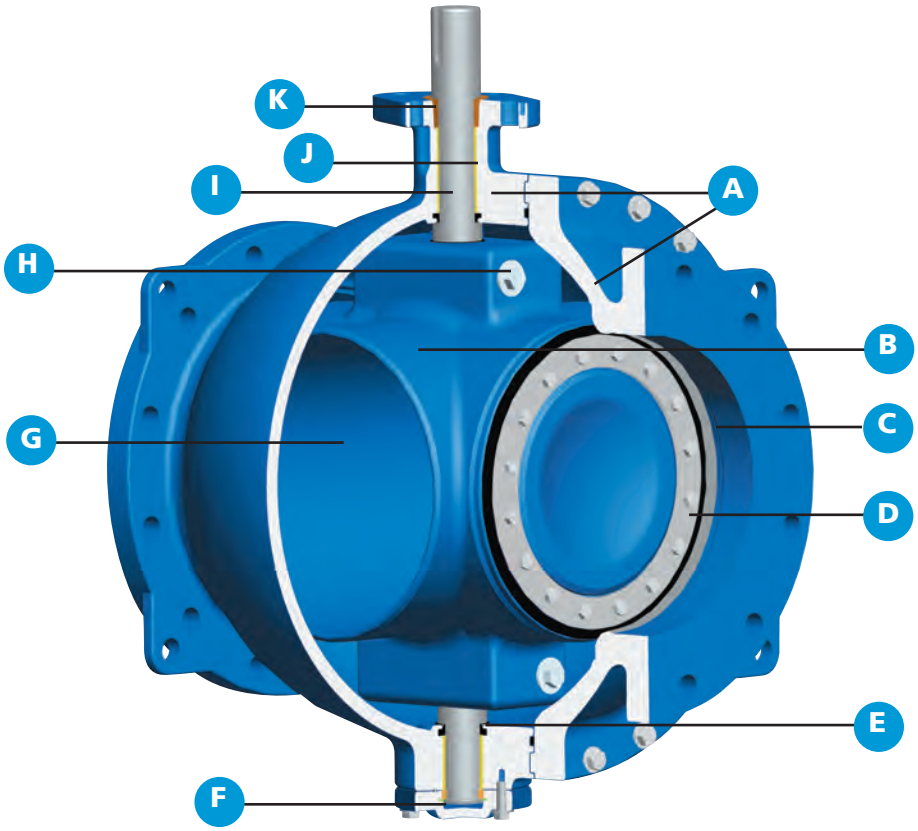
AWWA FLANGED BALL VALVE WITH BURIED SERVICE ACTUATOR

DATE 11-25-09

VAL-MATIC® VALVE AND MANUFACTURING CORP.

DRWG. NO. VMC-4104/BLSA

Feature Highlights



A. Body

The valve body consists of a main body section and end piece. The body design includes integral support legs and fully complies with AWWA Standard C507.

B. Ball

In the open position, the Ball provides a 100% clear flow, unobstructed circular opening. As the ball turns through its 90° travel, it provides a self-flushing (cleaning) action to the valve cavity between the body and ball. When fully closed, drop tight seating is provided.

C. Body Seat

Type 316 Stainless Steel provides extended life and a corrosion free mating surface for the resilient seat retained on the quarter turn ball.

D. Resilient Seating System

Tri-Loc™ Seating System with over 40 years of proven dependability is easily adjusted and field replaceable. All seat-retaining components are Type 316 Stainless Steel.

E. Grit Guard™ Seals

Grit Guard™ seals have been protecting Val-Matic valve bearings in raw sewage application with proven reliability for over 25 years.

F. Thrust Bearing Assembly

The thrust bearing is adjustable and pre-set at the factory.

G. FBE Coating

All valves are provided with fusion bonded epoxy which provides the highest level of corrosion protection and smooth flow surfaces for low headloss.

H. Taper Pins

Stainless steel taper pins provide over 40 years of proven dependability. The taper pin design locks the ball to the shaft and utilizes a Type 316 stainless steel bolt to maintain the lock during severe service.

I. Shafts

Large diameter stainless steel shafts are sized to provide maximum wear resistance with minimum stress during the most severe service conditions.

J. Shaft Sleeve Bearings

The teflon-lined shaft bearings provide low friction and high wear resistance.

K. Shaft Seal

The shaft seal is self-adjusting/ wear compensating V-Type packing. The packing is field replaceable without removal of the valve from the line or valve disassembly.

