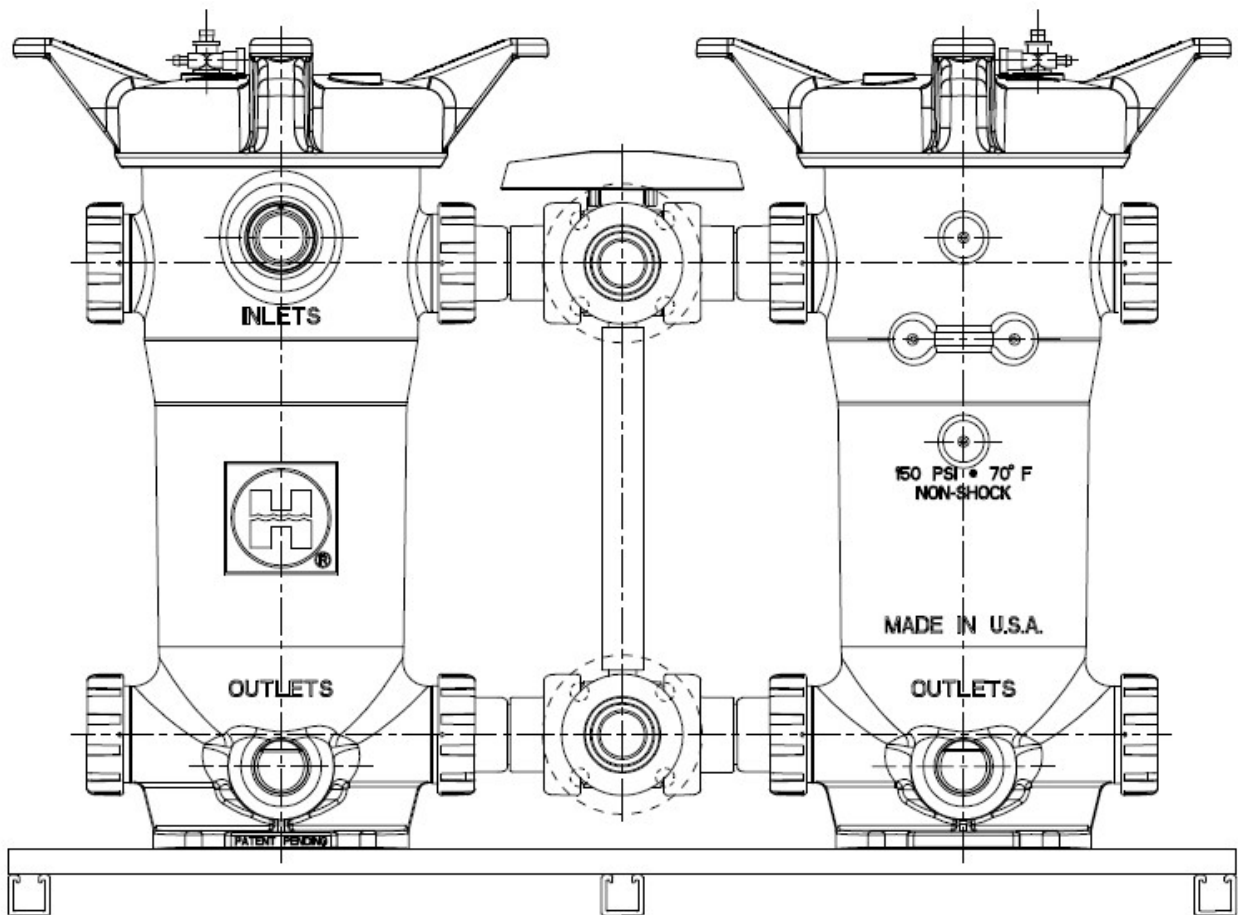


**HAYWARD FLOW CONTROL
FLV SERIES GFPP DUPLEX FILTER
INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS**



PLEASE READ THE FOLLOWING INFORMATION PRIOR TO INSTALLING AND USING HAYWARD FLV SERIES GFPP DUPLEX FILTER. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PRODUCT DAMAGE, PROPERTY DAMAGE, PERSONAL INJURY, OR EVEN DEATH.

