



General Installation & Service Kits



ENGINEERING GUIDE

Contact Spears® for any Information not found.

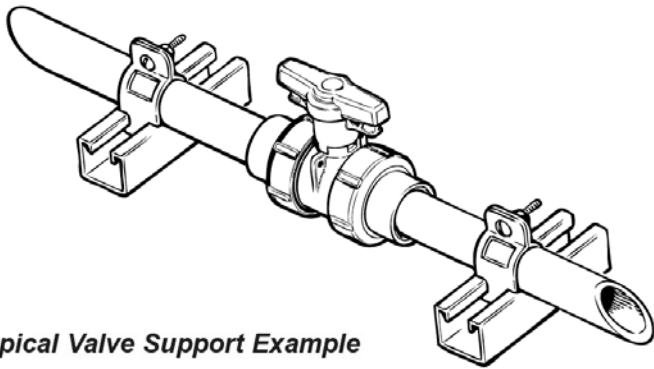
Ease of installation and maintenance is one of the major advantages of using thermoplastic valves. As with any product, certain procedures must be followed for successful installation, service and long life. This section specifies individual installation and maintenance service instructions for Spears® valves. All applicable instructions and procedures should be read thoroughly before starting. Suitability of the intended service application should be determined prior to installation. Please review "**Material Considerations in Application and System Design**", in the "**MATERIALS**" section of this manual for important additional considerations related valve installations.

Plastic piping systems should be engineered, installed, operated and maintained in accordance with accepted standards and procedures for plastic piping systems. It is absolutely necessary that all design, installation, operation and maintenance personnel be trained in proper handling, installation requirements and precautions for installation and use of plastic piping systems before starting.

Individual valve installation instructions specific to each product type are packaged with product. The following sections of this manual contain safety precautions and procedures for making solvent cement, threaded or flanged joints.

Precautions & Warnings for All Valve, Strainer & Accessories Installations

CAUTION: The system shall be designed and installed so as not to pull the valve in any direction. Valve and strainers must be supported with conventional piping system support devices.



Typical Valve Support Example

CAUTION: All valve connectors and connecting pipe should be inspected for any breaking, chipping, gouging or other visible damage before proceeding. All joining components must be clean and dry. All valves and pipe shall be removed from their packaging or containers and exposed to the environment for a minimum of one hour in order to thermally balance all components. Installation temperatures should be between 40°F and 110°F.

CAUTION: All valves with fixed socket end connectors in the body must be installed in the open position to aid in evaporation of solvent vapors which can attack internal components. **WARNING: TAKE EXTRA CARE THAT NO PRIMER OR SOLVENT CEMENT IS ALLOWED TO COME IN CONTACT WITH THE BALL OR OTHER INTERNAL VALVE COMPONENTS.**

CAUTION: Threaded pipe connections require application of a quality grade thread sealant to seal joint assembly. Sealant should be applied to male pipe threads. **WARNING: SOME PIPE JOINT COMPOUNDS OR PTFE PASTES MAY CONTAIN SUBSTANCES THAT COULD CAUSE STRESS CRACKING IN THERMOPLASTIC MATERIALS.**

Spears® Manufacturing Company recommends the use of Spears® **BLUE 75™** thread sealant which has been tested for compatibility with Spears® products. Please follow the sealant manufacturers' application/installation instructions. Choice of an appropriate thread sealant other than those listed above is at the discretion of the installer.

CAUTION: BEFORE THE VALVE IS CYCLED, all dirt, sand, grit or other material shall be flushed from the system. This is to prevent scarring of internal components; e.g., ball, cup, wedge, seats, etc.

WARNING: Some Lubricants, including vegetable oils, are known to cause stress cracking in thermoplastic materials. All lubricants should be checked for compatibility with PVC, CPVC or other thermoplastic products. Formulation changes by lubricant manufacturers may alter compatibility of previously acceptable materials and are beyond our control. Choice of lubricant is at the discretion of the installer.

WARNING: DO NOT USE COMPRESSED AIR OR GAS TO TEST ANY PVC OR CPVC THERMOPLASTIC PIPING PRODUCT OR SYSTEM, AND DO NOT USE DEVICES PROPELLED BY COMPRESSED AIR OR GAS TO CLEAR SYSTEMS. THESE PRACTICES MAY RESULT IN EXPLOSIVE FRAGMENTATION OF SYSTEM PIPING AND COMPONENTS CAUSING SERIOUS OR FATAL BODILY INJURY. All air must be bled from the system during initial fluid fill. Pressure testing of the system should not be made until all solvent cement joints have properly cured. Initial pressure testing should be made at approximately 10% of the system hydrostatic pressure rating to identify potential problems, prior to testing at higher pressures.

WARNING: Systems should not be operated or flushed out at flow velocities greater than 5 feet per second.



Valves Technical

Solvent Cement Welded Joints

Spears® Manufacturing Company recommends following Spears® solvent cement recommendations and reading ASTM D 2855, "Standard Practice for Making Solvent-Cemented Joints with Poly Vinyl Chloride (PVC) Pipe and Fittings". This method of joining valves and piping system components is very simple and reliable if procedures are followed correctly. Since variables of temperature, humidity, pipe size, time, and other conditions have a significant effect on solvent cement joints, it is important to understand the principles of each step and make adjustments for actual conditions. Shortcuts or excessive deviations may result in joint failures and or frozen valve movements.

Safety Precautions

WARNING: Solvent cements and primers for pipe, fittings and valves are flammable. Extinguish all smoking materials, flames, or other ignition sources in working or storage areas. Be sure to work only in a well-ventilated space. Avoid eye and unnecessary skin contact with all cements, primers or solvents. Ingestion or intentional inhalation of solvent vapors can be harmful or fatal. Additional safety precautions may apply; consult solvent cement manufacturer.

Selection of Solvent Cement

Spears® Recommends use of Spears® PVC and CPVC Cements and Primers. Suitable for appliance type, grade and consistency of solvent cement should according to size, installation conditions and chemical compatibility cement and system fluids. Contact Spears® for additional information.

