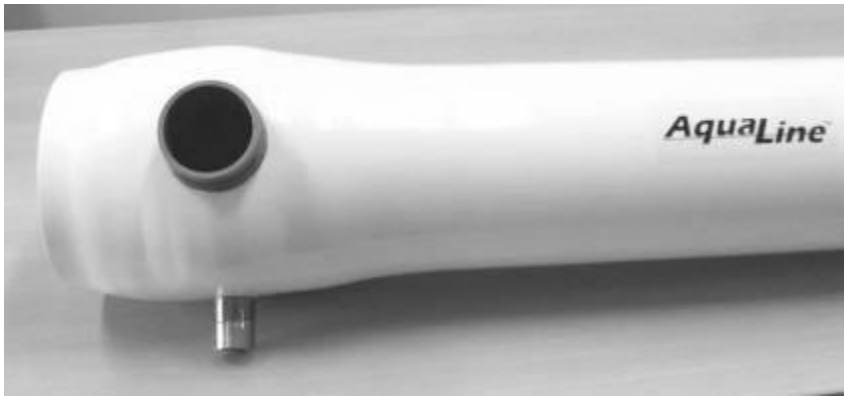
PENTAIR

CODELINE AQUALINE

USER'S GUIDE
8" SINGLE CARTRIDGE HOUSING



80CF15 (Non-ASME)

150 PSI

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www.codeline.com

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PREFACE

The AquaLine Series (Non-ASME)

Family of Vessels

The Aqualine is a standardized series of fiberglass pressure vessels designed for continuous, long-term use as housings and provide the optimum fluid quality or cleanliness level required for the application at the lowest overall operating cost in micro-filtration.

The Aqualine Series is designed for 150 psig pressure rating. They are unified in design and have maximum number of parts in common. Each model has the appropriate strength and material of construction to provide years of continuous use in typical service when properly maintained.

The Aqualine Series is designed and built in accordance with the Pentair standards and are Hydro tested as per PED/97/23/EC standards,1.5 times the design pressure. Testing as per ASME Standards will be on demand.

Aqualine Series model has passed rigorous qualification tests which require that the vessels do not burst at less than six times their design pressure. Safe use is further assured in that vessels will not fail catastrophically; overpressure is relieved by weeping through the fiberglass shell. Also, every production vessel is hydro-tested to verify structural integrity.

Aqualine system utilizes CodeLine FRP housing which can provide up to 50% reduction in capital expenditure over traditional filter housings. Further Aqualine uses high efficiency media Polyflex with locked fibers to deliver extended Element life.

While undertaking regular maintenance / repair / replacement of a pressure vessel it may be necessary to remove the pressure vessel from a bank. Also ensure sufficient spares are available for replacement. Care must be taken in installation / removal of the vessel to avoid damage to the shell. Damage to the shell can result in catastrophic failure and possible injury to personnel. Any corrections or recommendation for improvement for this manual should be addressed to:

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CONTENTS

OPERATION AND MAINTENANCE GUIDE

INTRODUCTION

MODELS

80CF15

150 PSI

This section is a guide to proper operation and maintenance of Aqualine Series pressure vessels.
Good industrial practice must be used in applying this information to assure safe vessel use. These guidelines are not intended to relieve the user from full responsibility for correct operation and maintenance of the vessels.

For technical specifications and dimensions, refer to the Engineering Drawings of each specific model.
The information in all sections must be carefully followed for the installation, operation & maintenance of the vessel to provide safe, long service life for which it is designed.

DANGER – High Pressure Device

Incorrect Installation, Operation & maintenance of these vessels may cause loss of life, severe bodily harm, and / or property damage. Read and understand all guidelines given in this bulletin before attempting to open, service or operate these vessels.
Failure to follow these guidelines and observe every precaution may result in malfunction and could result in catastrophic failure.

Misuse, incorrect assembly or use of damaged or corroded components can result in explosive release of the end closure.
We recommend that only a qualified technician experienced in servicing high-pressure hydraulic systems, open, close and service these vessels.

SAFETY PRECAUTIONS

DO

- Read, understand and follow every part of this section. Failure to take every precaution may void warranty and could result in explosive head failure.
- Install in an area where water leakage resulting from a vessel or piping malfunction would not damage sensitive equipment, such as electronic components.
- Install protective covering over equipment located below pressure vessels when performing maintenance.
- Verify that head locking components are properly placed and secured.
- Inspect end closures regularly, replace deteriorated components and correct causes of corrosion.
- Follow cartridge/element recommendations for loading element into vessel (see Replacing Elements on page no. 13).
- Mount the shell on horizontal members at Span "S" using compliant vessel supports furnished; tighten hold down straps just snug.
- Refer the Do's List mentioned on the 2nd page of the Vessel Sales Drawing to ensure safe operation and long life of the vessel.
- The vessel is designed for continuous use at a pH of 3-11 and for intermittent cleaning (max. 43.2 hours per year at a pH of 2-12).

DO NOT

- Operate the vessel outside the recommended operating and cleaning pH range.
- Operate vessel at pressures in excess of their specific rating.
- Service any component until you verify that pressure if fully relieved from the vessel.
- Use corroded components. Use of such components may result in catastrophic failure.
- Pressurize vessel until after visually inspecting to ensure that both locking segments are correctly installed and seated in their grooves.
- Tolerate leaks or allow end closures to be wetted in any way.
- Allow petroleum or silicone based products to come in contact with cartridge/elements during installation or maintenance.
- Pressurize vessel without element in place, unless permeate ports are plugged properly.
- Over-tighten fittings in ports.
- Stand or climb on the pressure vessels or the feed port.
- Allow force to be applied laterally to feed port.
- Refer the "Do Not" List mentioned on the 2nd page of the Vessel Sales Drawing to ensure safe operation and long life of the vessel.
- Use the vessel at negative pressure.
- Pressurize vessel with Compressed Air.

PRE-PRESSURIZATION CHECKLIST

DANGER – High Pressure Device

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This checklist is an aid intended to remind servicing and operating personnel of the detailed guidelines given in the AquaLine series operation and maintenance guide. The checklist alone does not include all the details needed for safe vessel operation. Use the checklist each time any service operation is carried out to ensure that each step is completed before pressurizing the vessel.

CARTRIDGE/ ELEMENTS

- ☐ **Installed** as per recommendation on pg13.
- ☐ **Feed** flow direction correctly noted and elements correctly oriented.

HEAD ASSEMBLY INTERLOCK

- ☐ **Retaining** Ring groove at each end of the shell is clean, free of corrosion and / or delamination with outboard face of groove true and is in sound condition.
- ☐ **All** components in as-new condition clean and free of damage or corrosion.
- ☐ **Retaining** Ring is fully seated in the vessel Retaining Ring groove.

HEAD

- ☐ **All** components in as-new condition clean and free of damage or corrosion.
- ☐ **All** components are properly assembled with new, freshly lubricated seals.
  Product port locking ring/nut installed.
- ☐ **Head** marked with proper pressure rating for system.
- ☐ Heads and cartridge/ element are installed in the correct position in the vessel as specified in the General Arrangement Drawing of Aqualine vessel

PIPING CONNECTIONS

- ☐ **Properly** aligned (strain free) and secured.
- ☐ **Leak** free.

Assembled by:_____ Date of Assembly:_____
Checked by:_____ Date of Inspection:_____

The following vessels listed by serial number below were serviced under this checklist:

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

INSTALLATION NOTES

Even though your vessel may be installed by others, there are few installation checks that you should make before system start-up. Vessels must be installed correctly to ensure safe use and long service life.

☐ Check that vessels are mounted on horizontal support frame using compatible black urethane saddles with hold-down straps that are snug & not tight.

☐ Check that each vessel is free to expand under pressure, shell is not rigidly clamped in place, and piping to vessel is not connected using rigid connections.

WARNING

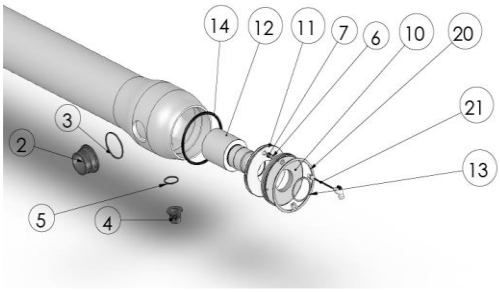
FAILURE TO ALLOW EXPANSION IN DIAMETER OR LENGTH WILL RESULT IN VESSEL DAMAGE.

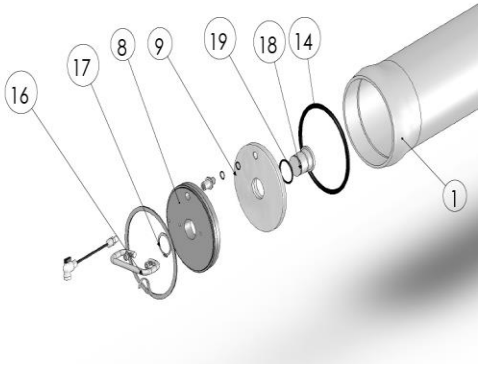
☐ Check that vessel does not support any other component; that piping manifolds are separately mounted, and that interconnection piping is self supported and connected to the pressure vessel with IPS grooved couplings.