Preferred Features & Benefits

With over 50 years of combined Ball Valve knowledge in the areas of Engineering, Manufacturing, Application and Design, the Val-Matic Ener•G® AWWA Rubber Seated Ball Valve has proven and preferred design features and advanced technology that only Val-Matic experience can provide. The Val-Matic Ener•G® Ball Valve is designed for tight seating, long life and energy savings.

Tight Seating

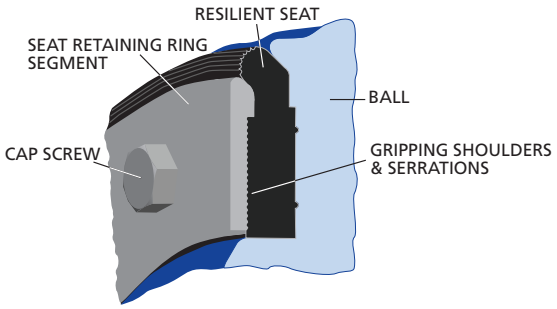
The resilient seat is based on technology with proven field use for over 40 years. Both single and double-seated valves are available for sealing in one or two directions. When fully open, the resilient seat is completely out of the flow stream.

Structural Integrity

The valve body is built with a main section and an end piece that are connected with precision registers and o-ring seals to withstand the rigors of pipeline service.

Tri-Loc™ Seat Retention System

Proven dependability since 1971, the Tri-Loc™ seat retention system provides positive mechanical retention of the valve seat while allowing easy adjustment or replacement. The seat is secured by three methods: clamp force, through-bolting and opposing registers in the ball and the seat retaining ring. Clamp force is provided by tightening nylok cap screws. These same screws provide through-bolting seat retention by passing through the precision molded holes in the resilient seat. Finally, molded shoulders in the seat are captured by registers and serrations in the ball and the retaining ring preventing outward movement of the seat.



Energy Savings

In these times of conservation and "Green" design, there is no better valve than the Val-Matic Ener•G® AWWA Ball Valve. When fully open, the valve provides 100% clear flow area equal to the valve size. Hence, the valve headloss is equal to an equivalent length of pipe and will represent a significant savings in pumping costs.

Proof of Design Tested

The Val-Matic Ener•G® Ball Valve is certified to rigorous pressure and cycle proof of design tests per AWWA C507. The valves were full-scale flow tested and operated at velocities exceeding 40-ft/sec at an independent laboratory.

Fusion Bonded Epoxy Coating

All Val-Matic Ener•G® Ball Valves are coated inside and out with NSF 61 fusion bonded epoxy per AWWA C550. The valve and its components are specifically designed for continuous uninterrupted fusion bonded epoxy coating. The interior and exterior are coated with fusion bonded epoxy for long life.

Proven Actuation

Val-Matic traveling nut actuators have been proven in rigorous field installations for over 40 years. Advances in design include ductile iron housings and levers, 450 ft-lb stops, ***exclusive*** externally adjustable closed stops and fully sealed housings. Traveling nut actuators can be fitted with stainless steel or non-metallic cylinders for hydraulic actuation.

Serviceability

If repairs become necessary, the valve is designed for easy field maintenance and repair. The shaft seal incorporates self-adjusting V-type packing, which is easily replaced in the field without removal from the line. Adjustment of the resilient seat is easily performed with a hand wrench. No two-part epoxy, hypodermic needles or pressure pots are required. The seat can be replaced with the valve in line.

Designed for Wastewater Service

The Ball Valve's clear flow path makes it ideal for wastewater service. However, Val-Matic takes additional steps to ensure its performance in wastewater by providing Grit Guard™ seals and a self-flushing action. The grit seals provide a seal between the shaft and body. These seals protect the body from corrosion and the bearings from premature wear. The ball is designed so there is a significant flushing action between the body and outside of the ball to prevent clogging in wastewater service.

Advanced Technology

Incorporating the latest in valve technology assures a high-quality valve that will provide long service. The design process utilized Solid Modeling and Finite Element Analysis (FEA) of the key structural components. Flow and torque data was derived from flow tests, mathematical models and Computational Fluid Dynamics (CFD). Manufacturing technology uses automated process control in the foundry and ISO 9001 controlled manufacturing processes. Every valve is tested in accordance with AWWA C507 on automated hydraulic test rigs with calibrated gauges.

