

Hydrophobic Liquid Filters

Installation and use manual



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INTRODUCTION

Hydrophobic membranes require prewetting prior to use with most aqueous chemicals, including sulfuric acid, ammonium hydroxide and TMAH. This prewetting process consists of wetting the membranes with a low surface tension fluid, such as isopropyl alcohol (IPA), then flushing the device with DI water prior to exposing the membrane to the aqueous chemical.

Proper flushing of the filter is required to prevent alcohol/chemical interaction and avoid potential sources of contamination in critical filtration processes.

SAFETY

WARNING: CHEMICAL HAZARDS. DOUBLE-CONTAINMENT is required when used with toxic and hazardous chemicals. All filter housings, filters and other pressurized vessels must be double-contained to prevent serious personal injury.



SAFETY CLOTHING, eye protection and safety apparatus appropriate for the liquids in use must be worn during component changeout and startup. Perform all operations with standard liquid handling procedures in accordance with all local codes for safety and ventilation.

DANGER! EXPLOSION HAZARD. All-polymeric components are not intended for use with flammable solvents. Due to the potential of static discharge, stainless steel housings are recommended for flammable solvents.



CAUTION: Indicates a potential hazardous situation that, if not avoided, could result in minor to moderate injury as well as minor to moderate damage to the equipment.

PREWETTING THE FILTER

STEP 1: UNPACK THE FILTER

Components are double-wrapped for cleanroom use.

Handle components according to the installation facility's cleanroom procedures. If provided, remove the shipping caps from the filter and put them in a safe place. They can be used at a later date for removal of the filter.

STEP 2: SELECT THE PROPER WETTING FLUID

60% IPA/40% DI Water

- 60% IPA (or higher) is recommended for all hydrophobic filtration products

WARNING: Isopropyl alcohol is flammable. Use in well-ventilated areas, away from flames and sparks. Avoid skin contact and breathing vapors.

Other Low Surface Tension Fluids

It is possible to use alternative low surface tension fluids to prewet the filter.

These fluids are recommended when interaction with trace IPA or DI water is unacceptable.

NOTE: It is not necessary to prewet a PTFE or UPE filter membrane when using most solvents, including the following liquids:

- Acetone
- Butyl acetate
- Butyl alcohol
- Ethyl lactate
- IPA
- Methyl alcohol
- PGME (propylene glycol monomethyl ether)
- PGMEA (propylene glycol monomethyl ether acetate)

NOTE: It is not necessary to prewet a UPE filter membrane when using the following solvents:

- Anisole (methyl phenyl ether)
- Cyclohexanone
- EGMEA (ethylene glycol monomethyl ether acetate)
- MMP (methyl 3-methoxypropionate)
- NMP (N-methyl pyrrolidinone)

STEP 3: WET THE FILTER

WARNING: Wear chemical-resistant clothing, eye protection and gloves. Take proper precautions when handling hazardous chemicals.



Cartridge

1. Place the filter in a suitable container and slowly fill the container with wetting fluid, allowing fluid to flow from the outside of the filter into the filter core. Fill along the outside and allow the fluid to flow through the membrane (Figure 1a).

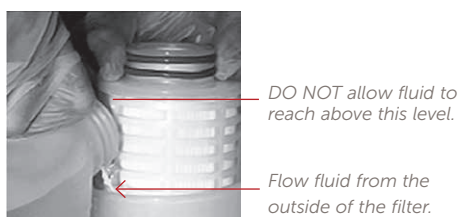
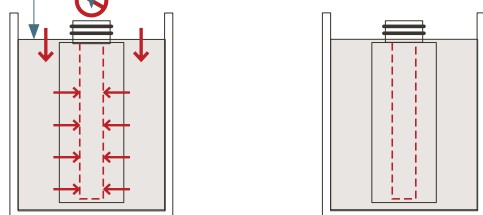


Figure 1a. Prewetting a cartridge in a container.

Continue filling until the level both inside and outside of the core reaches the top of the filter and wets the entire filter membrane (Figure 1b).

Maintain this liquid level as the filter fills with wetting fluid.

Do not add fluid directly to the core of the filter.



As the wetting fluid passes through the membrane to the core of the filter, continue to add more wetting fluid to the container in order to maintain a liquid level that is above the filter membrane.

Once the liquid level in the core is equal to the level outside the filter (and covers the entire filter membrane), let the filter sit for 30 minutes.

