



FILTER SPECIALISTS, INC.
Innovative Solutions. Clear Results.

**SUPPLEMENTAL MANUAL FOR THE
INSTALLATION, OPERATION AND
MAINTENANCE OF THE
XL234 FILTER VESSEL**

IMPORTANT

Read and Understand
ENTIRE Manual Before
Operating Vessel

090316

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IMPORTANT READ THE FOLLOWING SAFETY RECOMMENDATIONS PRIOR TO INSTALLATION OF VESSEL

This Manual has been prepared for the safe operation and maintenance of FSI pressure vessels. Warning labels are not a substitute for reading and understanding this manual.

- 1) Read the vessel warning labels and this instruction manual for the operation and maintenance of filter vessels before installation and operation.
- 2) **NOTICE** FSI recommends customers view the chemical compatibility chart for your application. Due to the length of the list and in order to maintain the latest information, the chart is located on the FSI website at www.fsifilters.com.
- 3) **WARNING** Protective Clothing: Before operating this vessel, operator should wear protective clothing including protective gloves and face shield. If handling hot liquids, operator should wear heat-resistant clothing such as Nomex garments to prevent possible burning or scalding. Refer to the material safety data sheet (MSDS) for specific information on material. The MSDS is supplied by the manufacturer of the material.
- 4) **WARNING** Improper use of this vessel can cause serious injury, blindness or death. A tipping vessel could cause serious injury. Properly secure the vessel before rotating the lid.
- 5) **WARNING** Pressure gauge and vent valve must be installed in access hole. Failure to install pressure gage and vent valve could result in serious injury when opening the lid. Direct vent valve exhaust to a safe place.
- 6) **WARNING** Gaskets can fail, which could cause serious injury and or blindness. Gasket material must be chemically and temperature compatible with fluid being filtered. Standard gaskets will not seal properly. **USE ONLY FSI GASKETS. THESE GASKETS ARE SPECIALLY DESIGNED FOR THIS VESSEL.**
- 7) **DANGER** Do not open a vessel under pressure. Escaping fluid under pressure can cause serious injury or death. The internal pressure should be zero.
- 8) **DANGER** Hot and or chemically active liquids can cause serious injury and blindness or death. When opening the vent, direct exhaust to a safe place.
- 9) **WARNING** Do not exceed the operating limits of this vessel and gasket. Serious injury or death could result if limits are exceeded.
- 10) Remove all items from the inside of the vessel that were included in the shipping process. These items may include extra paper work, insertion tools, and Polyloc[®] rims that are used to secure the baskets for shipment.

INSTALLATION INSTRUCTIONS

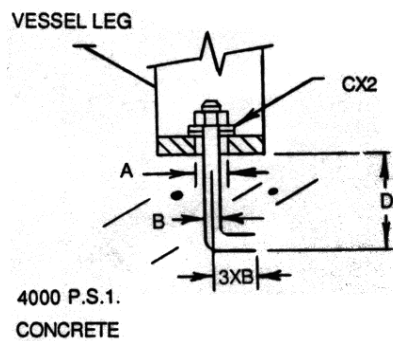
Placement of Manual

The end user is to locate the manual. Each filter vessel, at final installation, is to have one manual for the installation, operation and maintenance so it is visible and accessible to all.

Mounting

⚠ WARNING All vessels should be properly affixed for stability and prevent tipping. If bolting to a floor, follow the guidelines below.

New Floor Construction



A	B	C			D	Min. Pullout
Mounting Plt. Hole Dia.	Anchor Thd. Dia.	Amer. Std. Plane Washer			Embedment	
		ID	OD	THK		
1/2 in 12.7 mm	3/8 9.5	7/16 11	1 25.4	.10 2.5	3 76	4000 lb 1814 kg

Existing Concrete Floor

For vessels placed on existing floors, use the following or an equivalent:

- Red 1 – Chem Threaded Anchor Rod
- Red 1 – Chem Capsules

Refer to the manufacturer for part number and installation instructions:

ITW RAMSET/RED HEAD
 U.S. 12 & LIBERTY TRAIL
 MICHIGAN CITY, IN 46360
 PHONE NUMBER: 219-874-4217
 TELEX NUMBER: 258488
 TELEFAX NUMBER: 219-874-7035

INSTALLATION INSTRUCTIONS

Cleaning

Vessel should be cleaned to the customer's specifications.

Piping

The piping material used should be the same as the base material of the vessel. It should have a rating equal to or greater than the pressure and temperature rating of the vessel.