Required Materials

- Saw & miter box or wheel-type cutter
- Pipe deburring & beveling tool or mill file
- Solvent Cement - PVC cement for PVC materials, CPVC cement for CPVC materials; heavy bodied, as manufactured by Spears® Manufacturing Company
- Primer - as manufactured by Spears® Manufacturing Company
- Brush or dauber type cement and primer applicators - select a size no less than 1/2 the pipe diameter (see chart below).
- Use containers - sealable metal or glass to hold cements and primers
- Cotton cleaning rags
- Cleanup solvents - such as tetrahydrofuran (THF) or methylethylketone (MEK)

Recommended Applicator Size for Solvent Cement and Primer

Applicator Type & Size (in.)	Nominal Pipe Size (in.)									
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
Brush*	1/2		1			1-1/2		2	3	6
Dauber	3/4		1-1/2			Not Recommended				
Roller	Not Recommended								3	
Adjustable Swab										4

General Procedure Outline

General Preparation

For best results, installation should be made at temperatures between 40°F and 110°F.

All joint components should be inspected for any breaking, chipping, gouging or other visible damage before proceeding. All pipe and fittings should be removed from their packaging or containers and exposed to the installation environment for a minimum of one hour in order to thermally balance all components.

On True Union Ball, Check and Diaphragm valves, remove union nuts and end connectors before priming and cementing connections. With the threads facing the valve, slide the union nut over the pipe to which the end connector socket is to be cemented. Reinstall the valve body and union nuts only after the joint has fully cured.

On valves with fixed socket connections in the body, be sure the valve is in the open position to aid in evaporation of solvent vapors which can attack internal components. **TAKE EXTRA CARE THAT NO PRIMER OR SOLVENT CEMENT IS ALLOWED TO COME IN CONTACT WITH THE BALL OR OTHER INTERNAL VALVE COMPONENTS.**

Step 1: Cut Pipe Square

Pipe ends must be cut square, using a wheel-type cutter or saw & miter box. A fine-toothed hand saw (16-18 teeth / inch) with little or no set is recommended. A power cutoff saw with carbide blade is recommended for high volume cutting.

Step 2: Deburr & Bevel Pipe

Regardless of cutting method used in step 1, burrs are created which must be removed from both the pipe I.D. and O.D. before joining. All pipe ends should be beveled 10° to 15°. Commercially available deburring & beveling tool is recommended, or a mill file may be used.

Step 3: Clean Joint Components

Wipe away all loose dirt and moisture from the pipe O.D. and fitting I.D. with a clean, dry cotton rag. **DO NOT ATTEMPT TO JOIN WET SURFACES.**

Step 4: Check Joint Interference Fit

An interference between pipe and fitting socket is necessary for proper fusion of the joint. To check, lightly insert pipe into fitting socket. **DO NOT FORCE.** Interference between pipe and fitting should occur between 1/3 to 2/3 of the socket depth (full interference fit) and the socket bottom (net fit). Do not use components which improperly mate.

Valves Technical Solvent Cement Welded Joints



Step 5: Apply Primer

Primer is necessary to penetrate and soften both pipe and fitting socket surfaces in order for the solvent cement to properly bond. **THE MOST FREQUENT CAUSE OF JOINT FAILURES IS INADEQUATE SOLVENT PENETRATION AND SOFTENING OF BONDING SURFACES DURING THE WELDING OPERATION.**

- Using a brush or applicator size no less than 1/2 the pipe diameter, apply a liberal coat of primer with a scrubbing motion to the fitting socket until the surface is softened and semi-fluid. This may take 5 to 15 seconds depending on size and temperature (larger diameters and lower temperatures will increase required time).
- Apply primer to pipe in the same manner, extending application area to slightly more than the insertion depth into the fitting socket.
- Apply a second coat to both the fitting socket and the pipe.
- Check penetration and softening by scraping the primed surfaces. A few thousandths of the semi-fluid surface should be easily removed. Repeat primer application if necessary.

Step 6: Apply Solvent Cement

Solvent cement must be applied **IMMEDIATELY** to primed surfaces before the primer dries in an alternating 3-coat application. Using a brush or applicator size no less than 1/2 the pipe diameter, apply a liberal coat of solvent cement to the primed pipe surface, then apply a light to medium coat to the primed fitting socket. If a "net fit" was experienced during dry fit check (Step 4), apply an additional coat again to the pipe surface. **BE SURE TO USE A VERY LIBERAL AMOUNT OF SOLVENT CEMENT ON PIPE.**

VALVE INSTALLATION CAUTION: TAKE EXTRA CARE THAT NO PRIMER OR SOLVENT CEMENT IS ALLOWED TO CONTACT THE BALL OR OTHER INTERNAL VALVE COMPONENTS.

Step 7: Join Components

IMMEDIATELY following application of cement and before it starts to set, insert the pipe into the fitting socket with a one-quarter turn, twisting motion to evenly distribute cement within the joint. A full bead of cement should form around the circumference of the joint. Hold joint together for approximately 30 seconds to make sure the pipe does not move or back out of the socket.

CAUTION: ABSENCE OF BEAD FORMATION, VOIDS, OR GAPS IN THE BEAD ARE A SIGN OF INSUFFICIENT CEMENT APPLICATION. IF SUCH IS OBSERVED, IMMEDIATELY PULL THE JOINT APART AND REAPPLY AN ADEQUATE AMOUNT OF CEMENT.

Step 8: Remove Excess Cement

Using a cloth, wipe clean all excess cement from the exterior juncture of the pipe and fitting.

Step 9: Initial Set Time

The joint must not be handled or moved for a minimum of 2 minutes, after which the joint must be handled carefully until the cement has gone through a set period. Recommended minimum set time for Valves:
 30 minutes minimum at 60° to 100°F (15° to 40°C)
 1 hour minimum at 40° to 60°F (5° to 15°C)
 2 hours minimum at 20° to 40°F (-5° to 5°C)
 4 hours minimum at 0° to 20°F (-20° to -5°C)

Step 10: Joint Cure Time

The joint must adequately cure prior to use (see "Joint Cure Schedule" table below). Required cure time depends on temperature, pipe diameter, and pressure application. The following table is based on the guidelines of ASTM D 2855, "Standard Practice for Making Solvent-Cemented Joints with Poly Vinyl Chloride (PVC) Pipe and Fittings". It is the user's responsibility and risk in determining that the joint has properly cured for handling, testing, and use.

