MODEL SDX

SINGLE DISC EXTERNAL SPRING CHECK VALVE
INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

APPLICATION AND OPERATION

The Champion Valves, Inc. ("CVI") SDX Check valve is a self-operating check valve designed to prevent the backflow of gas or liquid media. Initial opening of the valve's discs begins when the upstream pressure exceeds the downstream pressure and the effective torque of the spring. This pressure is called the "cracking" pressure. Once the SDX disc opens, flow velocity determines the position and stability of the disc.

If the flow velocity upstream of the valve decreases and/or stops, the spring forces the disc to a closed position. Ideally, the disc will be fully closed just prior to flow reversal, thus alleviating the potential for water hammer.

LIMITATIONS AND PRECAUTIONS

SDX check valves are not recommended for the following service conditions.

- Pulsating flows
- Installation directly to a butterfly valve or other piping accessory that may interfere with the opening or closing of the SDX disc
- Vertical Flow **DOWN** without prior Factory Approval
- Vertical Flow **UP** without prior Factory Approval, especially when Lever Arm and Weight Package are to be installed.

The following precautions should be taken to ensure long service life of SDX Check valves.

- Accurate sizing of single disc check valves is crucial to ensure an acceptable pressure drop and a long service life.
- Flow velocities should be within the ranges shown in the Table below. Contact CVI for more accurate sizing details, or for application specific valve performance calculations.

MEDIA	FLOW RATE
Liquid	3 to 11 feet/second
	.91 to 3.35 m/second
.lk,l **Gas**	20 to 250 feet/second
	6.1 to 76.2 m/second

P.O. BOX 12901, WILMINGTON, NC 28405
PHONE: 910-794-5547 - FAX: 910-794-5581
WEBSITE: WWW.WAFERCHECK.COM

- A minimum of 5 (five) pipe diameters should be maintained between the valve and likely causes of turbulence (i.e. pump discharge, reducers, elbows, and tees, etc.). Contact CVI if concerned about these specifications.

UNPACKING AND INSPECTION

It is important to follow these instructions when unpacking and preparing to use this product:

Preparation for Shipment:

Product packaging and conservation for shipment must be sufficient to protect against deterioration and physical damage during shipment. CVI valves are normally shipped from the factory in boxes, crates or on skids. Protruding parts, such as the levers, weights, and spring assemblies are sometimes removed from the valves and either attached to the box or crate, or packaged separately. Special shipping conditions or packaging requirements must be defined in the Customer's Order and shall be appropriate to ensure safe transportation and conservation before installation.

Inspection of Packaged Product:

Inspect the product packaging for damage while the freight carrier is present. Any observed packaging damage should be reported to the carrier and a claim created.

Carefully open the shipping container, leaving it intact. Follow any instructions marked on the container. Carefully remove any packing material and lift the product from the container. The shipping container and packing material may be kept and reused for product storage or shipment.

Visually inspect the product for signs of possible damage, including missing, broken or loose parts, scratches, or other forms of damage that may have occurred during shipment. Items that are damaged during shipment are the responsibility of the purchaser. If damage is observed, file a claim with the freight carrier immediately. Refer to CVI Terms and Conditions for Sale for our full warranty policy.

Storage:

For short term storage (up to 3 months), keep the product indoors in the original packaging in a temperature not below 32°F or exceeding 85°F. General guidelines for short and long term storage:

- Do not expose the valve to direct sunlight.
- Do not expose the valve to weather conditions.
- Do not expose the valve to temperature extremes.
- Do not stack the valves on top of each other.
- Keep endcaps on when applicable, and protect the valve against dust, dirt, and damage.

For long term storage, the valve should be kept in a clean, heated, weather tight (dry), well-ventilated, fire-resistant storage facility with flooring that seals against dust and dirt, and will not be subject to flooding.

The valve should be securely held in place by banding or other means of support to prevent accidental damage due to movement of the valve.

For outdoor storage, special crating and valve preparation can be provided, at an additional charge, based upon specific requirements for each situation. Periodical checks at least every 6 months have to be carried out in the storage area to verify that the above mentioned conditions are maintained.

Handling:

Most valves are supplied with a removable lifting eye. Always lift the valve using this device, as damage to the valve body or threads (if applicable) could occur from improper lifting. Alignment and final installation should be done while the valve is being supported by the lifting eye.

The valve should never be used as an alignment point in the pipeline. Be sure the pipeline flanges on both sides of the valve are aligned with the proper spacing before the valve is installed into the system.