NOTICE In-feed and out-feed piping must be supported by brackets. The vessel is not designed to support piping. Questions concerning distance for supports should be directed to the FSI Engineering Department.

Relief Valve

NOTICE It is the responsibility of the end user to protect systems components, such as the FSI filter, from being over pressurized. This can be achieved by installing a system relief valve.

Pressure Gauge, Temperature Gauge, and Vent Valve

FSI does not supply the vessel pressure gauge, temperature gauge, or the vent valve. It is the responsibility of the end user to obtain, install and maintain the proper gauge, indicating vessel temperature and internal vessel pressure.

Inspection

NOTICE Periodic inspection of the unit for wear and tear is necessary to ensure long life and safety. A replacement parts list is included in this manual.

SHOULD THERE BE ANY QUESTIONS, OR IF ASSISTANCE IS NEEDED IN THE INSTALLATION, OPERATION OR MAINTENANCE OF THIS VESSEL, PLEASE CONTACT FILTER SPECIALIST'S ENGINEERING DEPARTMENT AT:

**FILTER SPECIALISTS, INC.
P.O. BOX 735
MICHIGAN CITY, INDIANA 46360
PHONE: 219-879-3307
FAX: 219-877-0632**

OPERATING PROCEDURES

OPENING THE LID

- 1) FSI recommends vessels be equipped with a pressure gauge. Before attempting to open the lid, close the inlet and outlet valve and drain the vessel. It is very important there is no internal pressure and the pressure gauge reads “0” PSI. (Figure 1) If necessary, slowly open vent valve. This should be vented in a downward position and away from personnel to prevent personal injury or property damage. VERIFY the pressure gauge reads “0” PSI.

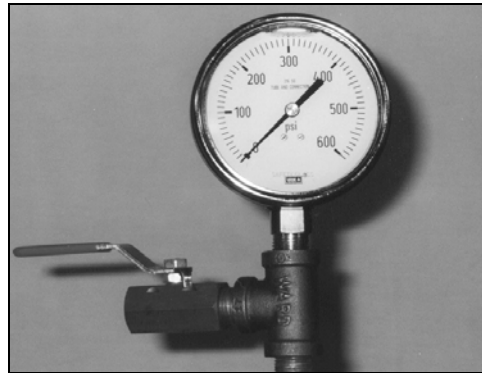


Figure 1
Pressure Gauge and Vent Valve

- 2) To remove the lid.
- 3) Turn the lid counter clockwise $1\frac{3}{4}$ ” to stop. Using both hands lift up on the handles evenly to remove the lid.



Figure 5
Push to Turn Lid



Figure 6
Lift Lid Evenly

NOTICE Operator may need to push down slightly on the lid while turning. This will compress the lid gasket enough for the lid to turn more freely.

OPERATING PROCEDURES CHANGING FILTER CARTRIDGES

- 1) Open the vessel as outlined in the “Opening the Lid” procedure.
- 2) Once the vessel has been drained and the lid is removed, unscrew the 3 lugs from the threaded posts and set aside.