Recommended Joint Cure Schedule for Valves

Temperature	60° - 100°F		40° - 60°F		20° - 40°F		10° - 20°F	
	Test Pressure (psi)		Test Pressure (psi)		Test Pressure (psi)		Test Pressure (psi)	
Nominal Pipe Size (in.)	0-180	181-315	0-180	181-315	0-180	181-315	0-180	181-315
1/2 to 1-1/4	1 hour	6 hours	2 hours	12 hours	6 hours	36 hours	8 hours	48 hours
1-1/2 to 3	2 hours	12 hours	4 hours	24 hours	12 hours	72 hours	16 hours	96 hours
3-1/2 to 5	6 hours	18 hours	12 hours	36 hours	36 hours	4 days	72 hours	8 days
6 to 8	8 hours	24 hours	16 hours	48 hours	3 days	9 days	4 days	12 days

NOTE: Extreme caution should be used when solvent cementing joints at temperatures below 10°F, and many variables exist at temperatures below 20°F. Relative humidity greater than 50% will increase required cure times specified. Consult solvent cement manufacturer for additional information.



Valves Technical Threaded Connections

Threaded joints are used where piping system dismantling for occasional cleaning or modification is anticipated. Since threading reduces the effective wall thickness of pipe, pressure ratings of the pipe are reduced to one-half that of unthreaded pipe using solvent cement welded joints. Valves, however, have individual pressure ratings substantially different from that of pipe. As a result, no reduction in the valve's specified pressure rating is necessary for threaded connections. Threaded systems should be made with Schedule 80 pipe only, threaded with an ANSI general purpose tapered pipe thread (NPT). Schedule 40 pipe should not be threaded.

General Procedure Outline

Step 1: Apply Joint Sealant

Threaded connections require application of a quality grade thread sealant to seal joint assembly.

WARNING: SOME PIPE JOINT COMPOUNDS OR PTFE PASTES MAY CONTAIN SUBSTANCES THAT COULD CAUSE STRESS CRACKING IN THERMOPLASTIC MATERIALS. Spears® Manufacturing Company recommends the use of Spears® BLUE 75™ thread sealant which has been tested for compatibility with Spears® products. Please follow the sealant manufacturers' application / installation instructions. Choice of an appropriate thread sealant other than those listed above is at the discretion of the installer.

Step 2: Assemble Joint by Hand

Threaded pipe and valves or fittings should be initially assembled "finger tight" (just enough to fully engage thread clearance).

Step 3: Strap Wrench Make-Up

Threaded plastic pipe and fitting components should always be installed using commercially available strap wrenches. Do not use conventional pipe wrenches which can damage plastic piping materials.

WARNING: THE SINGLE MOST COMMON CAUSE OF THREADED JOINT FAILURE IS OVERTIGHTENING.

Tapered pipe threads produce radial stress in female fittings. Overtightening can exceed the stress limits of thermoplastic materials, resulting in split fittings.

Apply strap wrench make-up of **no more than one to two turns** beyond finger tight thread engagement. Care should be taken in final positioning so as to avoid the need to "back-up" the wrenched assembly.



Valves Technical Flanged Connections



Flanges are used extensively for connections where removable system components are desired. Such includes periodic system servicing, anticipated system modification or add-on, and temporary component hookups. Flanges are also the standard connection for industrial butterfly type valves.

Pressure Ratings

Plastic pipe flanges are designed for system maximum internal pressures of 150 psi, water at 73°F, which must be taken into consideration when using flanges with higher pressure rated components, such as pipe or valves. As with all thermoplastic piping materials, pressure rating is a function of temperature. Refer to **"Temperature Pressure Rating for 150 psi Flanges"** chart below and that specified for individual products. Certain variations may exist according to product type and size.

Bolt Holes & Pattern

Bolt patterns and number of bolt holes are the same as Class 150 metal flanges per ANSI B16.5.

Gaskets

Full faced, 1/8" thick elastomer gaskets with a Shore "A" Durometer of approximately 70 is recommended.

Bolt Torque

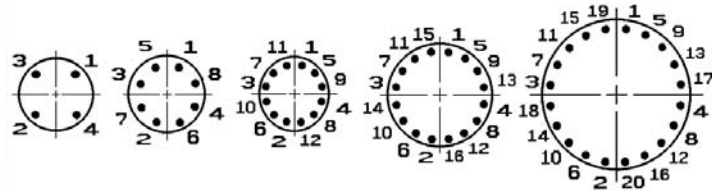
Recommended Bolt torque requirements are shown below. Threads should be clean and well lubricated. Actual field conditions may require variations in these recommendations.

CAUTION: UNNECESSARY OVER TORQUING WILL DAMAGE THE FLANGE.

Flange Size (in.)	Recommended Torque (ft. lbs.)
1/2 - 1-1/2	12
2 - 4	5
5	30
6-8	40
10	64
12	95
14-24	110

Torque Sequence

Bolts should be tightened in a 180° opposing pattern. Recommended bolt torque sequence is shown in the following table.



General Procedure Outline

Once a flange is attached to the pipe or valve, the method of joining two flanges is as follows:

- Step 1:** Piping runs joined to the flanges must be installed in a straight line position to the flange to avoid stress at the flange due to misalignment. Piping must also be secured and supported to prevent lateral movement which can create stress and damage the flange.
- Step 2:** With gasket in place, align the bolt holes of the mating flanges by rotating the ring into position. (Consideration should be given to alignment of One-Piece Flange prior to joining with pipe.)
- Step 3:** Insert all bolts, washers (two standard flat washers per bolt), and nuts.
- Step 4:** Make sure the faces of the mating surfaces are flush against gasket prior to bolting down the flanges.
- Step 5:** Tighten the nuts by hand until they are snug. Establish uniform pressure over the flange face by tightening the bolts in 5 ft.-lbs. increments according to the sequence shown in the above table following a 180° opposing sequence.
- Step 6:** Care must be taken to avoid "bending" the flange when joining a Spears® flange to a "raised face" flange, or a wafer-style valve. Do not use bolts to bring together improperly mated flanges.

Temperature Pressure Rating

System Operating Temperature °F (°C)		100 (38)	110 (43)	120 (49)	130 (54)	140 (60)	150 (66)	160 (71)	170 (77)	180 (82)	190 (88)	200 (93)	210 (99)
Flange Pressure Rating psi (MPa)	PVC	150 (1.03)	135 (.93)	110 (.76)	75 (.52)	50 (.34)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)
	CPVC	150 (1.03)	140 (.97)	130 (.90)	120 (.83)	110 (.76)	100 (.70)	90 (.62)	80 (.55)	70 (.48)	60 (.41)	50 (.34)	-0- (-0-)
	PP	150 (1.03)	105 (.72)	90 (.62)	80 (.55)	65 (.45)	50 (.34)	45 (.31)	30 (.21)	20 (.14)	-0- (-0-)	-0- (-0-)	-0- (-0-)



Valves Technical

Valve Service & Replacement Kits

For easy servicing and extended valve life, Spears® provides numerous maintenance repair kits and replaceable components for all repairable valves. Repair Kits generally include applicable seats, O-ring seals, diaphragms and other components typically subjected to normal operational wear.