Valve Construction

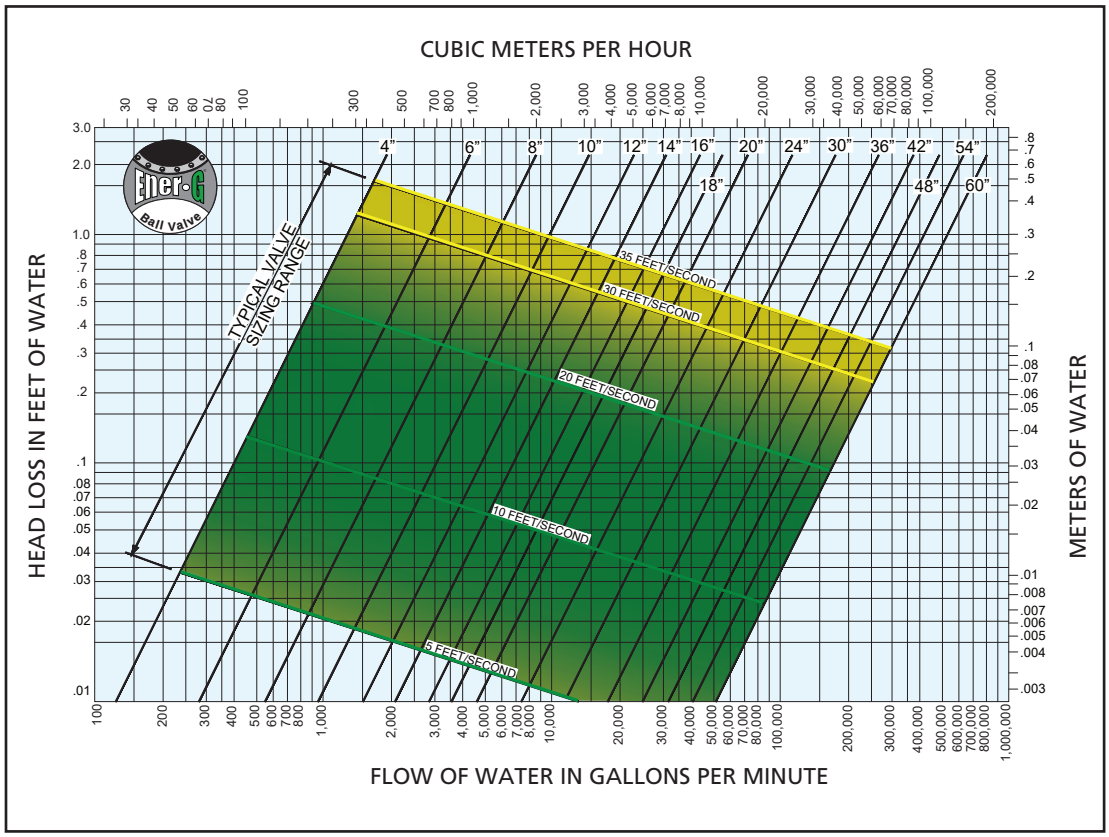
PRESSURE RATINGS

MAXIMUM PRESSURE RATINGS			
SERIES	**CONFIGURATION**	**AWWA Class**	**CWP (psig)**
4100	ANSI 125# Gray Iron - Single Seat	150D	150
4200	ANSI 125# Gray Iron - Double Seat	150D	150
4300	ANSI 250# Ductile Iron - Single Seat	300D	300
4400	ANSI 250# Ductile Iron - Double Seat	300D	300
4500	ANSI 150# Ductile Iron - Single Seat	250D	250
4600	ANSI 150# Ductile Iron - Double Seat	250D	250

MATERIALS OF CONSTRUCTION

COMPONENT	STANDARD	OPTIONAL
Body Class 150D	ASTM A126 Class B	
Body Class 250D/300D	ASTM A536 Gr 65-45-12	
Ball Class 150D	ASTM A126 Class B	
Ball Class 250D/300D	ASTM A536 Gr 65-45-12	
Shaft Class 150D	ASTM A276 Type 304	Type 316
Shaft Class 250D/300D	ASTM A563 Type 630	
Resilient Seat	EPDM	Buna-N
Body Seat and Hardware	Type 316 Stainless Steel	
Shaft Bearings	Teflon-Lined, Fiberglass Backed	Bronze
Grit Seal	Molythane	
V-Packing	Buna-N	

Headloss Chart



Flow Coefficients	
Size	**Cv**
4"	1,910
6"	4,310
8"	8,520
10"	14,700
12"	22,800
14"	30,500
16"	42,700
18"	56,100
20"	70,500
24"	106,000
30"	172,000
36"	257,000
42"	369,000
48"	480,000
54"	620,000
60"	775,000

Energy Cost Savings

An important characteristic of valves in water pumping systems that is often overlooked is the valve's ability to minimize energy consumption. Common flow coefficients for various valves used in pumping systems are shown below. Since Cv represents the flow through a valve with a 1 psi pressure drop, we can see that a Ball Valve provides the lowest headloss characteristics.