Never lift or move the valve assembly by using the body rim, external springs or levers (if supplied), valve disc or mounting holes.

Transport, unpack, and store being careful not to scratch the surfaces of flanges or gaskets. Also, take steps that will prevent any foreign matter from getting into the valves. Wooden plate or plastic caps should not be removed until the valves are installed.

The transportation of all packed material must be carried out safely and following the local safety regulations.

INSTALLATION

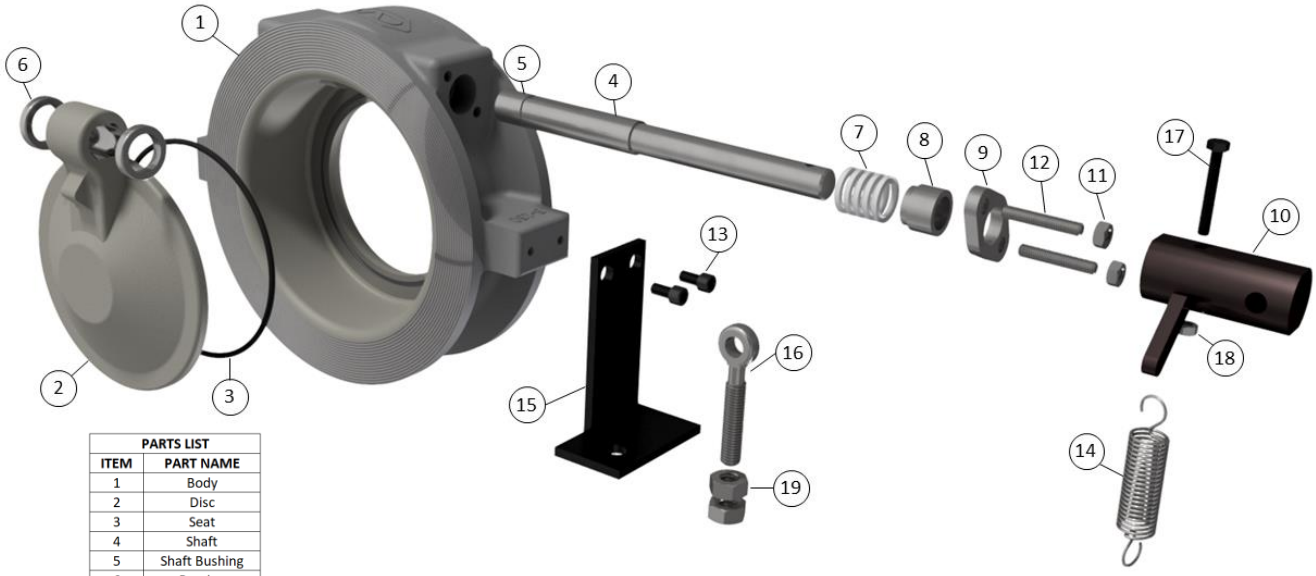
1. Remove the valve from carton or packing skid.
2. The protective rust-proof coating on the internal parts of steel or cast iron valves should be removed by brushing out with any standard petroleum solvent (Varsol, Kerosene) and air dried. Ensure internal parts operate freely.
3. Stainless Steel or Bronze valves need only to be wiped clean and installed.
4. In Horizontal flow installation, the hinge shaft must be Horizontal.
5. Insert the valve between two companion flanges of the same series as the valve and place gaskets on flange faces. The arrow on the valve or name plate indicating direction of flow should coincide with line flow. Install studs through companion flanges and tighten, using standard industry practice.
6. We recommend valve be installed at least five (5) pipe diameters downstream from a pump discharge and/or other pipe fittings for maximum service life.

P.O. Box 12901, WILMINGTON, NC 28405
Phone: 910-794-5547 - Fax: 910-794-5581
Website: www.waferCheck.com

MODEL SDX

ASSEMBLY AND DISASSEMBLY





PARTS LIST	
ITEM	PART NAME
1	Body
2	Disc
3	Seat
4	Shaft
5	Shaft Bushing
6	Bearing
7	Gland Packing
8	Gland Bushing
9	Gland
10	Spring Adaptor
11	Nut
12	Stud
13	Bolt
14	Spring
15	Bracket
16	Eyebolt
17	Pin
18	Pin Nut
19	Eyelet Nut

P.O. Box 12901, WILMINGTON, NC 28405
Phone: 910-794-5547 - Fax: 910-794-5581
Website: www.waferCheck.com

NOTE: EYE PROTECTION IS RECOMMENDED WHEN DISASSEMBLING AND ASSEMBLING CHAMPION CHECK VALVES.