Full Cartridge Replacement Kits are available for all True Union style ball valves and ball check valves. These include complete valve assembly, less union nuts and end connectors. Replacement Cartridges can be directly installed in place of existing valve unit using existing union nuts and end connectors.

Individual valve replacement parts may be ordered from the factory. Complete maintenance service instructions for each valve are available. Please contact Spears® Technical Services Department.

True Union 2000 Industrial Ball Valve Seat & O-ring Repair Kit

All kits include PTFE Seats (2), End Connector O-rings (2), Seal Carrier O-ring (1), Stem Bushing (1) and Stem O-rings (2). Sizes 2-1/2" & larger includes Seat O-rings (2).

Size	Part Number	
	w/EPDM O-rings	w/FKM O-rings
1/2	TU2-ERK-005	TU2-VRK-005
3/4	TU2-ERK-007	TU2-VRK-007
1	TU2-ERK-010	TU2-VRK-010
1-1/4	TU2-ERK-012	TU2-VRK-012
1-1/2	TU2-ERK-015	TU2-VRK-015
2	TU2-ERK-020	TU2-VRK-020
2-1/2 & 3	TU2-ERK-030	TU2-VRK-030
4	TU2-ERK-040	TU2-VRK-040
6	TU2-ERK-060	TU2-VRK-060

True Union 2000 Standard Ball Valve Seat & O-ring Repair Kit

All kits include PTFE/HDPE Seats (2), End Connector O-rings (2), Seal Carrier O-ring (1), and Stem O-rings (2).

Size	Part Number	
	w/EPDM O-rings	w/FKM O-rings
1/2	TU1-ERK-005	TU1-VRK-005
3/4	TU1-ERK-007	TU1-VRK-007
1	TU1-ERK-010	TU1-VRK-010
1-1/4	TU1-ERK-012	TU1-VRK-012
1-1/2	TU1-ERK-015	TU1-VRK-015
2	TU1-ERK-020	TU1-VRK-020
2-1/2 & 3	TU1-ERK-030	TU1-VRK-030
4	TU1-ERK-040	TU1-VRK-040

True Union 2000 Industrial Ball Valve Cartridge Replacement Kit

Includes valve assembly, less union nuts and end connectors.

Size	PVC Part Number ¹	
	w/EPDM O-rings	w/FKM O-rings
1/2	1820-005	1830-005
3/4	1820-007	1830-007
1	1820-010	1830-010
1-1/4	1820-012	1830-012
1-1/2	1820-015	1830-015
2	1820-020	1830-020
2-1/2 & 3	1820-030	1830-030
4	1820-040	1830-040
6	1820-060	1830-060

¹: For CPVC Cartridge Kit, add the letter "C" to the part numbers listed (e.g. 1820-005C).

True Union 2000 Standard Ball Valve Cartridge Replacement Kit

Includes valve assembly, less union nuts and end connectors.

Size	PVC Part Number ¹	
	w/EPDM O-rings	w/FKM O-rings
1/2	3620-005	3630-005
3/4	3620-007	3630-007
1	3620-010	3630-010
1-1/4	3620-012	3630-012
1-1/2	3620-015	3630-015
2	3620-020	3630-020
2-1/2 & 3	3620-030	3630-030
4	3620-040	3630-040

¹: For CPVC Cartridge Kit, add the letter "C" to the part numbers listed (e.g. 3620-005C).

True Union 3-Way Full Port Ball Valve Seat & O-ring Repair Kit

All Kits Include PTFE Seats (3), Seal Carrier O-ring (3), Stem O-ring (2), and End Connector O-ring (3).

Size	Part Number	
	w/EPDM O-rings	w/FKM O-rings
1/2	TU5-ERK-005	TU5-VRK-005
3/4	TU5-ERK-007	TU5-VRK-007
1	TU5-ERK-010	TU5-VRK-010
1-1/4	TU5-ERK-012	TU5-VRK-012
1-1/2	TU5-ERK-015	TU5-VRK-015
2	TU5-ERK-020	TU5-VRK-020

Valves Technical
Valve Service & Replacement Kits



Contact Spears® for 3-Way Full Port Kits

**True Union 2000 Industrial
3-Way Ball Valve**

Seat & O-ring Repair Kit (Horizontal or Vertical)

All kits include PTFE Seats (2-no branch seal), End Connector O-rings (3), Seal Carrier O-ring (1), Stem Bushing (1) and Stem O-rings (2). Sizes 2-1/2" & larger includes Seat O-rings (2).

Size	Part Number	
	w/EPDM O-rings	w/FKM O-rings
1/2	TU3-ERK-005	TU3-VRK-005
3/4	TU3-ERK-007	TU3-VRK-007
1	TU3-ERK-010	TU3-VRK-010
1-1/4	TU3-ERK-012	TU3-VRK-012
1-1/2	TU3-ERK-015	TU3-VRK-015
2	TU3-ERK-020	TU3-VRK-020
2-1/2 & 3	TU3-ERK-030	TU3-VRK-030
4	TU3-ERK-040	TU3-VRK-040

**True Union 2000 Industrial Ball
Check Valve
O-ring Repair Kit**

All kits include End Connector O-rings (2), Seal Carrier O-ring (1), Seat Plate O-ring (1).

Size	Part Number	
	w/EPDM O-rings	w/FKM O-rings
1/2	CK2-ERK-005	CK2-VRK-005
3/4	CK2-ERK-007	CK2-VRK-007
1	CK2-ERK-010	CK2-VRK-010
1-1/4	CK2-ERK-012	CK2-VRK-012
1-1/2	CK2-ERK-015	CK2-VRK-015
2	CK2-ERK-020	CK2-VRK-020
2-1/2 & 3	CK2-ERK-030	CK2-VRK-030
4	CK2-ERK-040	CK2-VRK-040
6	CK2-ERK-060	CK2-VRK-060

**Regular True Union Ball Valve
Seat & O-ring Repair Kit**

All kits include End Connector O-rings (2), Seal Carrier O-ring (1), Stem Bushing (1) and Seat O-ring (1).