12 in. Valve Flow Data			
Type of Valve	**Cv**	**△H**	**40-Year Energy Cost***
Swing Check & Weight	3,395	3.58	$49,900
Globe-Style Control Valve	1,800	12.75	$177,800
Butterfly Valve	6,550	0.96	$13,400
Eccentric Plug Valve	4,750	1.81	$25,300
Ener•G® AWWA Ball Valve	22,800	0.07	$936

* Assumes 50% usage over 40 years, $.08/kw-hr, 12 ft/sec velocity, 0.8 efficiency

The headloss from valves can be converted into the energy cost related to the pumping electrical power needed to overcome the additional headloss from the valve with the equation:

$$A = (1.65\ Q\ \triangle H\ Sg\ C\ U) / E$$

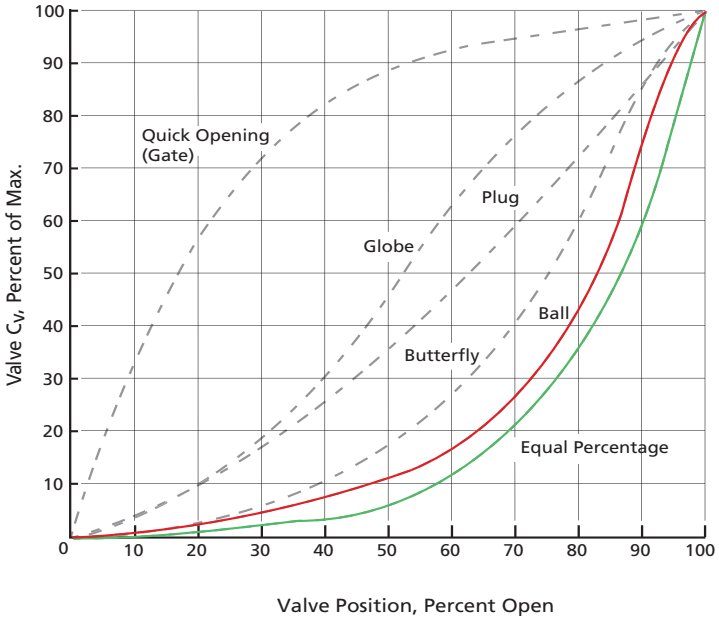
Where:

A = annual energy cost, dollars per year
Q = flow rate, gpm
△H = head loss, ft. of water
Sg = specific gravity, dimensionless
C = cost of electricity, $/kW·h
U = usage, percent
E = efficiency of pump/motor set

The table shows that the Val-Matic Ener•G® AWWA Ball Valve with its low energy cost pays for itself over its life. It consumes less than 1% the energy of a Globe-Style Control Valve. Larger systems and systems operating at higher velocities will provide even greater savings.

If your goal is to design a "Green" pumping system, the Val-Matic Ener•G® Ball Valve is the valve of choice.