If you have any question about the installation of vessel in your unit, contact your supplier.
For installation guidelines, refer to page no. 28-31.

Models	**80CF15**
Max Operating Pressure (PSI)	150
Operating Temp. Range (degree F)	20 – 140 (PVC) / 20 – 180 (PET)
Factory Test Pressure (PSI) CE	225 (1.5X)
Prototype Min. Qualification Pressure (PSI)	900
Operating pH Range	3 – 11
Operating pH Range	2 - 12
Engineering Drawing No.	17028

COMPONENT IDENTIFICATION





DWG REF	QTY	PART NUMBER	DESCRIPTION	MATERIAL
SHELL				
1	1	Order Section	SHELL	Filament Wound Epoxy/Glass composites - Head locking grooves integrally wound in place.
2	1	96327	3" Feed Port	SA-995 CD3MWCuN+ (UNS J93380)
3	1	196227	3" Port Seal	SQ. Seal – EPDM
4	1	17180	1" FNPT Port	SA-995 CD3MWCuN+ (UNS J93380)
5	1	45340	1" Port Seal	SQ. Seal – EPDM
HEAD				
6	2	17174/17403	1/4" FNPT Air Vent Port	Engineering Thermoplastic-PVC / PET
7	4	196208	1/4" Air Vent Port Seal	O - Ring – EPDM
8	1	17179	Bearing Plate Handle end	SB-221 A96061-T6
9	1	117007	Sealing Plate Handle end	Engineering Thermoplastic - Noryl
10	1	17176	Bearing Plate Product end	SB-221 A96061-T6
11	1	117006	Sealing Plate Product end	Engineering Thermoplastic - Noryl
12	2	17187/17406	3" Product Port	Engineering Thermoplastic-PVC / PET
13	1	17127	3" Port Retainer Ring	SA-479 316
14	1	196223	Head Seal	O - Ring – EPDM
15	1	17128	Product Port Seal	O - Ring - EPDM*
16	1	17104	Handle Assembly	SA-479 316
17	1	45247	Plug Retainer Ring	Stainless Steel
18	1	17132/17407	Plug	Engineering Thermoplastic-PVC / PET
19	1	196215	Plug Seal	O - Ring – EPDM
HEAD INTERLOCK				
20	2	47336	Quick Release Spiral Ring	SA-479 316
AIR VENT				
21	2	17185	Air Vent assembly	Engineering Thermoplastic.
VESSEL SUPPORT				
22*	2	52169	Saddle	Engineering Thermoplastic.
23*	2	45042	Strap Assy.	304 Stainless Steel-PVC Cushion.
24*	4	46265	Strap screw.	5/16-18 UNC, 18-8 Stainless Steel.
*Marked Components not shown				

OPENING THE VESSEL

STEP-BY-STEP GUIDE

Step 1. Relieve Pressure

1. Shut off all sources of pressure and relieve pressure from the vessel, following the system manufacturer's recommendations.

Step 2. Disconnect Piping

1. Disconnect piping as required at nearest convenient joint, being careful not to place undue stress on the Feed Port
   Caution: DO NOT tap on fittings as this could damage the ports.

Step 3. Examine End Enclosure

1. Examine enclosure of vessel for corrosion. Metal oxidation products and mineral deposits can interfere with vessel disassembly. If any is evident, proceed as follows:

a) Loosen any deposits with a small wire brush and / or a medium grade piece of ScotchBrite™.

b) Flush away loosened deposits with clean water.

Loosening deposits

Step 4. Removing Head Retaining Ring

1. No special tools are required for this operation. Engage your fore finger in the end tab of the retaining ring, lift it up and out of the stainless steel groove in the shell.

Lifting end of retaining ring out of groove

2. Remove the retaining ring from the stainless steel groove in the shell. This is accomplished by running your fingers behind the retaining ring as it continues to exit the groove.

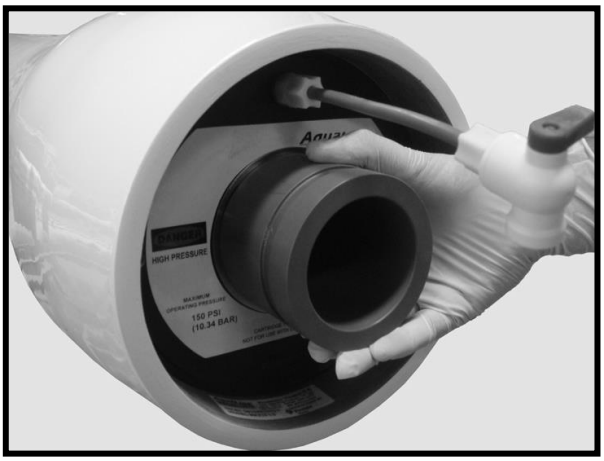
Removing the retaining ring from the groove

OPENING THE VESSEL

<u>Step 5</u>. Removing Head Assembly

A. *Removing head assembly on the FEED end of the vessel (On the end where the label is placed)*

1. Using a mallet tap the Bearing Plate lightly. Do not use a metal component to tap the bearing plate.
2. Hold the Product port with your hand
3. Carefully rock the head assembly back and forth to release the seal. (Care should be taken to avoid placing too much stress on the product port)



Removing Head Assembly

NOTE

It may be necessary to rock the head slightly and / or tap the head inboard to break head seal bond.

B. *Removing head assembly on Tail End (opposite end of the label) of the vessel*

1. Hold the handle of the Head and provide a slight jerk/rock the Head assembly back and forth to release the seal.
2. Once the Head is freed, pull the head assembly out using the Handle.

Opposite end of the vessel.

WARNING

Read all guidelines in this section before attempting to open the vessel.
Do not attempt to service any component without first verifying that vessel PRESSURE is fully relieved from the vessel. Attempting to remove any component before pressure is relieved may result in EXPLOSIVE release of the head.

CLOSING THE VESSEL

WARNING

Read all guidelines in this section before attempting to close the vessel.

CHECK THE HEAD ASSEMBLY FOR CORROSION AS DESCRIBED IN THE HEAD REBUILDING SECTION. CORRODED PARTS CAN RESULT IN CATASTROPHIC FAILURE.

Do not pressurize vessel until after visual inspection to ensure that retaining ring is fully seated.

Never attempt to repair a fiberglass shell.

Preliminary Steps

Do not proceed until…

1. Head has been checked for correct component assembly by following step-by-step instructions in the Head Rebuilding section.

Step 1. Inspect Shell inside Surface

1. Inspect the vessel inside surface for any corrosion deposits or other foreign matter. If any are found, clean the surface as follows:

Cleaning inside the vessel

Using a medium or finer grade of ScotchBrite™ and a mild soap solution, clean each end of the vessel inner surface up to 8" from each end of the vessel.

Rinse away all loosened deposits from the shell's inside surface using clean fresh water.

2. Inspect the vessel inside surface for scratches or other damage that could cause leaks. Vessels that leak must be replaced.
3. Inspect Feed port seals and attachments for internal and external damage or deterioration.

Step 2. Shell & Head Lubrication

1. Work O-ring lubricant into shell area behind the retaining ring groove and approximately ½" into the vessel I.D.
2. Ensure entire head seal is covered with a thin layer of O-ring lubricant, with no dirt or dust contamination.

WARNING

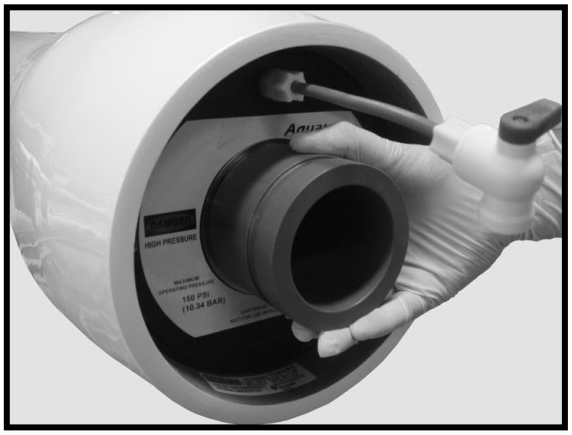
Any remaining lubricant should be cleaned from the vessel bore before applying fresh lubricant. Glycerine is a commercially available lubricant that will not foul cartridges.