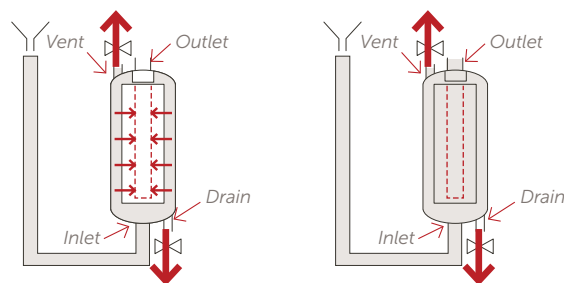
Figure 1b. Proper cartridge wetting.

2. Allow the filter to soak in the wetting fluid for 30 minutes.
3. Remove the filter from the wetting fluid. Drain the filter, then install the filter in a flushing stand.

CAUTION: DO NOT allow the filter to dry out.

Disposable

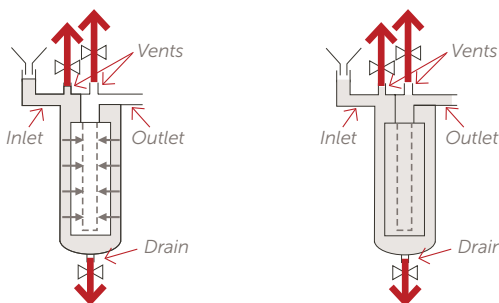
1. Connect tubing to the inlet fitting and position the disposable filter as shown in Figures 2a and 2b.



Fill the upstream side of the filter with wetting fluid through the inlet, and allow air to escape through the vent. Once all air is removed from the shell, close the vent valve to allow flow through the filter membrane.

Once the liquid fills the core and begins to flow from the filter outlet, let the filter sit for 30 minutes.

Figure 2a. Prewetting a Chem-Line™ II disposable filter.



Fill the upstream side of the filter with wetting fluid through the inlet, and allow air to escape through the vent. Once all air is removed from the shell, close the vent valve to allow flow through the filter membrane.

Once the liquid fills the core and begins to flow from the filter outlet, let the filter sit for 30 minutes.

Figure 2b. Prewetting a Chem-Line I disposable filter.

2. Open the vent valve.
3. Close the drain valve.
4. Pour wetting fluid into the tubing to fill the housing from the bottom up.
5. When the wetting fluid reaches the vent, tip the housing slightly to assure all air has been removed.
6. Close the vent.
7. Continue to add wetting fluid until the level inside the core of the filter reaches the top of the filter.

8. Allow the filter to soak in the wetting fluid for 30 minutes.
9. Drain the wetting fluid from the disposable filter, then install the filter in a flushing stand.

CAUTION: DO NOT allow the filter to dry out.

STEP 4: FLUSH THE FILTER WITH DI WATER

1. Open the housing vent or filter vent and slowly flow DI water through the filter. To get the best removal of IPA from “dead” areas in the housing, flush from both the vent and drain. Flow approximately 4 liters through each fitting, then close the vent and drain.
2. Flow DI water through the filter for the times recommended below. For other filters, contact an Entegris technical service representative.

DI WATER FLUSHING VOLUMES AND RATES

Filter type*	Minimum liters	Recommended liters	Flow rate (L/min)
25" Cartridge/ Disposable	20	200	2
Small Disposable (3000, 1500, 1000)			
10" AT/UPE	40	400	4
10" ATX/UPX	75	800	7
10" ATM/ATE/ AT3/UPM	100	1000	10

*For 20" cartridge, double 10" flush volume;
for 30", triple 10" flush volume.

3. Drain the DI water from the filter.

If a flushing stand was used, remove the filter from the flushing stand and allow excess water to drain.

CAUTION: DO NOT allow the filter to dry out.

NOTE: If a flushing stand or water flow is not available, soak the filter in a container of water for 30 minutes. Replace the water and repeat this step 3 times. It is very important to remove most of the IPA because the exothermic reaction (the generation of heat) between acid and alcohol is greater than acid and water. This whole removal method is not recommended for highly exothermic processes such as concentrated sulfuric acid, phosphoric acid and nitric acid.

INSTALLATION AND USE

STEP 1: INSTALL THE FILTER

NOTE: Minimize handling and use Nitrile gloves to ensure product cleanliness during installation of the filters.

Chemlock® Cartridge Filters
(installation into a Chemlock Housing):

1. Insert the filter into the bowl (Figure 3a).



Figure 3a. Insert filter into bowl.

CAUTION: DO NOT allow the filter to dry out.