Size	Part Number	
	w/EPDM O-rings	w/FKM O-rings
1/2	TU-ERK-005	TU-VRK-005
3/4	TU-ERK-007	TU-VRK-007
1	TU-ERK-010	TU-VRK-010
1-1/4	TU-ERK-012	TU-VRK-012
1-1/2	TU-ERK-015	TU-VRK-015
2	TU-ERK-020	TU-VRK-020
2-1/2 & 3	TU-ERK-030	TU-VRK-030
4 & 6	TU-ERK-040	TU-VRK-040

**True Union 2000 Industrial
3-Way Ball Valve**

Cartridge Replacement Kit

Includes valve assembly, less union nuts and end connectors.

Size	Vertical PVC Part Number ^{1,2,5}		Horizontal PVC Part Number ^{1,2,3,4}	
	w/EPDM O-rings	w/FKM O-rings	w/EPDM O-rings	w/FKM O-rings
1/2	4720L1-005	4730L1-005	5020L1-005	5030L1-005
3/4	4720L1-007	4730L1-007	5020L1-007	5030L1-007
1	4720L1-010	4730L1-010	5020L1-010	5030L1-010
1-1/4	4720L1-012	4730L1-012	5020L1-012	5030L1-012
1-1/2	4720L1-015	4730L1-015	5020L1-015	5030L1-015
2	4720L1-020	4730L1-020	5020L1-020	5030L1-020
2-1/2 & 3	4720L1-030	4730L1-030	5020L1-030	5030L1-030
4	4720L1-040	4730L1-040	5020L1-040	5030L1-040

- 1: For CPVC Cartridge Kit, add the letter "C" to the part numbers listed (e.g. 4720L1-005C).
- 2: For Double L-Port, change "L1" portion of part number to L2 (e.g. 4720L2-005).
- 3: For Triple L-Port, change "L1" portion of part number to L3 (e.g. 4720L3-005).
- 4: For T-Port, change "L1" portion of part number to "T" (e.g. 4720T-005).

**True Union 2000 Industrial Ball
Check Valve**

Cartridge Replacement Kit

Includes valve assembly, less union nuts and end connectors.

Size	PVC Part Number ¹	
	w/EPDM O-rings	w/FKM O-rings
1/2	4520-005	4530-005
3/4	4520-007	4530-007
1	4520-010	4530-010
1-1/4	4520-012	4530-012
1-1/2	4520-015	4530-015
2	4520-020	4530-020
2-1/2 & 3	4520-030	4530-030
4	4520-040	4530-040
6	4520-060	4530-060

- 1: For CPVC Cartridge Kit, add the letter "C" to the part numbers listed (e.g. 4520-005C).

**Regular True Union Ball Check Valve
O-ring Repair Kit**

Includes ball seal O-ring (1), end-connector O-rings (2), and seal carrier O-ring (1).

Size	Part Number	
	w/EPDM O-rings	w/FKM O-rings
1/2	CK-ERK-005	CK-VRK-005
3/4	CK-ERK-007	CK-VRK-007
1	CK-ERK-010	CK-VRK-010
1-1/4	CK-ERK-012	CK-VRK-012
1-1/2	CK-ERK-015	CK-VRK-015
2	CK-ERK-020	CK-VRK-020
2-1/2 & 3	CK-ERK-030	CK-VRK-030
4	CK-ERK-040	CK-VRK-040



Valves Technical
Valve Service & Replacement Kits

**Regular True Union Ball Valve
Cartridge Replacement Kit**

Includes valve assembly, less union nuts, and end connectors.

Size	PVC Part Number ¹	
	w/EPDM O-rings	w/FKM O-rings
1/2	2320-005	2330-005
3/4	2320-007	2330-007
1	2320-010	2330-010
1-1/4	2320-012	2330-012
1-1/2	2320-015	2330-015
2	2320-020	2330-020
2-1/2 & 3	2320-030	2330-030
4 & 6	2320-040	2330-040

¹ For CPVC Cartridge Kit, add the letter "C" to part numbers listed (e.g., 2320-005C).

**Regular True Union Ball Check Valve
Cartridge Replacement Kit**

Includes valve assembly, less union nuts, and end connectors.

Size	PVC Part Number ¹	
	w/EPDM O-rings	w/FKM O-rings
1/2	2220-005	2230-005
3/4	2220-007	2230-007
1	2220-010	2230-010
1-1/4	2220-012	2230-012
1-1/2	2220-015	2230-015
2	2220-020	2230-020
2-1/2 & 3	2220-030	2230-030
4	2220-040	2230-040

¹ For CPVC Cartridge Kit, add the letter "C" to part numbers listed (e.g., 2220-005C).

**Single Entry Ball Valve
Seat & O-ring Replacement Kit**

Includes PTFE seats (2), seat O-rings (2), and seal carrier O-ring (1).

Size	Part Number		
	w/Buna-N O-rings	w/EPDM O-rings	w/FKM O-rings
1/2	SE-BRK-005	SE-ERK-005	SE-VRK-005
3/4	SE-BRK-007	SE-ERK-007	SE-VRK-007
1	SE-BRK-010	SE-ERK-010	SE-VRK-010
1-1/4 & 1-1/2	SE-BRK-015	SE-ERK-015	SE-VRK-015
2	SE-BRK-020	SE-ERK-020	SE-VRK-020
3	SE-BRK-030	SE-ERK-030	SE-VRK-030
4	SE-BRK-040	SE-ERK-040	SE-VRK-040

**Gate Valve
O-ring Repair Kit**

1/2" through 2" Kit includes stem O-ring (1), body O-ring (1), wedge O-ring or gasket (1), stem bushing (1) and stem washer (1).

2" and 3" Kit includes seal carrier O-ring (1), stem O-ring (1), stem washer (1) and stem bushing (1).

4" Kit includes carrier O-ring (1), stem O-ring (1) and stem bushing.

Size	Part Number		
	w/Buna-N O-rings	w/EPDM O-rings	w/FKM O-rings
1/2	GT-BRK-005	GT-ERK-005	GT-VRK-005
3/4	GT-BRK-007	GT-ERK-007	GT-VRK-007
1	GT-BRK-010	GT-ERK-010	GT-VRK-010
1-1/4	GT-BRK-012	GT-ERK-012	GT-VRK-012
1-1/2	GT-BRK-015	GT-ERK-015	GT-VRK-015
2	GT-BRK-020	GT-ERK-020	GT-VRK-020
2-1/2 & 3	GT-BRK-030	GT-ERK-030	GT-VRK-030
4	GT-BRK-040	GT-ERK-040	GT-VRK-040

**Gate Valve
Internal Replacement Cartridge**

Includes complete internal assembly with bonnet and handle.