**Contact Pentair Water for guidance if damage to the vessel's internal surface or Feed port, seals or attachments is discovered during inspection.*

CLOSING THE VESSEL

<u>Step 3</u>. Installing Head and Cartridge

1. Slide the cartridge into the vessel until the Product Port end of the cartridge is partially exposed.
2. Hold the head assembly square to the axis of the shell by grasping the product port. Fix the head on the cartridge and slide the cartridge along with the head into the vessel
3. Grasp tightly and push the head in as far as it will go. (A sharp, forceful thrust or may be light tapping with a mallet may be necessary to enter the head into the vessel bore). When the head is correctly positioned, the locking groove will be exposed.
4. Once the upstream head is fixed into position fix the downstream head into position



<u>Step 4</u>. Install Head Interlock

1. Carefully wipe out any debris or moisture from the head Retaining ring groove. The groove must be clear and dry before proceeding.
2. With the head assembly installed in the shell, place the tip of the head Retaining ring in the stainless steel groove. (The non bent tab end).
3. Begin pushing the retaining ring into the groove as you rotate your hand around the I.D. of the shell.
4. Continue until the entire retaining ring is installed in the groove.
5. Verify that the retaining ring is fully seated in the groove before proceeding.

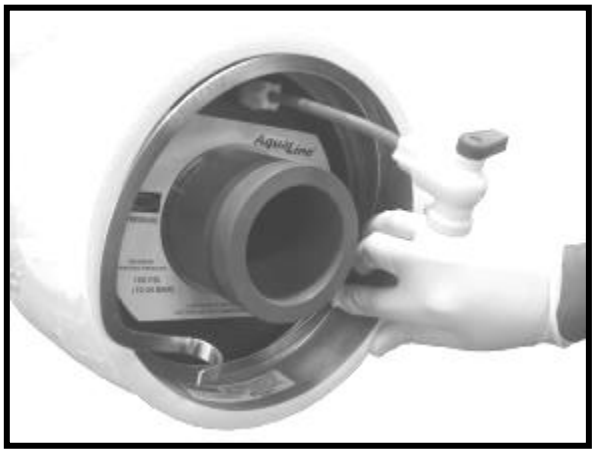
CAUTION

Incorrect assembly or installation can result in EXPLOSIVE HEAD failure.

CLOSING THE VESSEL

CAUTION

Do not pressurize vessel until verifying that the Head Retaining Ring is properly installed.



Fixing the Retaining Ring into the Groove

Step 5. Reconnect Piping

1. Reconnect manifold piping to the vessel Feed port and Product piping manifold to the Product Port via IPS grooved Coupling.

Step 6. PRE_PRESSURIZATION CHECKS

It is vitally important that the following checks be carried out before any attempt is made to pressurize the vessel.
It is recommended that the Pre-Pressurization Checklist (Page-05) be used to systematically verify that all steps have been performed.

HEAD ASSEMBLY

Verify the following at each end of the vessel:

1. Head assembly is in good condition, with no evidence of damage or corrosion. See the sections on Head Rebuilding and Maintenance.
2. Head retaining Ring is properly placed.

PIPING CONNECTIONS

1. Check all piping connections to ensure that they will provide a leak-free seal.

Step 7. Pressurization

1. After following the above pre-pressurization checks, pressurize vessel in accordance with element manufacturer's specifications.
2. Vessels should be filled slowly with water and the Air Vent assembly valves should be opened to assist trapped air in escaping.
3. Close the Air vent assemblies after the Vessel is completely filled with water and the air has escaped.

NOTE

In order to avoid damage to Aqualine element, Air Vent Assembly Valve to be opened at the System Startup to release the air entrapped

REPLACING ELEMENTS

IMPORTANT

Read all parts of this section before replacing cartridge. These procedures are provided for general information only. Cartridge should be installed in accordance with the cartridge loading recommendation.

Always remove and install cartridge using the handle attached to the membrane.

A record of cartridge serial numbers and locations should be made and checked during loading.

Do not scratch or damage vessel bore when removing or installing elements.

AquaLine elements are disposable Cartridges. Elements need to be replaced once it reaches the terminal Delta pressure of 2.5 bars. The operation philosophy of this element is: Outside –in Flow direction.

Preliminary Steps

Do not proceed with step by step instructions until…

1. All pressure has been relieved from the vessel, following system manufacturer's recommendations.
2. Handle end Head Assembly have been removed from vessel following step by step instructions in the "Opening the Vessel" section.

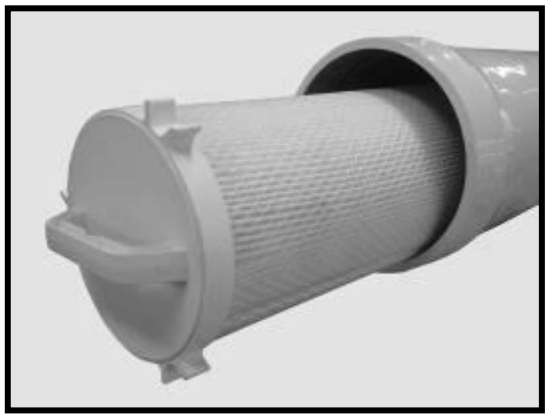
<u>Step 1</u>. Element Removal

1. Remove element from the vessel by holding the cartridge handle. Clean off any excess lubricant from vessel inside diameter before removing elements.

<u>Step 2</u>. Element Loading

1. Examine the inside diameter of the vessel for scratches or imperfections that may affect sealing capability of head or element seals. Corrosion deposits or other foreign matter, including any excess lubricant, should be removed as described in Section – Closing the Vessel.
2. Flush out the vessel with clean water to remove any dust and debris.

Examining for scratches



3. Examine cartridge/ element surfaces for any imperfection which could scratch the vessel bore.

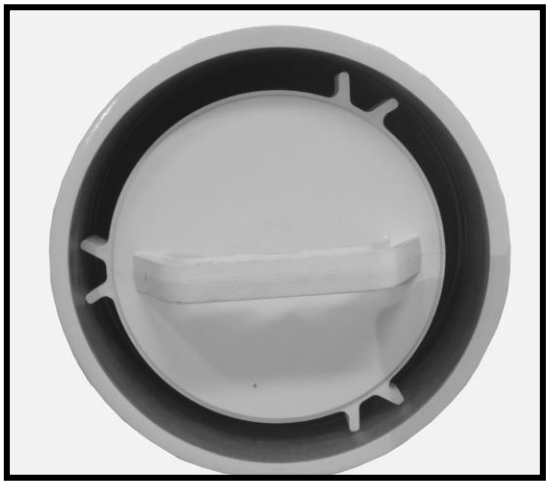
NOTE:

- AquaLine elements are disposable Cartridges. Elements need to be replaced once it reaches the terminal Delta Pressure of 2.5 bar. The Operation philosophy of this element is: Outside –in Flow direction.
- Using an approximate 50% mixture of glycerin in water lubricates the inside of the vessel and can be best accomplished using a suitably sized swab soaked in the mixture. This procedure will ease cartridge/element loading and reduce chance of scratching the vessel bore.

REPLACING ELEMENTS

4. Apply a light film of a non-petroleum based lubricant, such as Parker Super O-Lube™, to the membrane O-ring. (The amount of O-Lube should be just enough to give a luster to the O-ring. Excess O-lube must be removed to prevent possibility of element contamination).
5. Load the element/cartridge from the downstream end of the vessel and push it just enough for the cartridge to create a sealing with the Product Port.

Loading Element / Cartridge fig. 2



Loading Element / Cartridge fig. 1

CAUTION

Maintain cartridge/element alignment carefully during assembly procedure

HEAD – DIS-ASSEMBLING & ASSEMBLING

NOTE

Read all guidelines in this section before attempting to rebuild the head.

Head rebuilding should be performed in a clean work area. Dust or dirt on O-rings or other parts can scratch inner surfaces and cause subsequent leakage.

Replace any components not in "as-new" condition. Re-using corroded or damaged components can result in explosive head failure.

Downstream Head Assembly components

Unscrew the Air Vent Assembly Valve

Preliminary Steps

Do not proceed until…

1. All pressure has been relieved from the vessel, following system manufacturer's recommendations.
2. Head has been removed from the vessel following guidelines in "Opening the Vessel" section.

To dis-assemble head

Downstream End Head Assembly

STEP 1. Unscrew the Air Vent Assembly valve from the Downstream Head as shown in the Picture below

STEP 2. Remove Head seal from the head using screw driver or similar tool.

STEP 3.Remove the screw holding the handle one at a time

Removing handle

HEAD – DIS-ASSEMBLING & ASSEMBLING

NOTE

A small screw driver or similar tool may be used to remove the O-rings. However, do not damage the sealing surfaces in any way or leakage may result.