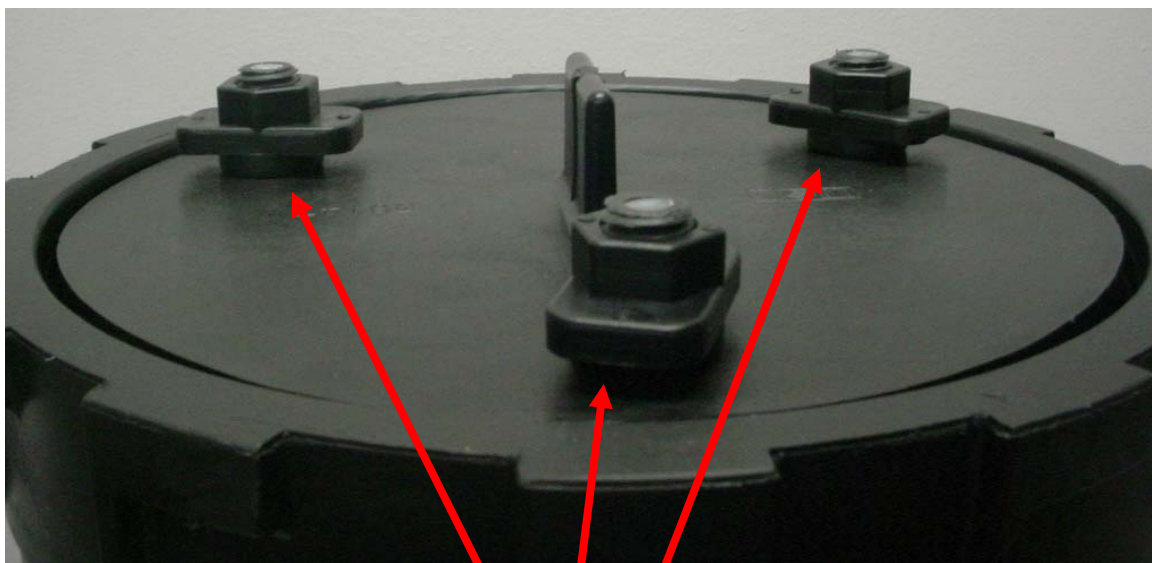


Figure 5
Hold Down Lugs

- 3) Remove the cartridge hold down plate.

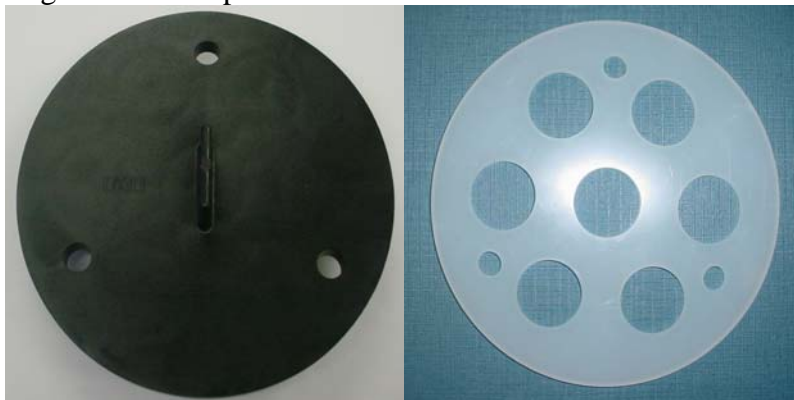


Figure 6
Double Open End Hold Down Plates

Figure 7
Bayonet Hold Down Plates

OPERATING PROCEDURES CHANGING FILTER CARTRIDGES CONTINUED

- 4) At this time, the cartridges are exposed and are seated in the cartridge spacer plate. Filter media can be removed at this time.



Figure 8
Cartridges nested in vessel



Figure 9
Cartridges removed

- 5) Remove the cartridge spacer plate by lifting straight up and out of the vessel body.



Figure 10
Cartridge Spacer Plate

NOTICE FSI recommends checking the gaskets and “O” rings for wear and tear each time filter media is changed. Use only FSI replacement gaskets and “O” rings.

OPERATING PROCEDURES

CHANGING CARTRIDGE ASSEMBLY & GASKET INSPECTION

- 1) To remove the cartridge assembly, follow the instructions as outlined in “Changing Filter Cartridges”.
- 2) Remove the cartridge plate assembly by simultaneously pulling up on the three threaded posts.

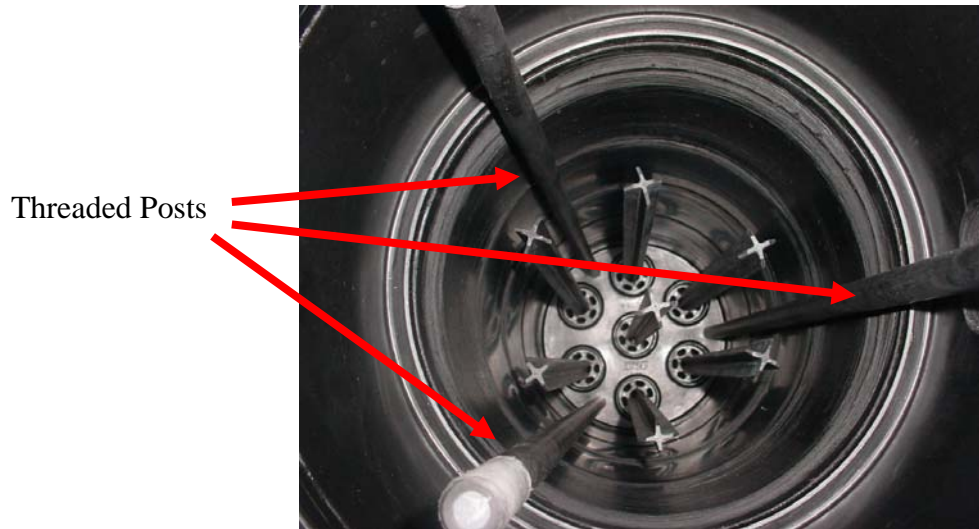


Figure 11
3 Threaded Posts/7 Locating Crosses

- 3) Remove and check the “O” ring gasket for any wear and tear. If the “O” ring is worn or nicked, replacement may be necessary. Inspect and clean the gasket groove or rim.