SHAFT LEAKAGE – RECOMMENDED PROCEDURE

Disassembly and assembly of the SDX Check valve is not recommended, as packing gland seal is difficult to re-install correctly. If a small leak has developed out of the shaft, it is first recommended to slightly tighten the gland (Part 9 on previous page) by tightening the two packing gland nuts (Part 11). Slowly tighten these one at a time, the same amount for each. Make sure that the disc (Part 2) is still able to operate freely. If these are over-tightened there may be too much friction between the packing and the shaft, and the check valve may not operate correctly. If leaking stops and the valve still operates as intended, no further steps are necessary. If the valve continues to leak out of the shaft, and it seems like the gland is as tight as possible without hindering the performance of the check valve, another possible solution would be to slowly loosen the nuts (Part 11) one at a time, the same amount for each. If the leaking does not stop or gets worse, there may be damage to the gland packing (Part 7), or a problem with its installation. Contact CVI for assistance before attempting to disassemble the check valve.

DISASSEMBLY INSTRUCTIONS

As mentioned above, disassembly of the SDX check valve is not recommended. Please contact CVI for assistance prior to proceeding with these instructions.

Disassembly and assembly of this check valve is moderately simple using a hammer, allen-wrench set, and pliers (optional), accompanied with the following instructions:

Please use caution when removing/installing the external spring. A preset spring may cause serious injury when tension is released. Instructions include numbers referencing the parts list, shown on previous page.

1. Lay the valve body (#1) down with downstream side facing upward.
2. Carefully detach the spring (#14) from the spring adaptor (#10) and eyebolt (#16) by first removing loop through eyebolt and then by removing spring from spring adaptor arm. Spring may have tension so be careful in this step. Removing a loaded spring can cause serious injury if done without caution.
3. Remove pin nut (#18) from pin (#17). Pull the pin out of spring adaptor. If necessary, use a hammer to gently knock the pin out of the spring adaptor using a small punch. Then slide the spring adaptor off of the shaft.
4. Next remove the two packing gland nuts (#11) from the studs (#12) using the appropriate allen wrench.
5. Gland (#9) and gland bushing (#8) should both be easily removed by pulling away from valve body.

P.O. Box 12901, WILMINGTON, NC 28405
Phone: 910-794-5547 - Fax: 910-794-5581
Website: www.waferCheck.com

6. The next step is to remove the shaft (#4). With a firm grip on the end of the shaft, or by carefully using pliers or similar tool to grip the shaft, pull the shaft out of the valve body. It may take a good amount of force to dislodge the shaft from the gland packing.
7. After the shaft is removed, the gland packing (#7) should be removed as well. Check for remaining packing material inside the valve body on the spring-side of the valve. The disc (#2) and bearings (#6) can now be lifted out of the valve from the outlet side, and the valve should be completely disassembled. It is not recommended to remove the seat (#3). If the seat is damaged, contact CVI for assistance.
8. To repair or replace valve internals, it is not necessary to remove the bracket (#15) from the valve body, or to disassemble the eyebolt (#16) from the bracket. If, however, this is desired, the bolts (#13) can be removed by loosening them using the appropriately sized allen wrench. Once removed, the bracket should then be easily pulled from the valve body. If the bracket seems stuck to the valve body, this is not unusual and a small amount of pulling force should remove it. To remove the eyebolt from the bracket, simply use a wrench to loosen the lower eyelet nut (#19) until the eyebolt can be removed.