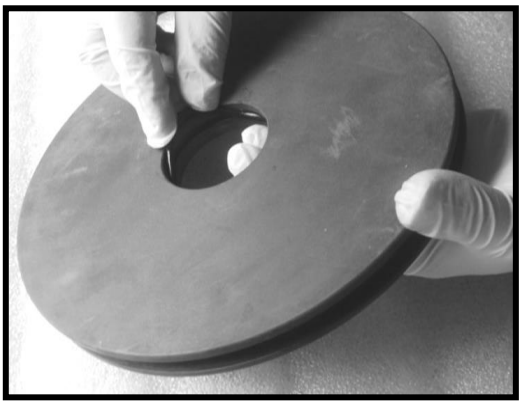
It is recommended that all seals be replaced each time the head is assembled.

STEP 4. Remove the retainer ring using Circlip Plier as shown in the Picture.

STEP 5. Removing the bearing plate by pulling the bearing plate from Sealing Plate. Bearing Plate is held in the assembly by Circlip, once the Circlip is removed the bearing plate is free to move.

STEP 6. Remove the Sealing Plate by pressing it out of the Solid Plug.

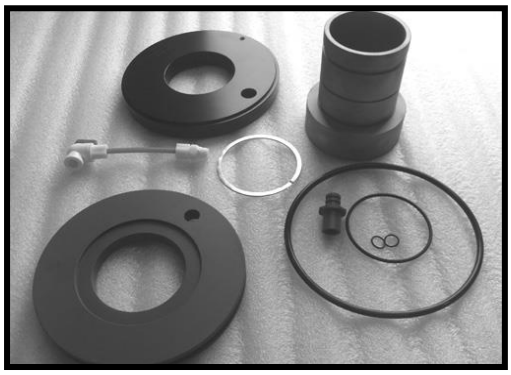
STEP 7. Remove ¼" Air Vent Port from the Sealing Plate by pulling it out as shown in the Picture below



STEP 8. Removing Seal from Sealing Plate using a sharp object i.e. Screw Driver the seal can be plucked out from the sealing plate groove

HEAD – DIS-ASSEMBLING & ASSEMBLING

Upstream End Head Assembly



Upstream Head Assembly components

STEP 1.Unscrew the Air Vent Assembly valve from the Downstream Head as shown in the Picture below

STEP 2.Using a small screw driver or similar tools remove the Head seal; however do not damage the Sealing Surface

STEP 3.Remove the 3" Port Retainer Ring located on the external side of the bearing Plate

STEP 4. Remove Bearing Plate by pulling the bearing plate from Sealing Plate. Bearing Plate is held in the assembly by Circlip, once the Circlip is removed the bearing plate is free to move.

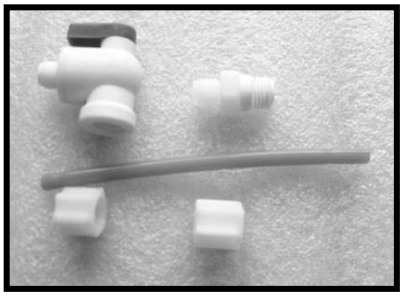
STEP 5. Remove Sealing Plate by pressing it out of the 3" Product Port as shown in the Picture

HEAD – DIS-ASSEMBLING & ASSEMBLING

STEP 6. Remove ¼" Air vent Port from the Sealing Plate by pulling it out as shown in the Picture below

STEP 7. Remove Product Port Seal from the 3.0" Product Port using sharp objects like the screw driver.

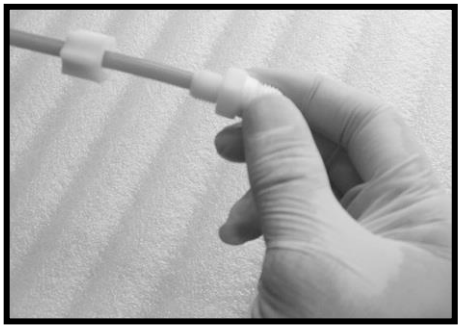
Air Vent Assembly Valve



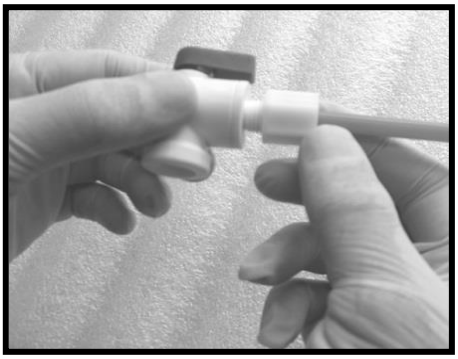
The Air Vent Assembly Valve consists of the following Components

1. Tubing Blue
2. Male Connector, Pipe ¼" Tube ¼"
3. Ball Valve ¼"
4. Compression Nut ¼"

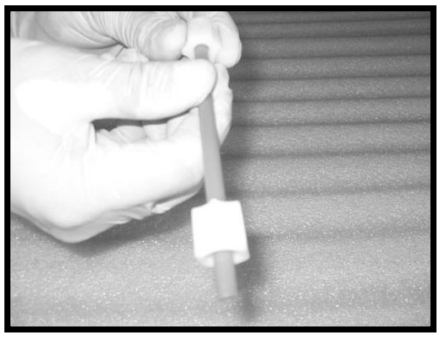
STEP 1. Hold the Air vent Assembly in one hand and unscrew the Male connector from the Compression nut with the other hand, as shown in the below picture.



STEP 2. After the Male connector is removed Gently Unscrew Ball Valve from the Compression nut.



STEP 3. Remove the Compression nuts from the tubing after the Male connector and the ¼" Ball valve is removed.



HEAD – DIS-ASSEMBLING & ASSEMBLING

Read all guidelines in this section before making any decisions on components structure or corrosion problems and treatment.

This section is intended only to provide guidelines in dealing with corrosion or component damage. In combination with good industrial practice, these guidelines provide a basis for safe system operation.

Any condition not covered in this section should be referred to Pentair Water.

Corrosion in this context includes metal oxidation products and mineral deposits.

Component Cleaning and examination

STEP 1. Wash Components

1. Wash all components in fresh water.
2. Blow components dry with compressed air, if available. Otherwise wipe with a dry, lint-free cloth.

STEP 2 Initial Component Inspections

1. Examine all components for any damage that could affect structural strength or sealing properties.
2. Replace any parts considered to be structurally unacceptable.

The following example indicates when replacement is required.

A. Bearing Plate dented or distorted (possibly from being dropped or hit).

B. Retaining Ring bent or damaged.

Any other details considered to be a potential problem should be referred to Pentair Water. If any component is cracked, softened or discolored, it may indicate a chemical resistance problem. These components must be replaced. Alternate materials may be required in these applications. Contact Pentair Water for a solution.

CAUTION

The following procedure should be used on all Engineering Thermoplastic Components contaminated by minerals or other foreign matter. If any component cannot be brought to "as-new" standards, it must be replaced.

STEP 3: This procedure applies to the following components:

A. Sealing Plate

B. Product Port Upstream Head Assy

C. Plug Downstream Head Assy

D. Air Vent Assemblies

1. Examine all plastic components for mineral deposits or other foreign matter. If any are found, proceed as follows:

A. Place components in a shallow container of soapy water and scrub entire surface with medium grade ScotchBrite™ until all foreign matter is removed.

B. Rinse components clean with fresh water.

C. Blow components dry with compressed air, if available.

D. Re-examine components for any damage that could affect structural strength or sealing properties. Any components not in "as-new" condition must be replaced.

HEAD – DIS-ASSEMBLING & ASSEMBLING

CAUTION

This procedure for evaluating corroded components is to be used on any corroded metal parts. If this fails to bring any component to "as-new" standards, the part must be replaced.

STEP 4. Evaluating Corroded Metal Components

This procedure applies to the following parts:

A. Bearing Plate

B. Retaining Ring

1. Examine these components for corrosion. For any components not in "as-new" condition, proceed as follows:

A. Loosen any large deposits with small wire brush.

B. Place components in shallow container of soapy water and scrub entire surface with medium grade ScotchBrite™ until all corrosion is removed.

C. Rinse components clean with fresh water.

D. Blow components dry with compressed air, if available.

E. Re-examine components for damage that could affect structural strength or sealing properties. Any components not in "as-new" condition must be replaced.

F. Inspect components for any condition that might have promoted corrosion, (e.g. external damage, inappropriate material selection, etc.)

CAUTION

Feed port and attachments to the shell must be carefully inspected to ensure that connections and sealing materials are sound and tight. Any questions or evidence of deterioration of these areas should be referred to Pentair Water Engineers.

Other than seal replacement, field repair should not be attempted by user maintenance personnel without first contacting the manufacturer for guidance.

To Re-Assemble Head

WARNING

Head must be carefully assembled following these instructions. Incorrect assembly can result in CATASTROPHIC failure.

Lubricating Head Seals & O-rings

1. Lubricate Product Port seal / Head Seal.
2. Lubricate and Install Head Seal on the outer groove of the sealing plate.

CAUTION

It is recommended that all seals be replaced each time the head is assembled. A seal replacement kit is available from Pentair Water.