Flow Characteristics



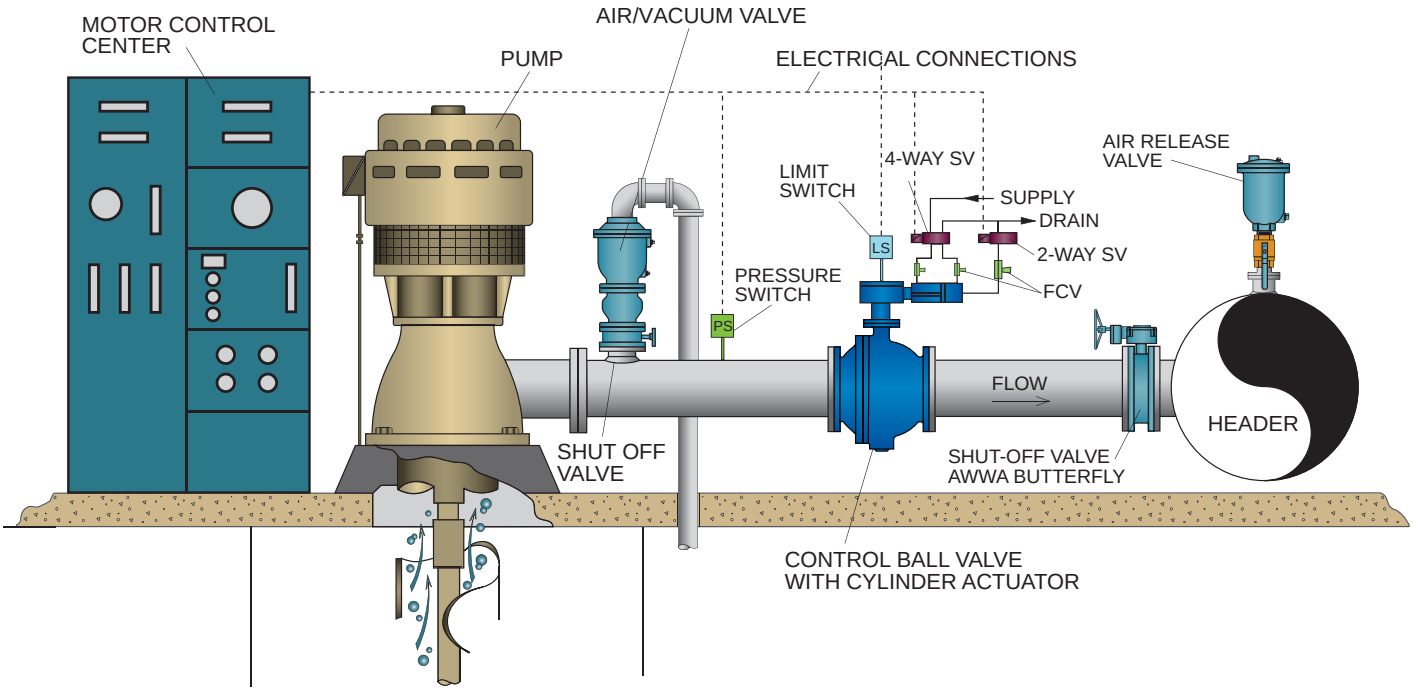
Inherent Flow Characteristics

In addition to being the best selection for energy savings, the Val-Matic Ener•G® Ball Valve is the best selection for surge control. Its inherent flow characteristics are highly suited to control flow and pressure.

Some valves like Globe and Plug will linearly reduce the flow rate in proportion to the movement of the closure member. Quick Opening valves, such as Gate Valves, only affect the flow during the last 30% of their closure. Equal percentage valves, like the Ball Valve, uniformly change the flow rate during the full travel.

The graph below provides the Inherent Flow Characteristics of various types of valves. The data is expressed in terms of flow coefficient (Cv) at various percents of the valve's position. The most desirable flow characteristic for surge control is equal percentage as provided by the Val-Matic Ener•G® Ball Valve.

Pump Control Ball Valve



Typical Pump Control System
(Single or Multiple Pump)

Pump Control Ball Valves

For pumping systems where surge control is critical and energy savings are important, a pump control ball valve is preferred. The valve is wired to the pump controls and provides adjustable opening and closing times in excess of the system critical surge period. Unlike check valves, the pump control ball valve's speed of operation is not affected by line flow or pressure conditions. Stable operating times are essential in controlling surges in pumping systems. A Val-Matic Ener•G® Ball Valve is the ideal pump control valve for pumping systems. Its equal percentage flow characteristics, rugged AWWA construction and negligible headloss make it the preferred choice.

Sequence of Operation

When the pump is started and pressure builds, a pressure switch (PS) located on the pump discharge pipe signals the Ball Valve to open. During shutdown, the valve is signaled to close while the pump continues to run. When the Ball Valve nears the closed position, a limit switch (LS) located on the valve will stop the pump. After a power outage or pump trip, the flow will rapidly reverse. The Ball Valve must close rapidly to prevent backspinning the pump and rapid depletion of a hydro-pneumatic surge tank when utilized.

Cylinder Actuator Control

The Ener•G® Ball Valve is equipped with a hydraulic cylinder actuator. The cylinder can be powered with pressurized water from the line or from an independent oil hydraulic power system. Mounted on the valve or in a floor-mounted panel are the hydraulic controls electrically wired to the pump controls. Solenoid valves (SV) direct the operating medium to the cylinder ports to cycle the valve. The speed of opening and closing is controlled by independently adjustable flow control valves (FCV). The valve hydraulic controls are equipped with a bypass line to send the controlled cylinder flow around the normal flow control valve and through an alternate fast-closing flow control valve.