Figure 12
Cartridge Plate Assembly & “O” Ring

OPERATING PROCEDURES

CHANGING CARTRIDGE ASSEMBLY & GASKET INSPECTION CONTINUED

- 4) Remove and inspect the lid gasket for wear and tear. If the gasket is worn or nicked, replacement may be necessary. Inspect and clean the lid gasket rim.



Figure 13
Lid & Lid Gasket

Figure 14
Ring Gasket Close Up

WARNING Gaskets need to be checked and replaced regularly. The lid compresses the gasket in the closing process. Over a period of time this can flatten the gasket and cause leaking. Failure to inspect and replace the gasket could result in death or serious injury. Use only FSI replacement gaskets. Please refer to the safety recommendations at the beginning of this manual.

- 5) Once the “O” ring and lid gasket have been checked and/or replaced, place the cartridge plate assembly back into the vessel body. Make sure one of the threaded posts is centered on the inlet. This improves flow of process fluid.

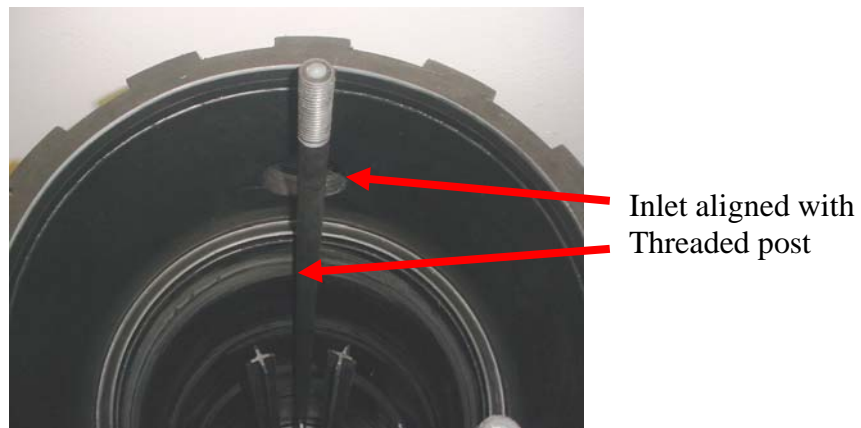


Figure 15 Cartridge Plate Assembly

OPERATING PROCEDURES

CHANGING CARTRIDGE ASSEMBLY & GASKET INSPECTION

CONTINUED

- 6) Insert the cartridge spacer plate by placing the three threaded posts through the holes on the plate, so that the deflector is positioned center on the inlet. Push down on the plate until it sits flush and rests on the support.



Figure 16
Cartridge Spacer Plate

Deflector
Plate

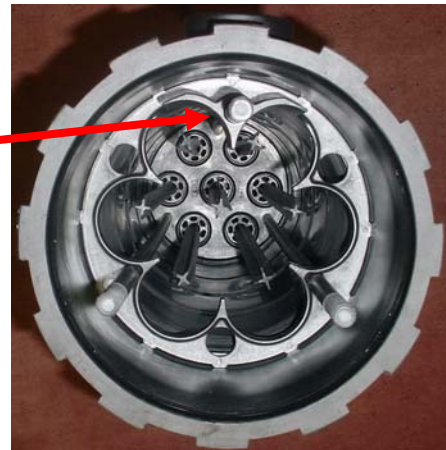


Figure 17
Cartridge Spacer Assembly

- 7) Visually inspect filter media and place cartridges on each locating cross. Verify the deflector plate is centered on the inlet.



Figure 18
Cartridge Spacer Assembly

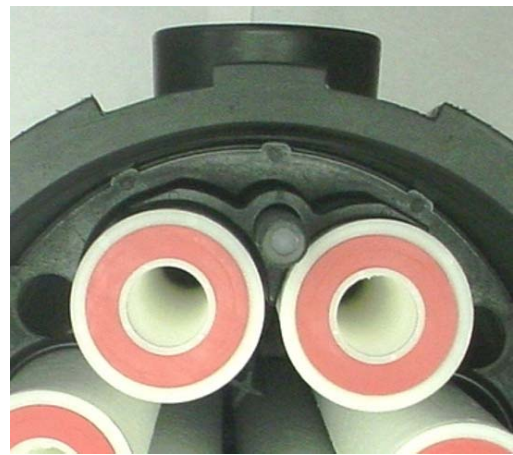


Figure 19
Centered Inlet & Cartridges

OPERATING PROCEDURES

CHANGING CARTRIDGE ASSEMBLY & GASKET INSPECTION

CONTINUED

- 8) Place the cartridge hold down plate over the cartridges on the threaded posts and install nuts.