Lubricate seals sparingly, using non-petroleum based lubricants, i.e. Parker Super O-lube®, Glycerine or suitable silicone based lubricants. (Silicone based lubricants, correctly used, will ease head assembly and disassembly). (Glycerine is a commercially available lubricant that will not foul cartridge).

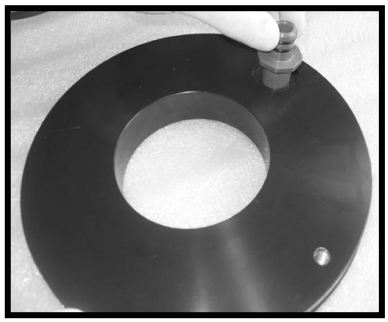
HEAD – DIS-ASSEMBLING & ASSEMBLING

Assembling Upstream Head assembly

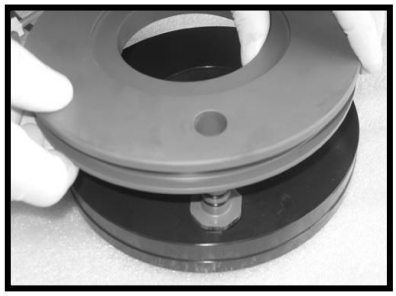
STEP 1: Place the Product Port Seal in the Groove present on the Product Port as shown in the Picture below

STEP 2: Place the seal on the ¼" Air Vent Port ensure that the Seal is lubricated

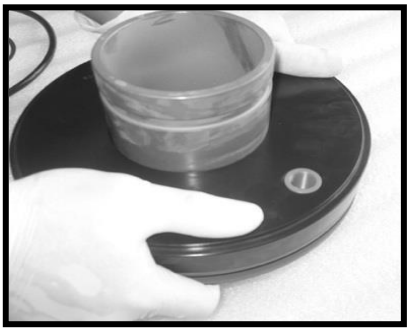
STEP 3: Press the ¼" Air Vent Port against the Bearing Plate and ensure that it sits exactly in the slot provided.



STEP 4: Place the Sealing Plate on the Bearing Plate such that the ¼" Air vent Port Sits in the hole on Sealing Plate as shown in the Picture below



STEP 5: Place the Assembly of sealing Plate and bearing Plate on the Product Port, Press the assembly till the 3" Product Port retaining Ring groove will be exposed



STEP 6: Begin pushing the 3" Product Port retaining Ring into the groove as you rotate your hand around the O.D of the Product Port, Continue until the Product Port Retaining Ring is installed in the Groove.

HEAD – DIS-ASSEMBLING & ASSEMBLING

STEP 7: Lubricate and Install the head seal on the outer groove of the Sealing Plate

STEP 8: Screwing the Air Vent Assembly to the Aqualine Upstream Head assembly

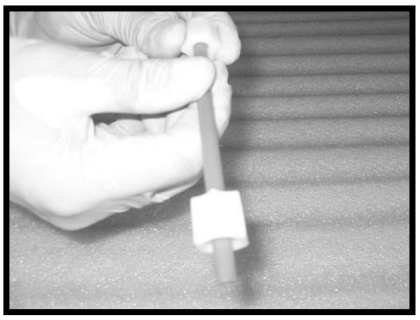
WARNING

The sealing plate must sit flush against the bearing plate. If any gap is evident, the components have not been assembled correctly.

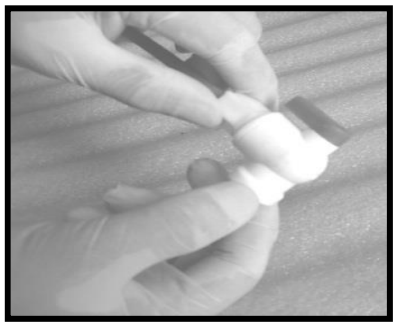
Incorrect assembly can result in CATASTROPHIC failure.

Assembling Air Vent Assembly Valve

Step 1. Place the Compression nuts on the tubing



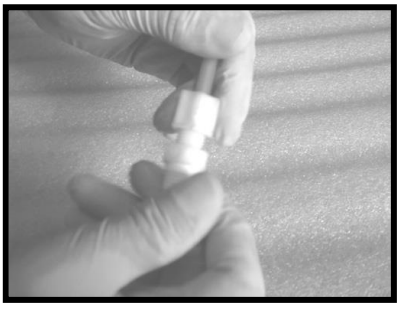
Step 2. Screw Ball Valve from the Compression nut as shown below



NOTE

Use Teflon tape on the male connector before screwing it to the Head Assembly to prevent the leakage through the Air Vent Port during the Operation.

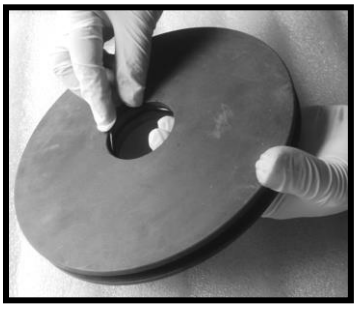
Step 3. Screw the Male connector to the Compression nut.



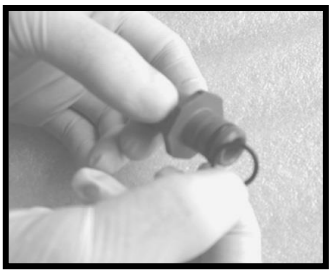
HEAD – DIS-ASSEMBLING & ASSEMBLING

Assembling Downstream Head assembly

STEP 1: Lubricate and Install the Seal into the groove of the Sealing Plate as shown below

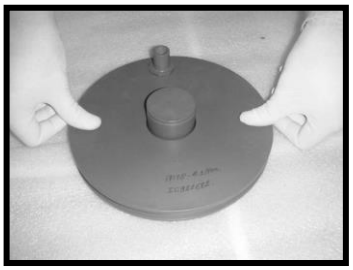


STEP 2: Place the seal on the ¼" Air vent Port ensure that the Seal is lubricated



STEP 3 Press the ¼" Air vent Port against the Sealing Plate and ensure that it sits exactly in the slot provided

STEP 4: Press the Sealing Plate against Solid Upstream Plug



STEP 5: Installing Bearing Plate, Press the assembly till the retaining Ring groove will be exposed

STEP 6: Install the retaining Ring using the Circlip plier and the handle using the Socket Head Cap Screws

STEP 7: Lubricate and Install the head seal on the outer groove of the Sealing Plate

STEP 8: Screwing the Air Vent Assembly to the Aqualine Downstream Head assembly

PREVENTIVE MAINTENANCE

Corrosion prevention is essential for the maintenance of safe operating conditions and to ease cartridge/ element servicing.

Attention to the points listed below will enhance long-term safe operation and will ease servicing.

For suggestions on cleaning corrosion deposits from the vessel inside surface, refer to “Closing the Vessel” section.

For suggestions on cleaning corrosion deposits from head components, refer to the “Head - Dis-assembling & Assembling” section.

PREVENTIVE CHECKLIST

- End closures. Inspect for components that may have deteriorated. Replace as needed.
- Keep external head assembly components as dry as possible.
- Do not tolerate leaks.

CAUTION

Any leakage indicates a potentially dangerous condition. Failure to eliminate leakage may void the warranty and could result in vessel failure.

TROUBLE SHOOTING

This section is intended only to provide guidelines for dealing with problems that might arise while working with AquaLine Series pressure vessels.

These guidelines are not in any way a replacement for the good industrial practice required to ensure safe operation. We recommend that only a qualified engineer, experienced in servicing high pressure hydraulic systems, carry out the following tasks.

Preliminary Inspection

Inspect the vessel at each end for corrosion which may interfere with head assembly removal. If corrosion is evident, proceed as follows:

1. Loosen any deposits with a small wire brush and/or a medium grade piece of ScotchBrite™.

Loosening Deposits

WARNING

Do not use a wire brush on components made from Engineering Thermoplastic.

2. Flush away loosened deposits with clean water.
3. Proceed with instructions given in "Opening the Vessel" section.

Difficulty in Opening Vessel

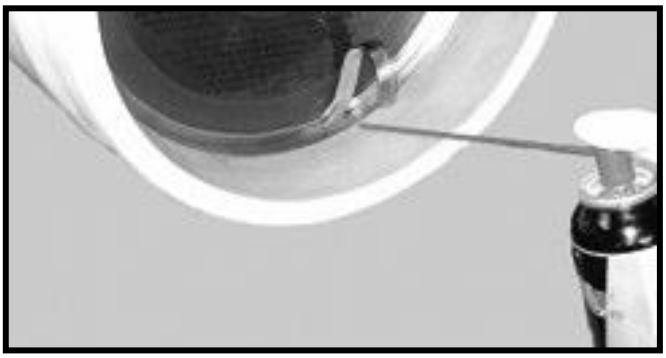
Head Retaining Ring

1. Will not release from the Retaining Ring Groove.

A. Apply penetrating fluid (such as WD-40 or LPS-1) to interfacing areas of retaining ring.

B. With a screwdriver handle or similar tool, tap the retaining ring to release the bond.

C. Again attempt to remove the retaining ring.



Applying penetrating fluid

CAUTION

When applying penetrating fluid, be careful to avoid element contamination.