Motor Actuator Control

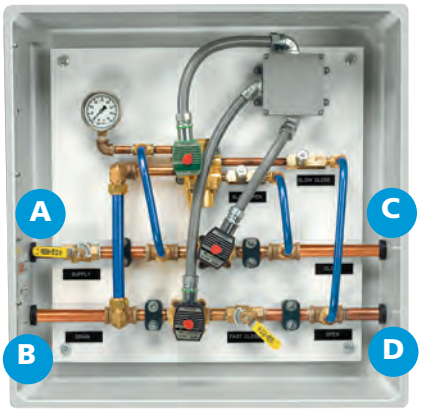
Alternatively, when a clean water supply is not available to power a cylinder actuator, such as a lift station application, the Ball Valve can be supplied with a motor actuator. The operating times are adjustable in the field with special actuator motor controls. To protect the pump and system on power failure, the valve can either be supplied with a battery backup system or a Surgebuster® Check Valve. The Surgebuster® provides low headloss and non-slam characteristics.

Hydraulic Panel

The Val-Matic hydraulic control panel uses the highest quality components available and is designed to reliably operate the pump control ball valve with water or oil supply. Unlike a motor-operated control valve, the control panel allows field adjustment of the valve operating times so that the valve can be timed to match the surge characteristics of the piping system. The controls are panel mounted and pre-wired to a terminal strip in a NEMA 4X junction box for easy installation. An optional NEMA 4X enclosure is available to secure and protect the equipment in the harshest of environments.

There are four pressure connections to the cabinet: Supply, Drain, Open, and Close. The supply connection is equipped with an isolation valve and pressure gauge for ease of troubleshooting the control system. The supply and drain headers are controlled by brass two-way normally-open solenoid valves assembled with rigid brass pipe and heavy duty, non-corrosive, quick connect style hose and fittings. They provide rapid valve closure upon electrical power failure to minimize backspinning of the pump. The emergency closure rate is adjustable in the 10-30 second range by the balancing valve in the bottom header. The normal open and closing of the pump control valve is controlled by the brass four-way solenoid valve and independently adjustable multi turn flow control valves. The flow control valves allow independent control of the operating times in the 30-600 second range.

The solenoid valves are wired to a NEMA 4X junction box using liquid-tight conduit. The solenoid valve wires are terminated inside of the junction box with terminals. Installation of the system is easy and fast since only one conduit connection is needed to connect the panel to the pump controls.



Hydraulic Panel

A. Supply Pressure
B. Drain
C. Pressure to Close
D. Pressure to Open

Electric Panel

The Val-Matic electrical control panel uses the highest quality components available and is designed to work with the hydraulic panel in controlling and monitoring the operation of the pump control ball valve. The relays and timers are panel mounted and pre-wired to a terminal strip in a hinged NEMA 4X enclosure for easy installation and to protect the equipment in the harshest of environments.

The control panel includes internal plug-in type Run and Stop Relays to control the operation of the pump. An adjustable Timing Relay monitors the operation of the system and automatically shuts down the pump if the pump does not build pressure or the valve fails to open. Transformer-type Pilot Lights are used to provide safe indication. The RUN, OPEN, and CLOSE pilot lights indicate valve and pump operation. The STOP light indicates that an alarm condition exists and the pump is locked out. Once the alarm condition is resolved, the RESET button is pressed to activate the system. An EMERGENCY STOP button is provided to stop the pump at the valve location. When the button is pressed, the valve closes at the normal rate, and automatically shuts off the pump when the closed limit switch is tripped.

Electric Panel

Exclusive Val-Matic Control System Features for Hydraulic and Electric Panels

- Waterproof and corrosion-resistant enclosures
- Rigid brass pipe with heavy duty hose and fittings
- Supply line with isolation valve and pressure gauge
- Reliable ASCO solenoid valves and vernier flow control valves
- Heavy-Duty switches and transformer pilot lights

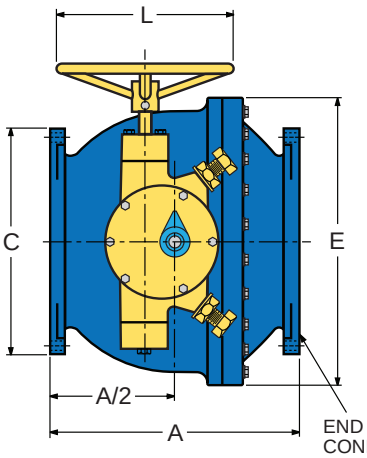
Oil Accumulator Systems

Oil Accumulator Systems include an electrical panel, ASME pressure tank, dual oil pumps and dual air compressors are skid-mounted and supply a safe and steady 80-125 psig oil supply pressure to the pump control valve, even after power failure.