2. Lock the cartridge in place by turning the cartridge clockwise. Attach and tighten the bowl to the housing head (Figure 3b).



Figure 3b. Twist filter ¼ turn to lock.

NOTE: Refer to the Chemlock housing manual for additional installation details.

Standard Cartridge Filters
(Installation into a standard housing):

1. Insert the filter into the housing head.

CAUTION: DO NOT allow the filter to dry out.

- Ensure that the cartridge is properly aligned when inserting the cartridge into the housing head. A misaligned cartridge can result in damage to the o-ring (Figure 4).

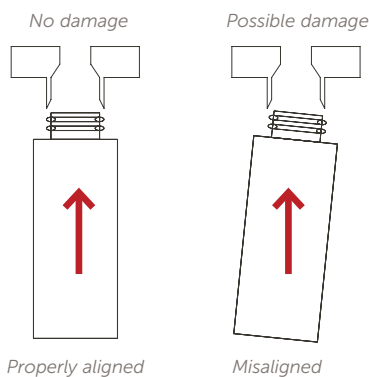


Figure 4: Prevent o-ring damage with proper installation.

- Push straight into the housing to avoid damage to the o-ring and seal (Figure 5).



Figure 5a: In bowl-down configuration, push straight up to engage o-rings.

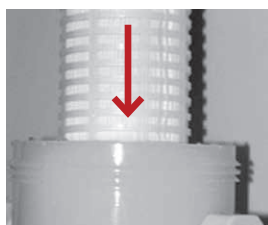


Figure 5b: In bowl-up configuration, push straight down to engage o-rings.

- Attach and tighten the bowl to the housing head.

NOTE: Refer to the manufacturer's housing manual for additional installation details and safety considerations.

Determine the filter orientation. The arrow on the housing indicates the direction of flow and the position of the inlet and outlet.

STEP 2: CONNECT THE FITTINGS

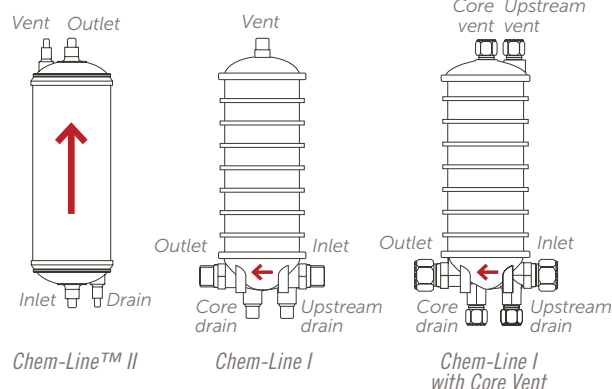
NOTE: The vents should always be oriented on the top.

- The upstream vent is essential for removing gas from the housing during the initial startup and during operation and chemical changeouts
- The downstream core vent improves filter flow performance during normal operations
- The vents facilitate the draining of the housing

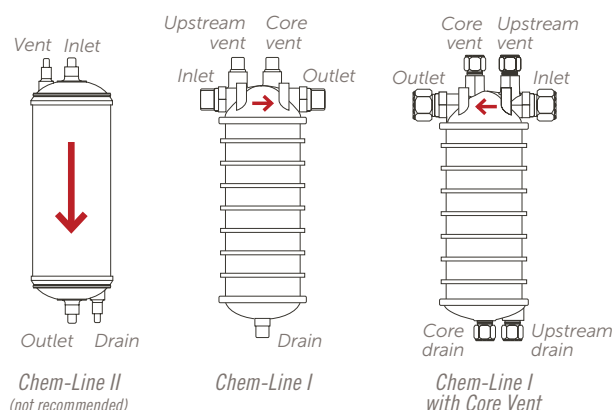
Drain: The drain facilitates the drainage of chemicals when changing chemicals in the bath or replacing the filter.

Vertical-Bottom Feed: Provides the most efficient venting.

Vertical–Bottom Feed: Highly recommended.



Vertical–Top Feed: Acceptable for Chem-Line I. Not recommended for Chem-Line II.



- Connect the inlet, outlet, vent and drain fittings. Use appropriate fittings.
- Vent and Drain Connections:** Rotate the vent to the topmost position and the drain to the lowest position.