Size	Part Number ¹		
	w/Buna-N O-rings	w/EPDM O-rings	w/FKM O-rings
1/2	2010-005	2020-005	2030-005
3/4	2010-007	2020-007	2030-007
1	2010-010	2020-010	2030-010
1-1/4 & 1-1/2	2010-015	2020-015	2030-015
2	2010-020	2020-020	2030-020

¹ For CPVC Cartridge Kit, add the letter "C" to part numbers listed (e.g., 2010-005C).



Butterfly Valve

Standard & True Lug Seat Repair Kit

Standard Valve and True Lug Kit through 12" includes Buna-N, EPDM or FKM seat (1) and PVC or CPVC seal carrier (1).

Sizes 14" and larger include EPDM or FKM seat only.

Size	PVC Part Number ^{1,2}		
	w/Buna-N	w/EPDM	w/FKM
1-1/2	BF-BRK-015	BF-ERK-015	BF-VRK-015
2	BF-BRK-020	BF-ERK-020	BF-VRK-020
2-1/2	BF-BRK-025	BF-ERK-025	BF-VRK-025
3	BF-BRK-030	BF-ERK-030	BF-VRK-030
4	BF-BRK-040	BF-ERK-040	BF-VRK-040
6	BF-BRK-060	BF-ERK-060	BF-VRK-060
8	BF-BRK-080	BF-ERK-080	BF-VRK-080
10	BF-BRK-100	BF-ERK-100	BF-VRK-100
12	BF-BRK-120	BF-ERK-120	BF-VRK-120
14	—	BF-ERK-140	BF-VRK-140
16	—	BF-ERK-160	BF-VRK-160
18	—	BF-ERK-180	BF-VRK-180
20	—	BF-ERK-200	BF-VRK-200
24	—	BF-ERK-240	BF-VRK-240

1: For CPVC Seat Replacement Kit, add a "C" to the end of the part number shown (e.g., BF-BRK-015C).

2: For PP, add a "P" to the end of the part number (e.g., BF-BRK-015P).

Butterfly Valve

Standard Valve Overhaul Kit

For standard sizes through 12" includes stem nut (1), stem bushing (1), bushing O-ring (2), stem O-ring (2), stem washer - hex (1), stem washer - round (1), timing stop (1), seat (1), seal carrier (1), disc O-ring (2) and stem bearing (1).

Sizes 14" and larger include stem nut (1) 14" only, stem bearing (1), bearing O-ring (1), stem bushing (1), bushing O-ring (3), seal carrier (1), seat (1) and stem O-ring (2) 16" and larger only.

Size	PVC Part Number ^{1,2}		
	w/Buna-N	w/EPDM	w/FKM
1-1/2	BF-BOK-015	BF-EOK-015	BF-VOK-015
2	BF-BOK-020	BF-EOK-020	BF-VOK-020
2-1/2	BF-BOK-025	BF-EOK-025	BF-VOK-025
3	BF-BOK-030	BF-EOK-030	BF-VOK-030
4	BF-BOK-040	BF-EOK-040	BF-VOK-040
6	BF-BOK-060	BF-EOK-060	BF-VOK-060
8	BF-BOK-080	BF-EOK-080	BF-VOK-080
10	BF-BOK-100	BF-EOK-100	BF-VOK-100
12	BF-BOK-120	BF-EOK-120	BF-VOK-120
14	—	BF-EOK-140	BF-VOK-140
16	—	BF-EOK-160	BF-VOK-160
18	—	BF-EOK-180	BF-VOK-180
20	—	BF-EOK-200	BF-VOK-200
24	—	BF-EOK-240	BF-VOK-240

1: CPVC Standard Valve Overhaul Kit available through 12" only. Add a "C" to the end of the part number shown (e.g., BF-BOK-015C).

2: For PP, add a "P" to the end of the part number (e.g., BF-BOK-015P).

Important Repair & Overhaul Kit Note

Ongoing Butterfly Valve design improvements have resulted in variations to repair kits. Standard cataloged kits are for current 72 part number series, dry-stem type valve revision. Kits for previous revisions are available and can be determined by valve serial number. When ordering kits, please specify valve size, material (PVC, CPVC, PP), Standard or True Lug type valve, Buna-N, EPDM or FKM elastomer material, and valve serial number stamped on the bottom of the valve body to ensure proper kit selection. Stainless Steel Stems are normally not replaced, but can be ordered separately on request.

Butterfly Valve

True Lug Valve Overhaul Kit

Includes stem nut (1), stem bushing (1), bushing O-ring (1), stem O-ring (1), stem washer - hex (1), stem washer - round (1), timing stop (1), seat (1), seal carrier (1), seal carrier, flange O-ring (1), disc O-ring (2) and stem bearing (1).

Size	PVC Part Number ¹		
	w/Buna-N	w/EPDM	w/FKM
1-1/2	BFT-BOK-015	BFT-EOK-015	BFT-VOK-015
2	BFT-BOK-020	BFT-EOK-020	BFT-VOK-020
2-1/2	BFT-BOK-025	BFT-EOK-025	BFT-VOK-025
3	BFT-BOK-030	BFT-EOK-030	BFT-VOK-030
4	BFT-BOK-040	BFT-EOK-040	BFT-VOK-040
6	BFT-BOK-060	BFT-EOK-060	BFT-VOK-060
8	BFT-BOK-080	BFT-EOK-080	BFT-VOK-080
10	BFT-BOK-100	BFT-EOK-100	BFT-VOK-100
12	BFT-BOK-120	BFT-EOK-120	BFT-VOK-120

1: For CPVC True Lug Valve Overhaul Kit, add a "C" to the end of the part number shown (e.g., BFT-BOK-015C).

Butterfly Valve

True Lug Valve Overhaul Kit with Disc

Includes stem nut (1), stem bushing (1), bushing O-ring (1), stem O-ring (1), stem washer - hex (1), stem washer - round (1), timing stop (1), seat (1), seal carrier (1) seal carrier flange O-ring (1), disc (1), disc O-ring (2) and stem bearing (1).

Size	Part Number ¹		
	w/Buna-N	w/EPDM	w/FKM
1-1/2	BFT-BOKD-015	BFT-EOKD-015	BFT-VOKD-015
2	BFT-BOKD-020	BFT-EOKD-020	BFT-VOKD-020
2-1/2	BFT-BOKD-025	BFT-EOKD-025	BFT-VOKD-025
3	BFT-BOKD-030	BFT-EOKD-030	BFT-VOKD-030
4	BFT-BOKD-040	BFT-EOKD-040	BFT-VOKD-040
6	BFT-BOKD-060	BFT-EOKD-060	BFT-VOKD-060
8	BFT-BOKD-080	BFT-EOKD-080	BFT-VOKD-080
10	BFT-BOKD-100	BFT-EOKD-100	BFT-VOKD-100
12	BFT-BOKD-120	BFT-EOKD-120	BFT-VOKD-120

1: For CPVC True Lug Valve Overhaul Kit with Disc, add a "C" to the end of the part number shown (e.g., BFT-BOKD-015C).