ASSEMBLY INSTRUCTIONS

1. First lay the valve body (#1) down with downstream side facing upward.
2. Ensure that the seat (#3) is installed correctly in the valve body. CVI does not recommend performing a seat change. Contact CVI if any concerns arise about the seat's viability before reassembling the valve.
3. If bracket (#15) is not installed on valve body, install it now. Attach bolts (#13) through bracket and into valve body. Tighten using appropriately sized allen wrench, and make sure both bolts are firmly tightened in place.
4. The shaft bushing (#5) should already be installed in shaft bore on opposite side of valve body from the spring. If it is not installed or if there is any concern over its installation, please contact CVI for assistance.
5. Place the disc (#2) down inside the valve body with the flat face resting against the seat, about where it will be installed to have it ready for the shaft (#4) to be assembled.
6. Insert the shaft from the spring-side of the valve, stopping when the shaft starts to protrude into the center of the valve where the disc is sitting.
7. Place the first bearing (#6) over the shaft on the spring-side of the disc and then proceed to push shaft through the bore of the disc. It is critical that the shaft is oriented so that the hole on the spring-end of the shaft is parallel to the face of the valve body, as shown in exploded view. Stop pushing the shaft once it protrudes past the other side of the disc bore, or slightly before.
8. Place second bearing on opposite side of the disc as the first bearing and push shaft through this bearing. The shaft now needs to be aligned with the shaft bushing (#5) inside the valve body. Once aligned push shaft through shaft bushing until fully inserted.
9. The gland packing (#7) now needs to be installed. This is the most critical part of the assembly, as the packing is the only seal against shaft leakage. If there is any uncertainty about this step,

please contact CVI for assistance. Provided gland packing can be in the form of (a) stackable chevron rings, (b) pre-cut pieces of packing cord, or (c) one long piece of packing cord.

a. For the stackable chevron rings, assemble the rings by stacking them together with each oriented the same as the previous, and then sliding them over the shaft into position in the valve body. Press gently into place inside the valve body. Do not use much force at this time.
b. For the pre-cut pieces of packing cord, there should be 3-5 pieces of cord. Wrap the first piece around the shaft near the slot in the valve body. Gently press the cord into the valve body. This can be done using fingers or by sliding the gland bushing (#8) over the shaft and gently pressing the packing into place. Repeat this step with remaining pieces while making sure to place cord so that split in cord is on opposite side of the previous piece each time. After each cord is installed, gently push into place in the valve body until all pieces are installed.
c. For the long piece of packing cord, wrap the cord around the shaft near the slot in the valve body. Continue to wrap the cord around the shaft, making sure to keep the cord contacting the portion of cord previously wrapped for each revolution around the shaft. Do not wrap too tight around the shaft while doing this. Once the cord is fully wrapped, slide the packing into the slot in the valve body. This can be done using fingers carefully, or by sliding the gland bushing (#8) over the shaft and gently pressing the packing into place. Do not use much force at this time.

10. Once all of the packing has been installed inside of the valve body, the next step is to install the gland bushing (#8). Slide the gland bushing over the shaft and press it into the gland packing. Do not use excessive force, as this will be tightened in the following steps.
11. Slide the gland (#9) over the shaft and press until slightly inserted into the valve body, against the gland bushing. Make sure the holes are aligned with the holes for the studs (#12), or if studs are already in place in valve body, slide the gland in place over the studs.
12. If studs (#12) are not installed in the valve body, insert them at this time into the holes in the valve body and tighten them into place using pliers, or similar tool to get a good grip on the end of each stud. If desired, Loctite thread lock may be used to hold studs in place in the valve body.
13. Once studs are installed, it is now time to tighten the gland using the gland nuts (#11). Tighten each of the nuts slowly and the same amount for each, making sure not to overtighten at this time. Once both nuts are tightened as much as possible by hand, it is recommended to tighten each of the nuts approximately 4-6 more revolutions using the appropriate wrench, alternating between every revolution. Make sure that the disc is able to rotate freely at this time. If the disc does not rotate freely, there may be too much friction between the gland packing and the shaft. Untighten the nuts if this is the case, until the disc is able to rotate freely. Make sure that both nuts are rotated in an alternating fashion, and the same amount throughout this step to ensure an equal amount of force is applied to the gland packing. It may be necessary to make adjustments after installation if any leakage is noticed. Refer to previous section “Shaft Leakage-Recommended Procedure” if shaft leakage occurs.