NOTE

Recommendations listed here are intended only as a guide. If the head assembly is still difficult to remove after all recommendations have been followed, call Pentair Water for technical assistance.

TROUBLE SHOOTING

Head Assembly

1. Will not release from shell when pulled.

Refer the "Opening the Vessel" section

NOTE

If the head assembly will not release from the shell after all recommendations have been followed, call Pentair Water for technical assistance.

SEAL LEAKAGE

1. Head Seal Leak

A. Carefully inspect the seal gland area in the shell and clean any contaminants from the gland.

B. Clean the seal area on the head and re-lubricate.

C. Install a new head seal that has been properly lubricated.

2. Seal Plate Seal Leak

A. Dismantle the Head by referring the "DIS-ASSEMBLING & ASSEMBLING" section.

B. The seal is seated in the sealing plate. Run your fingers around the seal and check for any seal damage. If the seal is damaged replace the seal.

C. Check for any damage/scratches on the sealing area. Replace the sealing plate if found damaged.

3. Feed Port Leak

IMPORTANT

Please contact Pentair Water if the Feed Port leaks are observed.

Sudden Drop in Product quality

If a system is started and stopped frequently and no provision is made to raise the pressure slowly, movement of the membrane column may damage O-ring seals and reduce Product quality.

If the quality of the product suddenly drops, and poor membrane performance is not suspected, remove the heads per instructions in the Users Guide (See "OPENING THE VESSEL"). Inspect these O-ring seals carefully for breakage or other damage. If the seals have rolled out of the groove, or are damaged, this may indicate excessive movement during start-up and shutdown which may be due to improper seating of the cartridge in the vessel.

Open the Vessel and re-seat the cartridge element (refer opening and closing of the vessel for details).

INSTALLATION GUIDE

Introduction

The AquaLine Series fiberglass cartridge housing is designed for continuous long term use as a housing for micro-filtration elements in typical water treatment systems at operating pressures of 150 PSI.

The AquaLine Series is designed to accommodate any make of 8-inch nominal diameter cartridge element.

Improper assembly, misuse, rigid clamping, impact, scratches, abrasion or corrosion can result in mechanical failure, property damage and serious injury or death.

The information and guidelines incorporated in this User's Guide are intended only as supplement to good industrial practice. Full responsibility for correct operation and maintenance of vessel remains with the user.

This guide should be used in conjunction with engineering drawings.

When properly installed and maintained, the AquaLine Series vessels can be expected to provide safe operation over a long service life.

Should any information in this guide not agree with the system supplier's instructions, call Pentair Water for clarification.

Regardless of when and by whom your vessel may have been installed, there are a few quick checks you should make before use. Check that each vessel is:

- Mounted with compliant material (Polyurethane Saddle) between the fiberglass shell and any rigid frame.
- Free to expand under pressure – shell not clamped rigidly in place, no rigid piping connection to port fittings.
- Not used in any way to support other vessels / objects.

HANDLING, RECEIVING AND STORAGE

Fiberglass reinforced plastic (FRP) Pressure vessels are extremely rugged and durable. They are designed for safe, long-term service when they are handled and installed properly. However, damage to the vessel shell or related components from improper handling or installation could result in malfunction or explosive head failure while in service. Therefore exercise the following precautions whenever handling vessel.

1. Never lift or move a vessel by placing anything inside it. The vessel is durable and ideally suited to its purpose, but careless handling can permanently damage it.
2. Be careful not to scratch the inside wall of the shell, especially in the sealing area inboard of locking segment groove near the end.
3. Do not drop vessel or allow it to hit hard on the ground or against other objects.
4. Do not apply undue stress to shell.
5. Before using a forklift to handle the vessel, pad the forks to lessen the chance of damaging the shell. Severe scratches or gouging of the vessel can result in failure of the vessel wall.

NOTE ON IMPACT DAMAGE

Exterior vessel damage can lead to early vessel failure. Damage received in shipment should be reported to the shipping company immediately upon receipt minor damage such as scratches that go no deeper than the paint may be acceptable. Call the Pentair Water customer service department for advice if in doubt.

STORAGE

Pentair Water recommends storing the vessel in the received packing or in a secure place. Vessel should not be stored in such a manner that they will roll over and get damaged.

If ambient or storage temperature drops below or increase above the operating temperature than do not use such vessel under same condition wait to normalize the temperature within the operating range.

MOUNTING SHELL & PIPING CONNECTION

NOTE

If mounting vessel for the first time, see "piping recommendations for AquaLine",

This section is concerned with the mounting of AquaLine Models 80CF15 pressure vessels.

These guidelines must be integrated with any additional procedure required for your specific installation.

Installation Guidelines

1. Provide adequate room for servicing at both ends of vessel. Element is installed and removed from the downstream end on the Vessel.
2. Follow all applicable Handling Guidelines.
3. Position each vessel on its mounting frame properly.

NOTE

It is important that each vessel be placed to minimize any strain on piping / tubing that connects a vessel to a header.

4. Mount vessels on polyurethane saddles (provided with the vessel) positioned in line with pre-drilled frame holes for two supports as per the Span length specified in the GA drawing. Holes for the mounting straps should be drilled at approximate center span 'S'.

WARNING

DO NOT MOUNT VESSEL RIGIDLY. RESTRICTED EXPANSION CAN RESULT IN DAMAGE TO THE VESSEL. SEE ELASTICITY AND MOUNTING REQUIREMENTS IN THE APPLICATION SECTION FOR FURTHER DETAILS.

MOUNTING SHELL & PIPING CONNECTION

5. Place mounting straps over vessel with plastic strip against vessel.
6. Position screw through the frame mounting holes into strap nuts and run up to the frame finger tight.
7. Connect vessel feed piping (See Piping Recommendations for more info)
8. Using a wrench, tighten mounting bolts one additional full turn. This should result in 25-50 lbs-in. of torque.

CAUTION

To avoid damage to vessel shell. DO NOT over-tighten mounting nuts.

WARNING

CodeLine straps are designed to secure the vessels during operation. They are not designed to handle all loads that might occur during shipment. Appropriate vessel restraint should be employed considering such factors as the mode of shipment, distance to be traveled and design of the system.
The vessels and frame should be blocked to prevent any differential movement which could be caused by the forces experienced during shipment.

PIPING CONNECTIONS

The following are suggested guidelines to ensure that the vessel is allowed to expand and is easily serviced:

1. Support the header and interconnecting piping in a manner that they are self-supporting.
2. Connecting piping alignment to feed and product ports should not exceed 0.030 inch (0.762 mm) misalignment.
3. Piping connections to the vessel's feed and Product ports should be via flexible IPS grooved Coupling.

APPLICATION GUIDE

Introduction

This Application Guide, together with the Installation Guide and the Operation and Maintenance Guide, outlines the general conditions for safe use of AquaLine pressure vessels. Because of the considerable risk inherent in high pressure vessels, it is the purchaser's responsibility to carefully evaluate each specified application to ensure that the AquaLine vessel selected is appropriate to that application.

Pentair Water will assist the purchaser in determining the suitability of the standard vessel for their specific operating conditions. For non-standard applications, alternate materials are available on special order. The final determination, however, including evaluation of the standard materials of construction for compatibility with the specific environment, is the responsibility of the purchaser.

SUITABILITY FOR INTENDED USE

AquaLine Series cartridge housings are designed for continuous long-term use as housings for micro-filtration cartridge elements. Models are available for 150 psi. Any make of eight-inch nominal diameter pleated cartridges are easily accommodated.

In a high pressure system there is considerable potential for catastrophic failure, which could result in serious injury or loss of life. All decisions as to suitability for use must include full consideration of the various safety aspects involved. These include, but are not limited to:

Process fluid compatibility (e.g. chemical and temperature consideration).

External environmental factors (e.g. corrosive atmosphere, remote or special environment where certain material might be undesirable, etc.).

Abnormal back pressure which might result in pressurizing product port above the rated pressure (alternate materials are available).

Capability of the user to maintain vessel properly.

Requirement for increased fire resistance in some circumstances.

Use of AquaLine pressure vessel for other than its intended application will void the warranty.

ELASTICITY AND MOUNTING REQUIREMENTS

Mounting design must allow for vessel expansion, both axially and radially. Although the expansion under pressure is slight, undue restriction can result in damage to the vessel and to other system components. Typically the vessel, would expand approximately 0.20 inch (6 mm) in length and 0.015 inch (0.4 mm) in diameter. The following suggestions will help to ensure the vessel is allowed to expand and will ease servicing.