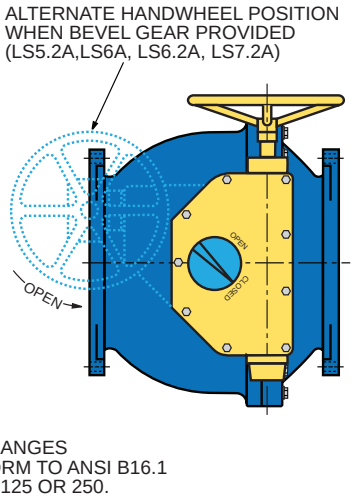
Oil Accumulator System

Manual Actuated Valves

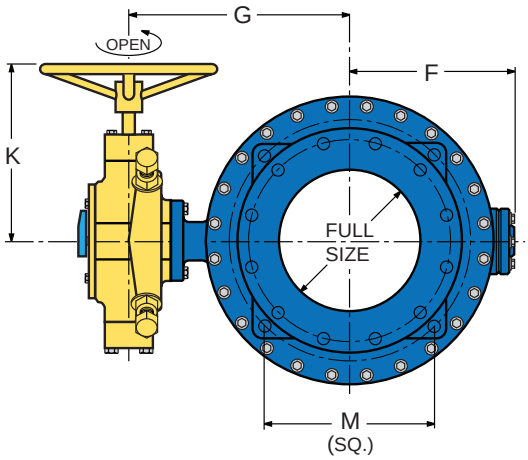
Installation Dimensions



LS1A to LS4A
ACTUATOR ORIENTATION



LS5A to LS7A
ACTUATOR ORIENTATION



4" - 54"
DIMENSIONS

Val-Matic's traveling nut manual actuators are designed to specifically match the torque characteristics of the Val-Matic Ener•G® Ball Valve and are built in accordance with AWWA Standard C507 for Ball Valves. The traveling nut actuator provides characterized closure which allows the valve to slowly close during the last half of travel to reduce pipeline surges. Val-Matic actuators have the exclusive features of externally adjustable stops rated to 450 ft-lbs of input torque.

Dimensions in Inches

Valve Size	AWWA Class	Actuator Size*	No. of Turns	A	C	E	F	G	K	L	M
4	150	LS-1A	15	12.38	9.00	11.75	7.25	10.25	9.38	8	7.11
	300	LS-1A	15	13.00	10.00	11.75	7.25	10.50	9.38	8	7.87
6	150	LS-2.2A	20	15.75	11.00	14.75	8.50	11.38	11.25	12	8.57
	300	LS-2A	20	16.00	12.50	15.00	9.50	12.38	11.25	12	9.63
8	150	LS-2A	20	18.00	13.50	17.88	10.38	13.63	11.25	12	10.34
	300	LS-3.2A	35	18.00	15.00	18.13	11.75	16.13	13.88	12	11.49
10	150	LS-3A	35	19.50	16.00	21.13	12.38	16.00	13.88	12	12.20
	300	LS-3A	35	21.13	17.50	21.63	13.88	17.50	13.88	12	13.34
12	150	LS-3A	35	21.00	19.00	24.25	14.38	18.13	14.88	16	14.32
	300	LS-3A	35	24.00	20.50	24.50	16.50	20.25	14.88	16	15.55
14	150	LS-3A	35	26.25	21.00	27.50	16.38	20.00	14.88	16	15.82
	300	LS-4A	50	27.75	23.00	27.75	18.75	22.63	19.88	24	17.32
16	150	LS-3A	35	27.00	23.50	30.63	18.63	22.25	14.88	16	17.59
	300	LS-4A	50	28.13	25.50	31.63	21.75	25.63	21.38	30	19.18
18	150	LS-4A	50	30.00	25.00	33.88	20.38	24.38	21.38	30	18.74
	300	LS-4A	50	31.00	28.00	34.50	23.63	27.63	21.38	30	20.94
20	150	LS-4A	50	32.00	27.50	36.75	21.88	25.75	21.38	30	20.50
	300	LS-5.3A	100	34.00	30.50	37.38	25.81	30.50	23.97	16	22.71
24	150	LS-5A	100	37.00	32.00	43.13	26.25	31.50	28.25	24	23.77
	300	LS-5A	100	42.75	36.00	43.63	30.88	36.13	28.25	24	26.78
30	150	LS-5.2A	255	46.00	38.75	52.44	31.03	35.50	20.13	16	28.55
	300	LS-5.2A	255	50.25	43.00	53.44	37.25	42.50	20.13	24	39.99
36	150	LS-5.2A	255	54.00	46.00	62.00	38.13	43.38	19.50	24	33.85
	300	LS-6A	425	54.00	50.00	63.00	44.88	51.50	24.88	24	37.12
42	150	LS-6.2A	425	59.50	53.00	71.06	43.75	50.25	24.88	24	38.80
	300	LS-6.2A	425	61.00	57.00	72.56	51.50	58.00	24.88	30	42.07
48	150	LS-6.2A	425	72.00	59.50	79.69	49.50	55.63	24.88	30	43.39
	300	LS-7.2A	720	76.50	65.00	81.19	58.38	67.00	32.25	30	47.72
54	150	LS-6.2A	425	82.00	66.25	89.50	55.00	64.50	24.88	30	49.67
		LS-7.2A	720					67.00	32.25		