Valves Technical Valve Service & Replacement Kits

Butterfly Valve

Standard Valve Overhaul Kit with Disc

For standard sizes through 12" includes stem nut (1), stem bushing (1), bushing O-ring (2), stem O-ring (2), stem washer - hex (1), stem washer - round (1), timing stop (1), seat (1), seal carrier (1), disc (1), disc O-ring (2) and stem bearing (1).

Sizes 14" and larger includes stem nut (1) 14" only, stem bearing (1), bearing O-ring (1), stem bushing (1), bushing O-ring (3), disc (1), seal carrier (1), seat (1) and stem O-ring (2) 16" and larger only.

Size	Part Number ^{1,2}		
	w/Buna-N	w/EPDM	w/FKM
1-1/2	BF-BOKD-015	BF-EOKD-015	BF-VOKD-015
2	BF-BOKD-020	BF-EOKD-020	BF-VOKD-020
2-1/2	BF-BOKD-025	BF-EOKD-025	BF-VOKD-025
3	BF-BOKD-030	BF-EOKD-030	BF-VOKD-030
4	BF-BOKD-040	BF-EOKD-040	BF-VOKD-040
6	BF-BOKD-060	BF-EOKD-060	BF-VOKD-060
8	BF-BOKD-080	BF-EOKD-080	BF-VOKD-080
10	BF-BOKD-100	BF-EOKD-100	BF-VOKD-100
12	BF-BOKD-120	BF-EOKD-120	BF-VOKD-120
14	—	BF-EOKD-140	BF-VOKD-140
16	—	BF-EOKD-160	BF-VOKD-160
18	—	BF-EOKD-180	BF-VOKD-180
20	—	BF-EOKD-200	BF-VOKD-200
24	—	BF-EOKD-240	BF-VOKD-240

1: CPVC Standard Valve Overhaul Kit available through 12" only. Add a "C" to the end of the part number shown (e.g., BF-BOKD-015C).

2: For PP, add a "P" to the end of the part number (e.g., BF-BOKD-015P).

Wafer Butterfly Valve Overhaul Kit

All Kits include Seat (1), Flange Gaskets (2), Stem Bushing O-rings (2), Bushing Washers (2), Stem Bushings (2).

Size	Part Number		
	w/Buna-N	w/EPDM	w/FKM
2	BFW-BOK-020	BFW-EOK-020	BFW-VOK-020
2-1/2	BFW-BOK-025	BFW-EOK-025	BFW-VOK-025
3	BFW-BOK-030	BFW-EOK-030	BFW-VOK-030
4	BFW-BOK-040	BFW-EOK-040	BFW-VOK-040
6	BFW-BOK-060	BFW-EOK-060	BFW-VOK-060
8	BFW-BOK-080	BFW-EOK-080	BFW-VOK-080
10	BFW-BOK-100	BFW-EOK-100	BFW-VOK-100
12	BFW-BOK-120	BFW-EOK-120	BFW-VOK-120

Wafer Butterfly Valve Overhaul Kit w/Disc

All Kits include Seat (1), Flange Gaskets (2), Stem Bushing O-rings (2), Stem Bushing Washers (2), Stem Bushings (2), Replacement Disc (1).

Size	Part Number ¹		
	w/Buna-N	w/EPDM	w/FKM
2	BFW-BOKD-020	BFW-EOKD-020	BFW-VOKD-020
2-1/2	BFW-BOKD-025	BFW-EOKD-025	BFW-VOKD-025
3	BFW-BOKD-030	BFW-EOKD-030	BFW-VOKD-030
4	BFW-BOKD-040	BFW-EOKD-040	BFW-VOKD-040
6	BFW-BOKD-060	BFW-EOKD-060	BFW-VOKD-060
8	BFW-BOKD-080	BFW-EOKD-080	BFW-VOKD-080
10	BFW-BOKD-100	BFW-EOKD-100	BFW-VOKD-100
12	BFW-BOKD-120	BFW-EOKD-120	BFW-VOKD-120

1: For CPVC Overhaul Kits with Disc available in EPDM or FKM only. Add a "C" to the end of the part number shown (e.g., BFW-EOKD-020C).

Wafer Butterfly Valve Overhaul Kit

All Kits include Seat (1), Flange Gaskets (2).

Size	Part Number		
	w/Buna-N	w/EPDM	w/FKM
2	BFW-BRK-020	BFW-ERK-020	BFW-VRK-020
2-1/2	BFW-BRK-025	BFW-ERK-025	BFW-VRK-025
3	BFW-BRK-030	BFW-ERK-030	BFW-VRK-030
4	BFW-BRK-040	BFW-ERK-040	BFW-VRK-040
6	BFW-BRK-060	BFW-ERK-060	BFW-VRK-060
8	BFW-BRK-080	BFW-ERK-080	BFW-VRK-080
10	BFW-BRK-100	BFW-ERK-100	BFW-VRK-100
12	BFW-BRK-120	BFW-ERK-120	BFW-VRK-120

Industrial Swing Check Valve Seat & O-ring Repair Kit

All kits include Bonnet O-ring (1), Disc O-ring (1), Seat O-ring (1), Plug O-ring (1) and Arm Plug O-ring (1).

Size	Part Number	
	w/EPDM O-rings	w/FKM O-rings
3/4	SK-ERK-007	SK-VRK-007
1	SK-ERK-010	SK-VRK-010
1-1/4	SK-ERK-012	SK-VRK-012
1-1/2	SK-ERK-015	SK-VRK-015
2	SK-ERK-020	SK-VRK-020
2-1/2 & 3	SK-ERK-030	SK-VRK-030
4	SK-ERK-040	SK-VRK-040
6	SK-ERK-060	SK-VRK-060
8	SK-ERK-080	SK-VRK-080

Butterfly Check Valve Repair Kit

Repair Kit Contains: Flex Seal Gasket Seat (1), Hinge Post (1), Flapper Plates (2), Flapper Covers (2), Post Strip (1), Seat Post O-rings & Plastic Assembly Screws (2).