1. Mount the vessel on the polyurethane support pads (saddles) furnished. Do not mount directly to any rigid structure.
2. Use the stainless steel straps furnished. Straps should be tightened sufficiently to hold the vessel on the polyurethane support pads, but not so tightly so as to restrict expansion. (A torque of 25-50 lbs-in. is sufficient.)
3. U-bolts should not be used for vessel mounting under any circumstances.
4. Provide flexible piping connection to permit de-coupling the header from the vessel. Recommended Feed and Product connections are via flexible IPS grooved coupling.
5. Do not hard plumb any piping connections to the vessel.
6. Support the header independently. Piping should be self-supporting or supported by the headers.
7. Include an expansion loop in the branch connection to allow for:
    A. Elastic growth under pressure.
    B. Thermal growth in vessel length.
8. The total weight of branch connection and fittings supported by the vessel should not exceed 8 lbs for either the Feed / Product port for AquaLine 80CF15 model vessels.

The above suggestions are intended to help prevent damage in typical applications. Unusual or special applications may involve other considerations to be determined by the system designer.

CORROSION

Considerations relating to corrosion are an important factor in vessel application. Corrosion can result in catastrophic failure and / or cause difficulty in removing head components from the shell. Correct component material selection is essential for safe long-term use. Although the process fluid is the main consideration, external environment conditions should also be taken into account.

All reasonable precautions should be taken to protect head assemblies from external wetting, particularly in corrosive atmospheres (e.g. salt-water areas or acid atmosphere such as near lead acid battery arrays, etc.) Leaks from vessel or nearby components, which allow head parts to be routinely wetted, should not be tolerated.

The following typical list of AquaLine model 80CF15 pressure vessel components indicating the standard material of construction of each part is listed General Arrangement Drawing. An evaluation of the possibility of corrosion damage to the metal head interlock components is of critical importance. Alternate materials are available upon requests.

SAFETY

CAUTION

Pressure vessel may cause loss of life, severe bodily harm or property damage if not correctly installed, operated and maintained.

Safety in service of fiberglass vessel depends on proper application, installation, operation and maintenance. This section is intended to provide guidance towards safe system design. The safety information given in the installation and operation and maintenance section should also be studied and used appropriately in conjunction with the precautions listed below.

Design Considerations for Safety

Fluid Compatibly

The materials of construction selected must be compatible with the process fluid and with proposed preserving and cleaning fluids. Standard materials are listed on the engineering drawings. In case where the standard materials are unacceptable, suitable alternative may be available on request.

Pressure and Temperature design limits

Operation of a vessel outside its design limits will void the warranty and would result in vessel fatigue with possible eventual catastrophic failure. Although each AquaLine™ 80CF15 model vessel is tested as per Pentair/CE specifications, long term operation above the designed pressure must be prevented. For product port pressure rating and maximum operating temperature, refer respective sales drawings.

Over pressure protection

It is essential that over pressure protection be provided such that the pressure to which any vessel is subjected cannot exceed 105% of design pressure.

Mounting

The pressure vessel should not be used as a support. Piping manifolds and other fittings should be supported by properly designed system framework. Operating personnel should be discouraged from applying from undue force to any fittings connected directly to a pressure vessel.

Accessibility

Pressure vessel should be positioned within the system such that cartridges can be inserted and removed from the Downstream end (i.e. elements are installed and removed in the direction opposite to the feed flow).

NOTE

AFTER END OF SERVICE LIFE OF VESSEL, DISPOSE THE VESSEL AND ITS COMPONENTS AS PER APPLICABLE LOCAL LAWS AND REGULATIONS

PIPING RECOMMENDATIONS

Various methods of connecting side port vessel to manifolds are possible. The recommendation method is to connect each vessel side port to the manifold using two flexible IPS grooved joint and an intermediate piping section. A 90^0 – elbow would be an ideal, however, a straight piping connection would also be acceptable. A two joint method is preferred over a single IPS grooved connection because it does not require as much care in vessel alignment and manifold welding accuracy. Figures 1 & 2 illustrate the preferred method.

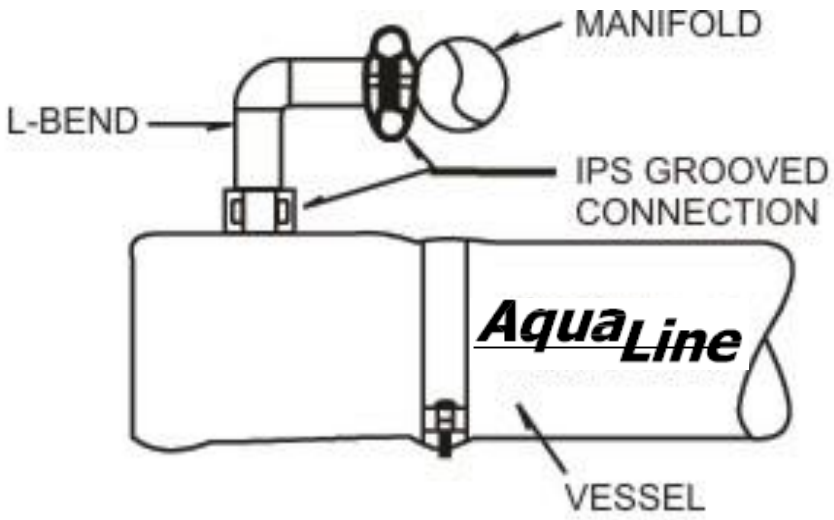


FIGURE 1

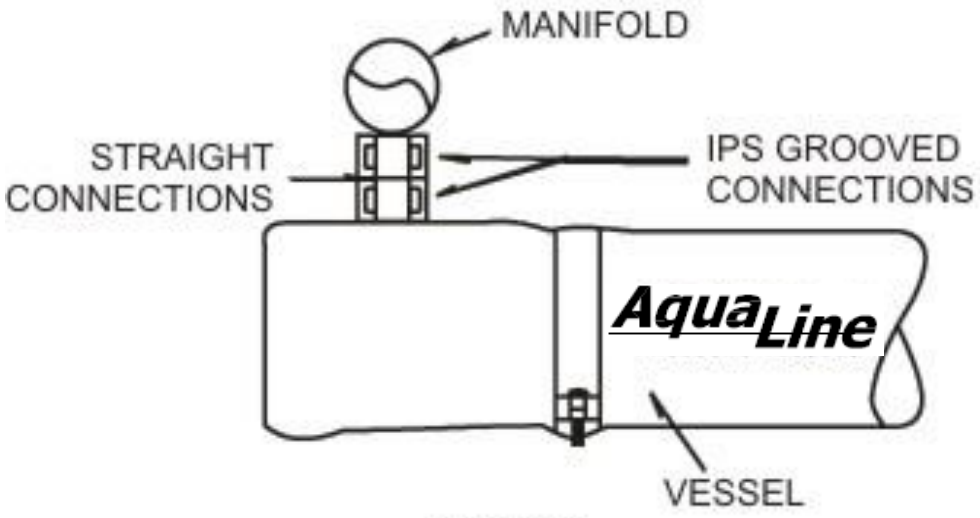


FIGURE 2

PIPING RECOMMENDATIONS

An alternate method using a single IPS grooved coupling is acceptable but requires more thoughtful execution. The manifold must be fabricated using close tolerances to help ensure correct alignment. Installation must follow a sequence of assembly steps to initially ensure correct shell to manifold alignment. First, the vessel should be set into the rack and secured loosely into position for the best alignment possible. At this time set the side port to manifold clearance at .125 inches (3.17 mm) per IPS recommendations for cut groove applications. After proper alignment is achieved, secure the shell and fix the manifolds into position. (See figure 3 & 4 for reference).