14. Next, place spring adaptor (#10) over the shaft on the spring-side of the valve so that the spring adaptor arm extends in the downstream direction, or direction of the flow arrow. Line up the hole through the shaft with the hole through the spring adaptor, making sure that the arm on the spring adaptor stays pointing in the downstream direction. If the hole in the shaft is not oriented in the correct direction at this time, the shaft is going to need to be re-installed correctly. If installed correctly, place pin (#17) into the hole on the spring adaptor, and gently tap or hammer down into position through shaft, until flush with the top surface of the spring adaptor. Install pin nut (#18) on pin and tighten securely against spring adaptor with appropriately sized wrench or socket.
15. The eyebolt (#16) position is designed to be variable to allow for the cracking pressure of the valve to be slightly altered. The position of the eyebolt does not need to be determined prior to spring installation, as it can easily be adjusted later. At this time make sure that the eyebolt is installed with an eyelet nut (#19) installed on each side of the bracket. Do not over tighten these nuts yet, as the position of the eyebolt may need to be altered.
16. Carefully install spring (#14) by looping one of the spring ends through the eyebolt at the bottom of the bracket and then stretching the spring to loop through the arm of the spring adaptor. If this is too difficult, try loosening the eyebolt and repositioning to make the spring length shorter. Be careful with the spring when it is loaded, as releasing a loaded spring can cause serious injuries. Make sure that the eyebolt and nuts are tightened sufficiently at this time.
17. Once the spring is installed, sit the valve upright and test the cracking pressure of the valve by pushing against the disc in the downstream direction. It may be necessary to get assistance in this step to make sure the valve does not fall over, as this could cause serious injury. If the valve opens too easily, the spring may need to be stiffened. If the valve is very difficult to open, the spring may need to be loosened. For either of these operations, first lower the valve back down flat against the surface as it was before. Next, adjust the eyelet nuts to either lengthen or shorten the install length of the spring. After altering, make sure to tighten the nuts sufficiently. Stand the valve back up and repeat this step until the cracking pressure of the valve is satisfactory. Again, be careful when installing the spring as releasing a loaded spring can cause serious injuries.
18. If there are any problems with the valve upon reassembly, or if difficulties arise in assembling with the proper spring torque, please contact CVI immediately and do not install a faulty valve into any application.

CHAMPION VALVES, INC. BONDS AND VULCANIZES THE ORIGINAL ELASTOMER SEAT TO THE VALVE BODY. CHAMPION VALVES DOES NOT RECOMMEND THAT THE ELASTOMER SEAT BE REPLACED, EXCEPT BY CHAMPION VALVES. CHAMPION VALVES DOES NOT WARRANT NOR SHALL CHAMPION VALVES, INC. BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES.

CHAMPION VALVES INC.

INSTALLATION OF REPLACEMENT SPRING

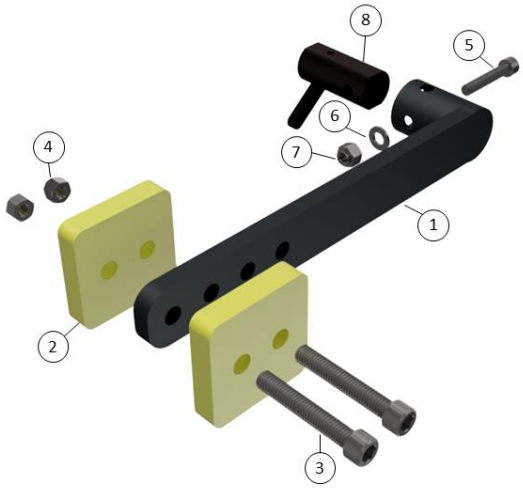
1. Carefully detach the spring from the spring adaptor and eyebolt. Spring may have tension so be careful in this step. Removing a loaded spring can cause serious injury if done without caution.
2. Install replacement spring by carefully looping one of the spring ends through the eyebolt at the bottom of the bracket and then stretching the spring to loop through the arm of the spring adaptor. If this is too difficult, try loosening the eyebolt and repositioning to make the spring length shorter. Be careful with the spring when it is loaded as releasing a loaded spring can cause serious injury.
3. Once the spring is installed, sit the valve upright and test the cracking pressure of the valve by pushing against the disc in the downstream direction. It may be necessary to get assistance in this step in order to make sure the valve does not fall over, as this could cause serious injury. If the valve opens too easily, the spring may need to be stiffened. If the valve is very difficult to open, the spring may need to be loosened. For either of these operations, first lower the valve back down flat against the surface as it was before. Next, adjust the eyelet nuts to either lengthen or shorten the install length of the spring. After altering, make sure to tighten the nuts sufficiently. Stand the valve back up and repeat this step until the cracking pressure of the valve is satisfactory. Again, be careful when installing the spring as releasing a loaded spring can cause serious injuries.
4. If there are any problems with the valve upon reassembly, or if difficulties arise in assembling with the proper spring torque, please contact CVI immediately and do not install a faulty valve into any application.