If the filter is being used on a recirculated bath, where gas is generated by the chemical (for example, NH_4F or $\text{H}_2\text{SO}_4/\text{H}_2\text{O}_2$), always keep the vent partially open and returned to the overflow weir of the bath. This will constantly purge the housing of gas and prevent the filter from being blocked by gas. The correct opening can be achieved with a partially open valve or with a length of $\frac{1}{16}$ " ID tubing, which limits flow. For high-flowing Torrento® and QuickChange® ATE filters, a larger diameter tube may be necessary. Please refer to Application Note entitled, "Practical Use Guide for Using Torrento and QuickChange ATE Filters in Outgassing Applications" and consult Entegris' application engineers for further information. The valve can be mounted either directly on the housing or remotely.

CAUTION: If the valve is mounted directly on the housing, wear protective clothing when adjusting the valve during system operation. Avoid excessively long or curling tubing, which might interfere with the proper operation of the vent.

3. Connect the drain line or cap.

NOTE: The filter housing cannot be fully drained through the inlet or outlet fittings. The drain must be used to most efficiently remove liquid from the filter unit.

A valve is recommended for the drain. Pitch the tubing running from the drain to waste to prevent the entrapment of chemicals. A cap can be used in place of a valve if a safe method of removing the cap to drain the housing is employed.

4. Verify that all connections are leak-tight.
5. Optional: Attach a replacement tag to the feed line adjacent to the filter.

STEP 3: START THE CHEMICAL FEED

WARNING: Wear chemical-resistant clothing, eye protection and gloves. Take proper precautions when handling hazardous chemicals.



A highly exothermic reaction may result when concentrated acids come in contact with water in the filter.

1. Open the vent valve.
2. Before starting the chemical, please make note of the following safety procedures:

WARNING: Strong acids react exothermically with water. Thoroughly drain all water from the filter before exposing the filter to a strong acid. If the water is thoroughly drained, a transition can be made directly from water to acid. There will be some heating of the fluid, but it should not be excessive.

If water is not drained, increase the acid concentration in incremental steps, until the desired level of concentration is reached. Allow the temperature to stabilize after each incremental step, then drain the filter and housing. There will be much more heat generated, since the amount of heat is related to the amount of water present. Be careful not to exceed the temperature/pressure rating of the filter and its housing.

3. Start the flow of chemical. If possible, it is best to start the flow of chemical slowly and gradually increase the flow rate.
4. Flow the process chemical through the filter until the chemical exits through the vent valve. Once all air bubbles have been vented from the housing, close the valve unless the vent is plumbed to the overflow weir in a recirculation bath.

For best results to avoid contamination of the system during installation, fill process chemical into filter, then drain chemical to waste. Then proceed to introduce chemical into full system.

Alternative for outgassing fluids used in recirculation processes: Attach tubing from the upstream vent to the recirculation bath's overflow. Leave the vent valve open to direct gas out of the filter housing to prevent filter dewetting.

CAUTION: When using a remote drain, purge the drain valve during the start of the chemical flow. If necessary, the initial flow of filtered chemical can be directed to the drain to remove residual water from the unit (10–20 liters of chemical is sufficient for most applications).

DISPOSAL

FLUSH HAZARDOUS CHEMICALS FROM THE FILTER BEFORE DISPOSAL

The following recommendations are for aqueous-based chemicals. If possible, the unit should be flushed with water while on the process equipment.

 **WARNING:** The contact of water with some chemicals can result in an exothermic reaction.

 **WARNING:** Because chemicals can diffuse into the Teflon® fluoropolymer resin, the filter unit may still contain hazardous chemicals even after flushing.

 **WARNING:** Do not exceed the pressure and temperature rating of the filter device during flushing.

 **WARNING:** Wear chemical-resistant clothing, eye protection and gloves. Take proper precautions when handling hazardous chemicals.



1. Relieve chemical pressure. Close valves to assure no chemical flow.
2. Open drain and vent valves. Completely drain chemical from the housing.
3. If possible, flush the filter with water while installed on process equipment. If it is not possible to flush the filter while on the equipment, remove the filter from the piping and flush it in a flushing stand.
4. Open the vent and drain lines. Direct them to a chemical drain. Direct the outlet of the filter to drain.
5. Connect the inlet to a water supply capable of about one GPM. Start the flow of water.
6. After five minutes, close the drain and vent valves. Flush for an additional 15 minutes. If appropriate, check the pH of the filtrate to assure that the chemical has been removed.
7. Turn off the flow of water. Drain the filter device.
8. Remove the filter from the system. If desired, the filter may be dried under an exhaust hood.
9. Cap the inlet, outlet, vent and drain fittings.
10. Dispose of the filter in accordance with local regulations.

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