Figure 20
Cartridge Hold Down Plate

- 9) Thread the hex lugs onto the threaded posts. Hand tighten the lugs so that 1-4 threads are visible at the top of the lug. Lugs must be placed with the round bottom flush against the cartridge hold down plate, and the hex top facing up.

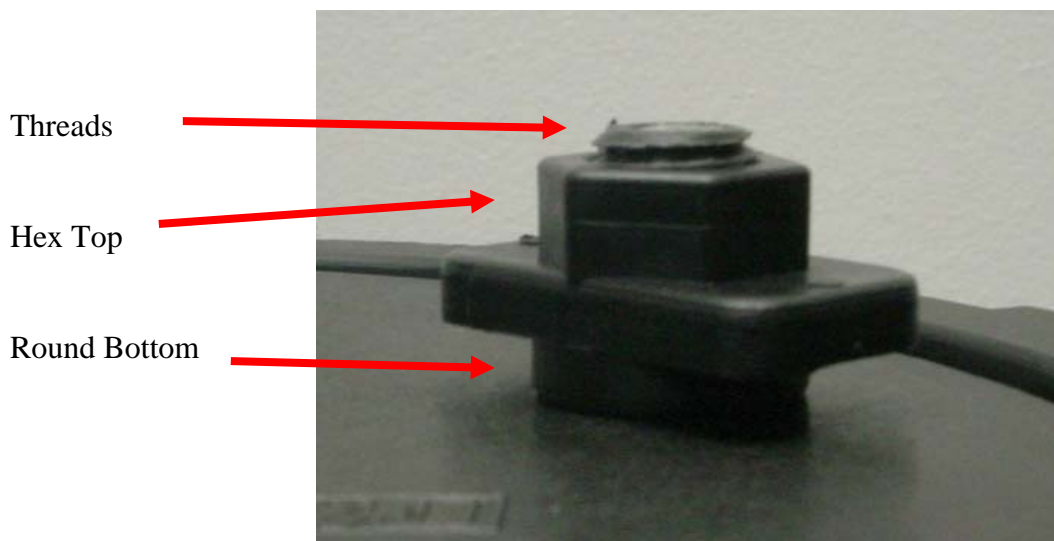


Figure 21
Lug-Round Bottom/Hex Top

- 10) The lid is now ready to be placed. See “Closing The Lid” procedure.

OPERATING PROCEDURES BASKET AND BAG ASSEMBLY

- 1) The basket must be inserted all the way down into the vessel as shown, below the bag ring lip.



Figure 22
Stainless Steel Basket



Figure 23
Basket Inserted Into Vessel

- 2) Insert Bag and push the Bag Ring down firmly on the Bag Ring Lip all the way around to seat. The bag must be pushed down into the basket for proper filtering.

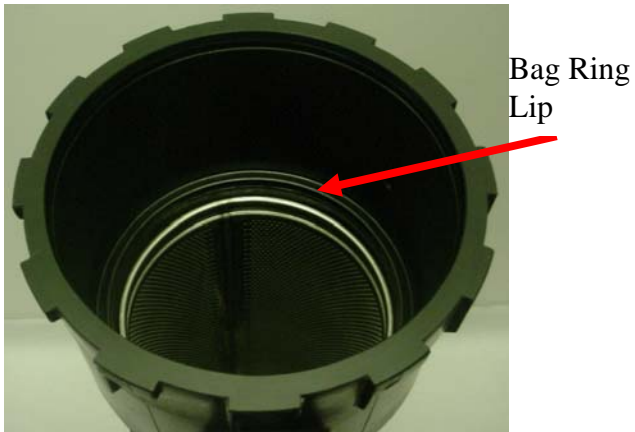


Figure 24
Bag Ring Lip



Figure 25
Bag Inserted Into Vessel

NOTICE

Failure to seat ring properly may result in fluid bypass.

OPERATING PROCEDURES CLOSING THE LID

- 1) Set the lid on the vessel body, aligning the lugs. Once the lugs are aligned, the lid will fall into place.