*Actuator sizes vary with flow and pressure conditions.

Specification

SCOPE

1.1 This specification covers the design, manufacture, and testing of 4”- 54” AWWA Class 150 and 300 Rubber Seated Ball Valves.

STANDARDS AND APPROVALS

2.1 The valves shall be designed, manufactured and tested in accordance with American Water Works Association Standard AWWA C507.

2.2 The valves shall be certified Lead-Free in accordance with NSF/ANSI 372.

2.3 Manufacturer shall have a quality management system that is certified to ISO 9001 by an accredited, certifying body.

DESIGN

3.1 The valve shall be constructed with a two-piece body rated for 150 or 300 psi with end flanges in full conformance with ANSI B16.1 Class 125 or Class 250. The main body section and end piece shall contain integrally cast support feet and lifting lugs.

3.2 The valve port shall be a 100% clear bore equal to the nominal valve size with no seat hardware in the flow stream when fully open. The ball shall be self-flushing when in intermediate positions for wastewater service.

3.3 Double (or single) resilient seats shall provide drop-tight service and shall be located on the ball and mechanically retained with a stainless steel retaining ring and stainless steel nylok cap screws, which shall pass through both the resilient seat and the retaining ring. The retaining ring shall be continuous or investment cast with overlapping sections, serrated grooves and shoulders. The resilient seat shall be field adjustable and replaceable without removing the valve from the pipeline and mate to a continuous 316 stainless steel body seat ring.

3.4 Valve shafts shall be inserted into blind hubs in the ball and locked to the ball with taper pins retained with stainless steel jam bolts. The shaft shall be sealed with resilient grit seals in the body bores.

3.5 Teflon-lined, fiberglass-backed sleeve bearings shall be located in the body hubs.

3.6 An adjustable thrust bearing shall be provided to center the ball in the body.

3.7 Shaft seals shall be of the V-type and shall be replaceable without removal of the valve from the line or the shaft from the valve.

ACTUATION

4.1 Manual actuators shall be of the traveling nut design with characterized closure per AWWA C507 and equipped with externally adjustable closed position stops capable of withstanding 450 ft-lbs. Actuators shall be lubricated with EP-2 grease and fully enclosed in an iron housing sealed against the entry of water.

4.2 Cylinder actuators shall be traveling nut with characterized closure and sized to position the valve with an air, water or oil supply pressure of 80-150 psi and built in accordance with AWWA C541. The rotating mechanism will consist of a lever and traveling nut directly connected to the cylinder rod. The cylinder rod, heads and barrel shall be constructed of stainless steel or non-metallic material for water service. Rod and piston seals shall be of the self-adjustable, wear-compensating type. The piston shall be one-piece with a wear strip.

4.3 Motor actuators shall be furnished in accordance with AWWA C542 for Power Actuators and factory tested on the production ball valve. The motor unit shall be mounted to a self-locking traveling nut actuator with characterized closure and externally adjustable closedstop.Themotoractuator assembly shall be designed for open/close service with a minimum operating time of 60 sec. The motor unit shall be furnished with a position indicator, independently adjustable, 15-amp limit switches, and adjustable torque sensors to protect the valve indicator. A handwheel with a declutch lever shall be provided so that the handwheel does not rotate during electrical operation. Motors shall be sized with a 1.5 safety factor and a power supply of 230/460V, three phase, 60 Hz AC. Electrical operation shall include Local-Off-Remote selector switch, Local Open/Close push buttons and position indication lamps.

MANUFACTURE

5.1 Valve interiors and exteriors shall be coated with an NSF/ANSI 61 certified fusion bonded epoxy in accordance with AWWA C550.

5.2 Rubber Seated Ball Valves shall be Val-Matic® Series #4000 as manufactured by Val-Matic® Valve & Mfg. Corporation, Elmhurst, IL. USA.