NOTE: EYE PROTECTION IS RECOMMENDED WHEN DISASSEMBLING AND ASSEMBLING CHAMPION CHECK VALVES.

P.O. BOX 12901, WILMINGTON, NC 28405
PHONE: 910-794-5547 - FAX: 910-794-5581
WEBSITE: WWW.WAFERCHECK.COM

NOTE: EYE PROTECTION IS RECOMMENDED WHEN DISASSEMBLING AND ASSEMBLING CHAMPION CHECK VALVES.

INSTALLATION OF LEVER ARM AND WEIGHT PACKAGE



Item No.	Part Name
1	Lever Arm
2	Weight Plates
3	Weight Screws
4	Weight Locknuts
5	Spring Adaptor Screw
6	Washer
7	Spring Adaptor Locknut
8	Spring Adaptor

1. When installing a lever and weight package to a fully assembled SDX valve, the first step is to slide the lever arm bore over the top of the spring adaptor so that the lever arm is pointing in the downstream direction, or direction of the flow arrow. (Note: If a reverse installation is desired to decrease the cracking pressure of the valve, install in the opposite direction. This is not recommended, however, as it may cause the disc to make insufficient contact with the seat, causing the valve to leak. Contact CVI beforehand.)
2. Once the lever arm is installed in the correct orientation, the spring adaptor screw should then be installed by sliding through the lever arm and spring adaptor. Make sure the head of the spring adaptor screw is on the upstream side of the lever arm, as shown above.
3. The washer and spring adaptor locknut should be installed next. Place the washer over the threaded end of the spring adaptor screw and place up against the outside of the lever arm. Then screw on the spring adaptor locknut with a wrench (or socket wrench) while holding the spring adaptor screw in place with the appropriately sized allen key. Tighten until spring adaptor locknut and washer are securely fastened against lever arm and the spring adaptor screw head

is resting tight against the spring adaptor, through the hole in the lever arm. The locknut should be tightened using a reasonable amount of force, but not so much as to cause damage to the locknut threads or the washer.

4. Next, to install the weight plates the appropriate weight set should first be selected (if multiple options have been provided). The larger the weight plates, the higher the cracking pressure achieved. The position of the weight plates should be determined next. The further away from the rotation point the weight plates are installed, the higher the cracking pressure of the valve. There are generally three positions where the plates could be installed. (Note again that this assumes the lever is installed in standard position, and not in reverse position. Contact CVI before installing in reverse position.)
5. Once the desired weight plates are selected and the position is determined, place one weight plate on either side of the lever arm. Slide the weight screws through both holes with the head side of the weight screws on the outside of the lever arm, as shown above. Slide all the way through both weight plates. If there is not enough length of the weight screw to attach the weight locknut on the other side, contact CVI as the incorrect weight screws may have been sent in the package.
6. Once both weight screws are installed through the weight plates, place the weight locknuts on and screw down with a wrench while holding the weight screws in place with the appropriately sized allen key. Tighten until securely fastened against the weight plates. The locknuts should be tightened using a reasonable amount of force, but not so much as to cause damage to the locknut threads or washer. This is very important; if not installed appropriately the weight plates could become loose during operation and could cause serious damage or injury.
7. Since the lever arm and weight assembly is an external component, it is also a Safety Concern. Moving components can cause damage to surrounding equipment and could potentially cause injury or death if not installed correctly. Please make sure all of these directions are followed carefully and go back and check that all locknuts are tightened thoroughly. However, do not over-tighten locknuts so much as to cause damage to threads, as this could also cause failure, damage, and/or injury. If at all concerned with the installation, please contact CVI immediately and we will do our best to ensure the device is properly installed.

NOTE: EYE PROTECTION IS RECOMMENDED WHEN DISASSEMBLING AND ASSEMBLING CHAMPION CHECK VALVES. CHAMPION VALVES DOES NOT WARRANT NOR SHALL CHAMPION VALVES, INC. BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES CAUSED BY INCORRECT ASSEMBLY/DISASSEMBLY OF CHAMPION VALVES, OR BY NEGLIGENCE TO FOLLOW ANY GUIDELINES PRINTED IN THIS DOCUMENT. IT IS RECOMMENDED THAT IF ANY CONCERNS EXIST REGARDING THE SAFETY OR FUNCTIONALITY OF THE CHAMPION CHECK VALVE AND/OR ASSOCIATED COMPONENTS, THAT CHAMPION VALVES, INC. BE CONTACTED IMMEDIATELY.