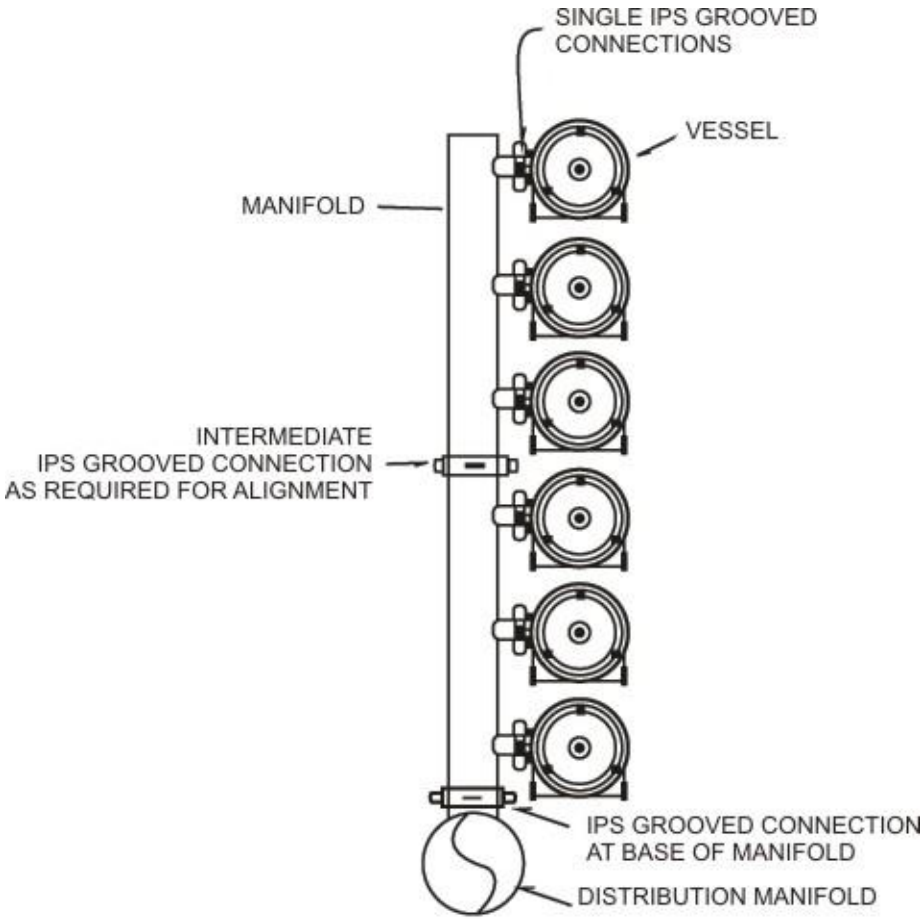


FIGURE 3

PIPING RECOMMENDATIONS

Even though a single IPS grooved coupling arrangement may be the choice for low cost and compactness, it brings with it the necessity to provide the required amount of flexibility in some other way.

A IPS grooved coupling allows angular but not lateral misalignment. Two rigidly restrained pipes not lying on a common axis can be forced to align if the fit is close enough to allow the two halves of the coupling to be pulled together by the bolts. This practice is not recommended. The resulting stresses are complex and have leveraged intensity. Any misalignment must therefore be kept to an absolute minimum.

Figure 3 illustrates how IPS grooved couplings might be incorporated in the manifolds to alleviate misalignment where a line of vessels is connected to a common manifold header and only one flexible IPS grooved joint is used between the vessel and the manifold.

In checking for correct alignment, the maximum axial misalignment from port to manifold should be .030 inches (.76 mm) in any direction (See figure 5). While exceeding .030 inches (.76 mm) misalignment should not significantly reduce vessel safety, it may decrease vessel service life. A recommended method of checking for acceptable alignment is to test for coupler rotation.

To use the rotation method, install the IPS grooved coupling between the vessel side port and the manifold. With the two coupling bolts tightened until snug, you should be able to rotate the coupling by hand. If rotation is possible, the alignment will be acceptable.

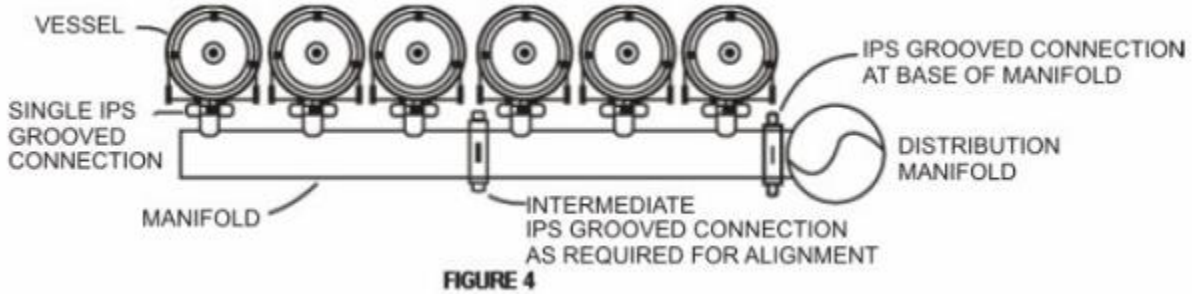


FIGURE 4

FIGURE 5

AQUALINE SYSTEM – PIPING INSTALLATION

Installation

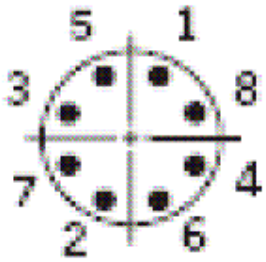
1. Place the vessel mounted with skid on foundation and ensure that it is secured properly to the ground

2. The AquaLine Filtration system has feed piping and product piping to which the Feed water piping from raw water source and product piping to the storage tank has to be assembled.

3. Sizes of Gasket , Socket and Spigot Flanged connections is given below
   a. Gasket: Full Faced, 1/8" thick elastomer with Shore "A" Durometer of approximately 70 is recommended
   b. Socket & spigot Flanged : ASTM D 2467 (PVC), ASTM F 439 (CPV),as applicable
   c. Bolt Hole Pattern –ANSI B16.5 ;ASTM D 4024
   d. Bolt Circle Diameter = ANSI B 16.5 Standard; ASTM D 4024, +/- 1/16"

4. Check for the Threads of the Bolt. They should be clean from dirt, dust, Lubricate as appropriate.

5. Connect the Flanged in a sequence as shown below.



   a. Do not over tighten the bolts on the Flanged. Over-tightening or unnecessary torque will damage the Flange.

   b. Refer to the Torque chart below

TORQUE CHART						
Sr. No.	Flange Size	OD of Flange	Bolt Size	Bolt Size	No of Bolts	Torque ft lbs
1.	4"	9"	7.5	Bolt Diameter 5/8"- 3 ½" Long	8	25
2.	6"	11"	9.5	Bolt Diameter ¾"- 4" Long	8	40
3.	8"	13.5"	11.75	Bolt Diameter ¾"- 4 1/2" Long	8	40

CAUTION

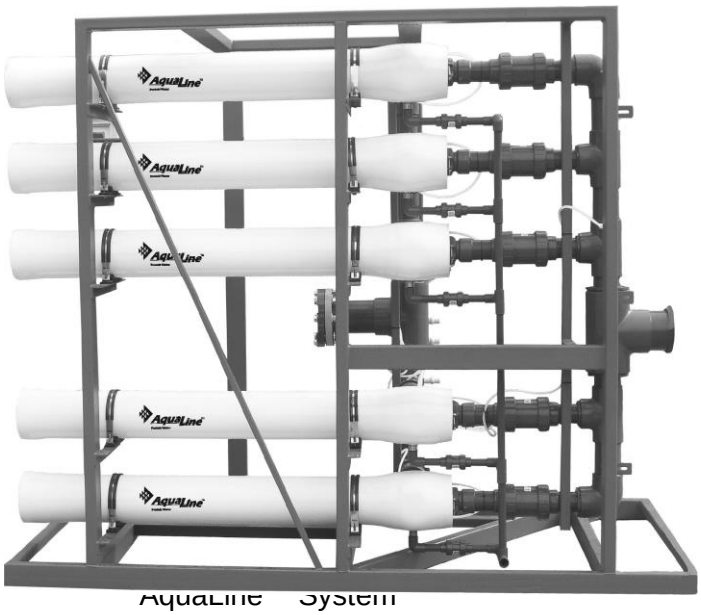
Flanges to Change subjected to availability. Please contact factory Pentair Water India, to understand the final Flange Dimensions.

AQUALINE SYSTEM - PIPING INSTALLATION

6.0 Check for pipe leaks from Flanged joints. If leaks persist, remove the Flange check gasket & Flange for any damage.

7.0 Please replace the gasket and Flanged if found damage

Note:
Actual Field conditions may require certain variations in the recommendations



AquaLine System

AquaLine Element

WARRANTY TERMS & CONDITION

FOR LATEST WARRANTY TERMS & CONDITIONS VISIT ON https://codeline.pentair.com/en/downloads

(**Document Name -** Warranty Terms & Conditions - Pentair Warranty FRP Housings)

PENTAIR WATER REGISTRATION CARD

Vessel Model:	**Serial Numbers** Numbers are located at one end of the vessel. (If you have purchased more than 64 vessels, please attach the serial nos. separately).
Date of Purchase	
OEM Purchased From: (Name/ Address/Tel no.) ________________________ ________________________ ________________________ ________________________	
Treatment System wherein used: (Please circle the relevant) • RO • UF • NF • Other	
System Capacity:_________GPD No. of Vessels: __________ Date of Installation:__________	
Name/Address/Tel & email of your Company: ________________________ ________________________ ________________________ ________________________	
Installation Site: (Address/Country) ________________________ ________________________ ________________________ ________________________	Mailing Address: CodeLine Division Pentair Water India Pvt. Ltd. L/52-55, Verna Industrial AreaVerna, Goa – 403 722. INDIA Tel: 91-832-6754400 Fax: 91-832-6754412 www.codeline.com

Thank you for purchasing a world class CodeLine vessel. To help us service you better and update you on “improvement and changes”, please fill up the above registration card and mail at the address given in the same.