Figure 26
Place Lid on Vessel Body

- 2) Push down evenly on the lid until it bottoms out. Rotate the lid clockwise 1 3/4" to stop while maintaining pressure.



Figure 27
Push Down Evenly & Turn

NOTICE Operator may need to apply a small amount of lubricant to the inside lid and gasket to aid in turning. Lubricant should be compatible with the product being filter.

OPERATING PROCEDURES GROMMET REMOVAL AND INSERTION

1) Insert tool into grommet and gently pull it out as shown.



Figure 28
Grommet Removal



Figure 29
Grommet Removal

2) Grommet hole is now visible. Inspect for any damage or burrs. A small burr may be carefully filed down, a damaged hole will not seal properly. In the event of a damaged hole, consult your FSI representative.



Figure 30
Grommet Hole

OPERATING PROCEDURES GROMMET REMOVAL AND INSERTION

- 3) Apply a small amount of Vaseline to the new grommet and insert into hole as shown.



Figure 31
Grommet Insertion



Figure 32
Grommet Insertion

- 4) Grommet must be inserted completely into the hole so it bottoms out as shown.



Figure 33
Correct Grommet Insertion

NOTICE

Incorrect grommet insertion will result in leakage.

OPERATING PROCEDURES OPTIONAL LEG EXTENSION

- 1) The leg extensions are designed to fully support the vessel foot and must be oriented as shown. Attached extension using the supplied hardware and torque to 24 pound-feet.

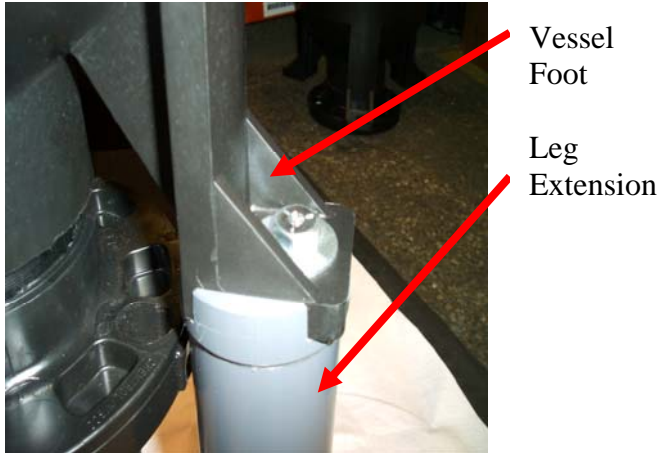


Figure 34
Leg Extension Side View



Figure 35
Leg Extension Top View

- 2) Shown below is the IMPROPER assembly



Figure 36
Incorrect Assembly

**INCORRECT
ORIENTATION**
Extension is on
backwards and
must be rotated
around. Top of
extension should
not be visible.

NOTICE Incorrect installation of leg extension will cause improper support of the vessel and may lead to leaks or vessel failure. It is the responsibility of the user to properly install the leg extensions. If there are any questions, please contact FSI.

ROUTINE MAINTENANCE

The following are basic tips in maintaining the operation of the filter vessel.

- 1) The Filter In Operation - Once the filter is operational and in use, the differential pressure should be checked regularly. It is suggested that when the differential pressure across the filter elements reaches a predetermined amount, the elements be changed. If the differential pressure suddenly drops, stop filtration immediately and check bags or cartridges for proper seal or rupture.
- 2) Keep the threads clean. Inspect periodically for wear and tear. If the wear become excessive, replace with authorized FSI parts.
- 3) If problems occur with the lid sticking or not rotating, add a small amount of lubricant to the lid threads and gasket. This should help in the installation of the lid.
- 4) Inspect and clean the gaskets and gasket grooves. If the gasket is worn or nicked, replacement may be necessary.
- 5) When inserting new filter elements, make sure that all cartridges are properly seated.
- 6) When inserting the basket into the seat, the basket rim flange must cover entire opening. If it does not, the basket may cock and be forced through the opening under pressure.

ROUTINE MAINTENANCE CONTINUED

BLOW DOWN PROCEDURE

To aid filter element changes, the liquid in the vessel should be evacuated prior to the change. Use only if gravity evacuation does not yield desired results. After the fluid has been drained by gravity flow through the drain valve use the blow down procedure instructions below.



The gas used for blow down must be stable in the environment of the fluid being evacuated. Pressure must not exceed vessel rating. Exceeding pressure rating could result in serious injury or death.