Use Existing Hinge post Bolts

Size	Part Number ¹	
	w/EPDM O-rings	w/FKM O-rings
2	BFC-ERK-020	BFC-VRK-020
2-1/2	BFC-ERK-025	BFC-VRK-025
3	BFC-ERK-030	BFC-VRK-030
4	BFC-ERK-040	BFC-VRK-040
6	BFC-ERK-060	BFC-VRK-060
8	BFC-ERK-080	BFC-VRK-080
10	BFC-ERK-100	BFC-VRK-100
12	BFC-ERK-120	BFC-VRK-120

1: For CPVC Butterfly Check Valve Repair Kit, add a "C" to the end of the part number shown (e.g., BFC-ERK-020C).

Valves Technical
Valve Service & Replacement Kits



Y-Pattern Valve - Internal Repair Kit

Internal Repair Kit includes: Stem O-ring (1), Seal Carrier (1), along with a factory assembled (required) internal component replacement unit consisting of Stem assembled with Seat & Seal Carrier components. Install in valve using existing valve Bonnet, Bonnet Nut, and Handle/Nut. True Union style valve kits include additional End Connector O-rings (2).

Size	Part Number							
	w/EPDM O-ring	CPVC w/EPDM O-ring	w/FKM O-ring	CPVC w/FKM O-ring	Union w/EPDM O-ring	CPVC Union w/EPDM O-ring	Union w/FKM O-ring	CPVC Union w/FKM O-ring
1/2	YV-ERK-005	YV-ERK-005C	YV-VRK-005	YV-VRK-005C	YV-UERK-005	YV-UERK-005C	YV-UVRK-005	YV-UVRK-005C
3/4	YV-ERK-007	YV-ERK-007C	YV-VRK-007	YV-VRK-007C	YV-UERK-007	YV-UERK-007C	YV-UVRK-007	YV-UVRK-007C
1	YV-ERK-010	YV-ERK-010C	YV-VRK-010	YV-VRK-010C	YV-UERK-010	YV-UERK-010C	YV-UVRK-010	YV-UVRK-010C
1-1/4	YV-ERK-012	YV-ERK-012C	YV-VRK-012	YV-VRK-012C	YV-UERK-012	YV-UERK-012C	YV-UVRK-012	YV-UVRK-012C
1-1/2	YV-ERK-015	YV-ERK-015C	YV-VRK-015	YV-VRK-015C	YV-UERK-015	YV-UERK-015C	YV-UVRK-015	YV-UVRK-015C
2	YV-ERK-020	YV-ERK-020C	YV-VRK-020	YV-VRK-020C	YV-UERK-020	YV-UERK-020C	YV-UVRK-020	YV-UVRK-020C
3	YV-ERK-030	YV-ERK-030C	YV-VRK-030	YV-VRK-030C	YV-UERK-030	YV-UERK-030C	YV-UVRK-030	YV-UVRK-030C
4	YV-ERK-040	YV-ERK-040C	YV-VRK-040	YV-VRK-040C	YV-UERK-040	YV-UERK-040C	YV-UVRK-040	YV-UVRK-040C

Y-Check Valve - Seat & O-ring Repair Kit

All Kits include Seat (1), Bonnet O-ring (1), and Plug O-ring (1).

All True Union Kits include Seat (1), Bonnet O-ring (1), Plug O-ring (1), and End Connector O-rings (2).

Size	Part Number			
	w/EPDM O-ring	w/FKM O-ring	Union w/EPDM O-ring	Union w/FKM O-ring
1/2	YC-ERK-005	YC-VRK-005	YC-UERK-005	YC-UVRK-005
3/4	YC-ERK-007	YC-VRK-007	YC-UERK-007	YC-UVRK-007
1	YC-ERK-010	YC-VRK-010	YC-UERK-010	YC-UVRK-010
1-1/4	YC-ERK-012	YC-VRK-012	YC-UERK-012	YC-UVRK-012
1-1/2	YC-ERK-015	YC-VRK-015	YC-UERK-015	YC-UVRK-015
2	YC-ERK-020	YC-VRK-020	YC-UERK-020	YC-UVRK-020
3	YC-ERK-030	YC-VRK-030	YC-UERK-030	YC-UVRK-030
4	YC-ERK-040	YC-VRK-040	YC-UERK-040	YC-UVRK-040

Diaphragm Valve - Diaphragm & End Connector O-ring Replacement Kit

Includes diaphragm (1), and end connector O-rings (2).

Size	Part Number				
	EPDM O-ring & DIAPHRAGM KIT	EPDM O-ring & PTFE* DIAPHRAGM KIT	FKM O-ring & DIAPHRAGM KIT	FKM O-ring & PTFE* DIAPHRAGM KIT	FKM O-ring & FKM Backed Diaphragm Kit
1/2	DV-ERK-005	DV-TERK-005	DV-VRK-005	DV-TVVK-005	DV-VTVRK-005
3/4	DV-ERK-007	DV-TERK-007	DV-VRK-007	DV-TVVK-007	DV-VTVRK-007
1	DV-ERK-010	DV-TERK-010	DV-VRK-010	DV-TVVK-010	DV-VTVRK-010
1-1/4 or 1-1/2	DV-ERK-015	DV-TERK-015	DV-VRK-015	DV-TVVK-015	DV-VTVRK-015
2	DV-ERK-020	DV-TERK-020	DV-VRK-020	DV-TVVK-020	DV-VTVRK-020

* Elastomer backed PTFE laminated diaphragm.

Diaphragm Valve - Replacement Diaphragm

Size	Part Number			
	EPDM DIAPHRAGM	FKM DIAPHRAGM	PTFE* DIAPHRAGM	FKM backed PTFE* DIAPHRAGM
1/2	27-39-00541	27-39-00542	27-39-00565	27-39-00566A
3/4	27-39-00741	27-39-00742	27-39-00765	27-39-00766A
1	27-39-01041	27-39-01042	27-39-01065	27-39-01066A
1-1/4 or 1-1/2	27-39-01541	27-39-01542	27-39-01565	27-39-01566
2	27-39-02041	27-39-02042	27-39-02065	27-39-02066
2-1/2 or 3	27-39-03041	27-39-03042	27-39-03065	27-39-03066
4	27-39-04041	27-39-04042	27-39-04065	27-39-04066
6	27-39-06041	27-39-06042	27-39-06065	27-39-06066
8	27-39-08041	27-39-08042	27-39-08065	27-39-08066

* Elastomer backed PTFE laminated diaphragm.