- 1) Close inlet valve.
- 2) Close outlet valve.
- 3) Open vent valve.
- 4) Check gauge – internal pressure must be zero.
- 5) Open drain valve.
- 6) Close vent.
- 7) Connect gas to vessel via vent valve. Verify gas pressure does not exceed pressure vessel rating.
- 8) Open vent valve slowly.
- 9) Close vent valve after metering out fluid.
- 10) Disconnect gas.
- 11) Close drain valve.
- 12) Make sure internal pressure is zero and continue with opening instructions.

REPLACEMENT PARTS LIST XL234 MODULAR FILTER COMPONENTS

Replacement parts may be obtained by calling our Sales Office in Michigan City, Indiana, at 1-800-348-3205. Please have the vessel model number or serial number available when reordering parts.

The following kits contain all parts necessary for a complete internal change out. Determine your vessel size, cartridge type and length and gasket type. Part numbers are in bold.

DESCRIPTION	QTY	XLC200	XLC300	XLC400
DOUBLE OPEN END CARTRIDGE KIT WITH EPR GASKET	1	KITXLDOECART20E	KITXLDOECART30E	KITXLDOECART40E
DOUBLE OPEN END CARTRIDGE KIT WITH VITON GASKET	1	KITXLDOECART20V	KITXLDOECART30V	KITXLDOECART40V
BAYONET CARTRIDGE KIT WITH EPR GASKET	1	KITXLBAYCART20E	KITXLBAYCART30E	KITXLBAYCART40E
BAYONET CARTRIDGE KIT WITH VITON GASKET	1	KITXLBAYCART20V	KITXLBAYCART30V	KITXLBAYCART40V

The following kits contain the necessary parts for specific replacements. Determine your vessel cartridge length. Part numbers are in bold.

ITEM	DESCRIPTION	QTY	XLC200	XLC300	XLC400
9	TIE RODS	3	KITXLTIEROD20	KITXLTIEROD30	KITXLTIEROD40
8	CARTRIDGE CROSS RISER	7	KITXLCARTRSR20	KITXLCARTRSR30	KITXLCARTRSR40

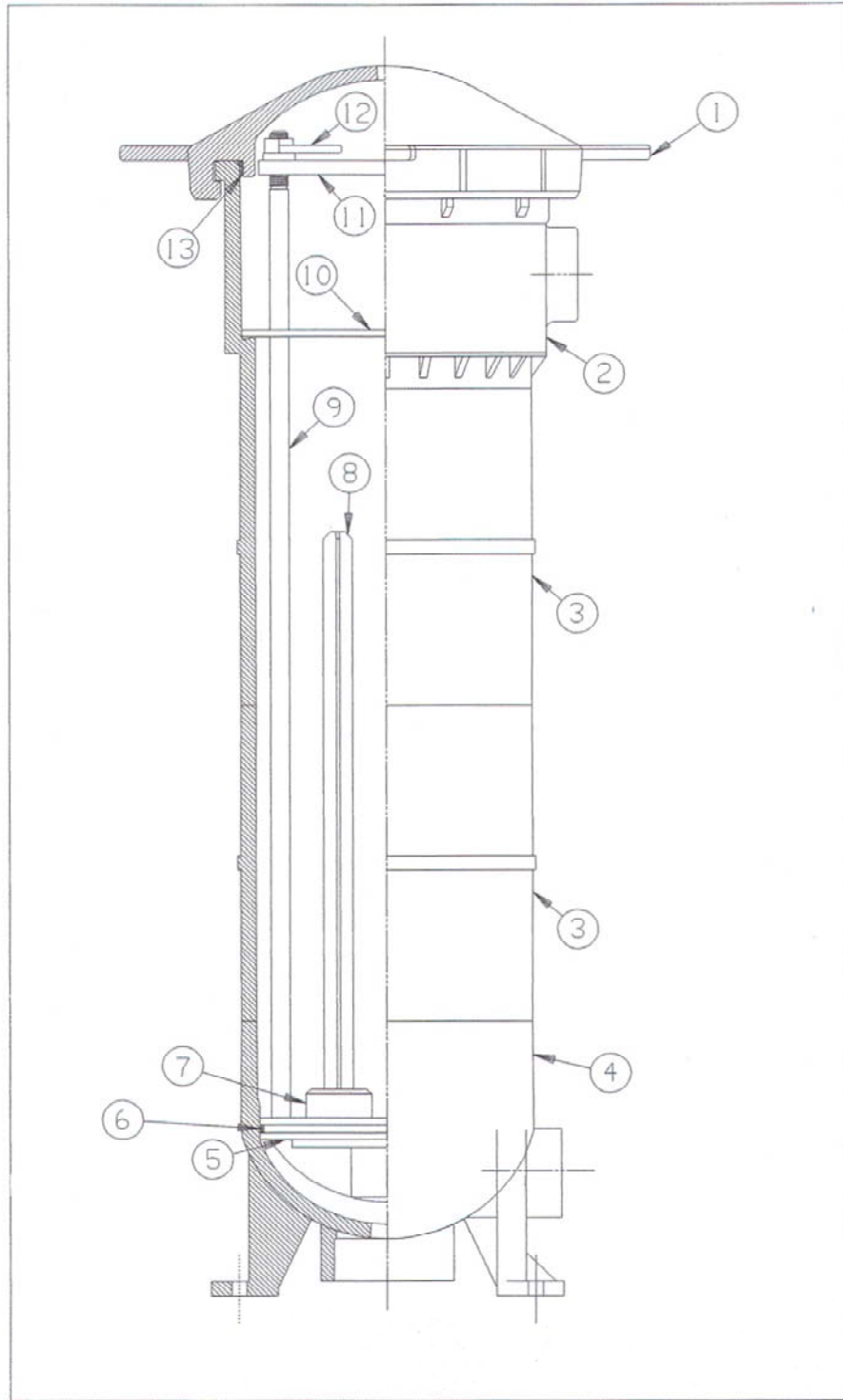
The following items are standard for all XL234 vessels:

ITEM	DESCRIPTION	QTY	PART NUMBER
	GROMMET KIT EPR	6	KITXLGROMEP
	GROMMET KIT VITON	6	KITXLGROMVI
12	HOLD DOWN NUT KIT	3	KITXLHOLDNUT
1	LID (NPT)	1	P36110PG18BKM
1	LID (BSP)	1	P36110BPG18BKM
13	LID GASKET EPR	1	EGL30443E70
13	LID GASKET VITON	1	EGL30443VI70
6	CARTRIDGE PLATE GASKET EPR	1	EGR30445E50
6	CARTRIDGE PLATE GASKET VITON	1	EGR30445VI
10	SPACER PLATE	1	R36145PG18BK
11	HOLD DOWN PLATE DOE	1	R36147PG18BK
11	HOLD DOWN PLATE BAY	1	R36156PG18BK
5	CARTRIDGE SEAT	1	PAA36158PP
	BASKET	1	EBA27926C0912

The following items are optional for all XL234 vessels:

ITEM	DESCRIPTION	QTY	PART NUMBER
19	3" FLANGE LEG ASSEMBLY KIT	1	KITXLFLGLEG

XL234 Modular Filter Components



TIPS AND TROUBLESHOOTING

PROBLEM	CAUSE/SOLUTION	PAGE
LID WILL NOT OPEN	<ol style="list-style-type: none"> 1) Pushing down slightly on the lid may be necessary while rotating the lid. This compresses the gasket, which in turn, frees the lugs for easy rotation. 2) The lid must rotate at least 1 ¾" to clear the lugs. 3) Operator must pull up evenly on handles to remove lid. 	<p>6</p> <p>6</p> <p>6</p>
VESSEL IS LEAKING	<ol style="list-style-type: none"> 1) Inspect and clean the gasket groove or rim. 2) If the gasket is worn or nicked, replacement may be necessary. 3) <u>Verify</u> the cartridge plate and/or the filter media are properly seated. 4) Gaskets need to be checked and replaced regularly. The lid compresses the gasket in the closing process. Over a period of time this can flatten the gasket and cause leaking. Use only FSI gaskets. 5) Verify the lid has been closed properly. 6) Inspect grommet. Replace if necessary. 	<p>10</p> <p>10</p> <p>11</p> <p>10</p> <p>14</p> <p>15</p>
LID WILL NOT CLOSE	<ol style="list-style-type: none"> 1) Conventional gaskets will not work. Use only FSI gaskets. 2) Apply a small amount of lubricant around the inside of the lid and gasket. Make sure the lubricant used is compatible with the product being filtered. 3) Verify the cartridge plate assembly or conversion plate is properly seated in the bottom head and level. Improper insertion will cause too much height to the cartridge hold down plate and filter media. This in turn prevents the lid from closing properly. 4) Verify the lid and vessel body lugs are aligned. This allows the lid to fall in place. 5) Verify each lug on the hold down plate is tightened enough to see (1-4) threads on the rod. 	<p>2</p> <p>14</p> <p>11</p> <p>14</p> <p>12</p>

**Operating Range for XL234 Filter Housing
(Water Service)**