1. Hayward Flow Control (Hayward), a division of Hayward Industries, guarantees its products against defective material and workmanship only. Hayward assumes no responsibility for property damage or personal injury resulting from improper installation, misapplication, or abuse of any product.
2. Hayward assumes no responsibility for property damage or personal injury resulting from chemical incompatibility between its products and the process fluids to which they are exposed. Determining whether a particular PVC, CPVC, or PP product is suitable for an application is the responsibility of the user. Chemical compatibility charts provided in Hayward literature are based on ambient temperatures of 70°F and are for reference only.
3. Hayward products are designed for use with non-compressible liquids.

WARNING

Hayward PVC and CPVC products should NEVER be used or tested with compressible fluids such as compressed air or nitrogen. Use of PVC and CPVC products in compressible fluid applications may result in product damage, property damage, personal injury, or even death.

WARNING

The FLV Series GFPP Duplex Filter is intended for use in liquid service only. Do not attempt to use this vessel for filtering air or gases. Use of this product in air or gas service may result in product damage, property damage, personal injury, or even death.

4. The maximum recommended fluid velocity through any Hayward product is eight feet per second (8 ft/s). Higher fluid velocity can result in damage due to the water hammer effect.
5. Piping systems must be designed and supported to prevent excess mechanical loading on Hayward products due to system misalignment, weight, shock, vibration, and the effects of thermal expansion and contraction.
6. The effect of temperature on plastic piping systems must be considered when the systems are initially designed. The pressure rating of plastic systems must be reduced with increasing temperature. Maximum operating pressure is dependent upon material selection as well as operating temperature. Before installing any Hayward product, consult Hayward product literature for pressure vs. temperature curves to determine any operating pressure or temperature limitations.
7. PVC and CPVC plastic products become brittle below 40°F. Use caution in their installation and operation below this temperature.

WARNING

Hayward PVC and CPVC products should not be used in services with operating temperature below 34°F.

8. Due to differential thermal expansion rates between metal and plastic, transmittal of pipe vibration and pipe loading forces, **DIRECT INSTALLATION OF PLASTIC FILTER VESSELS INTO METAL PIPING SYSTEMS IS NOT RECOMMENDED.** Wherever installation of plastic filter vessels into metal piping systems is necessary, it is recommended that at least 10 pipe diameters in length of plastic pipe be installed upstream and downstream of the plastic valve to compensate for the factors mentioned above.
9. Published operating requirements are based on testing of new vessels using clean water at 70°F. Vessel performance is affected by many factors including fluid chemistry, viscosity, specific gravity, flow rate, and temperature. These should be considered when sizing Hayward products.
10. Systems should always be depressurized and drained prior to installing or maintaining any Hayward product.

WARNING

Failure to depressurize and drain system prior to installing or maintaining filter vessel may result in product damage, property damage, personal injury, or even death.

CAUTION

Extreme caution should be used when utilizing the Hayward FLV Series GFPP Duplex Filter. Operators must follow all instructions in this Installation, Operation and Maintenance Instruction, as well as the Installation, Operation and Maintenance Instruction that was provided with this unit for the individual filter vessels on this assembly (Hayward document FLVIOM). In addition, operators must follow their own company safety policies and adhere to any local, municipal, county, regional, state, or national government safety policies or codes while using and operating this equipment.

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1.0 INSTALLATION:

1.1 Transporting the Vessel:

The Hayward FLV Series GFPP Duplex Filter should be stored inside factory packaging until product is ready to be installed. The Duplex Filter should be moved as close to the installation site as possible prior to removing from packaging. The Duplex Filter is shipped as an assembly and is mounted to a fiberglass grate, or skid, and should be moved using a pallet jack, or forklift (See Figure 1).

After removing the Duplex Filter from packaging, a forklift, or pallet jack, should be used to transport the Duplex Filter to installation site. Care must be taken not to damage vessels, threads, or basket (inside vessels) with pipe, chain, strap, or other lifting equipment. In order to protect threads, Hayward recommends leaving cover and assembly nuts on vessel bodies while moving assembly.

CAUTION

Hayward FLV Series GFPP Duplex Filter requires at least two people to lift or move. Attempting to lift or move the Duplex Filter alone could result in property damage or personal injury.

1.2 Mounting the Duplex Filter to Floor or Skid:

Hayward FLV Series GFPP Duplex Filter is shipped preassembled to a fiberglass grate, or skid, with fiberglass struts supporting the grate from underneath. Make sure that the Duplex Filter assembly will be located in an area where the floor is level. The Duplex Filter assembly can be mounted to the floor by fastening the grate, or struts, to the floor via floor-mounted studs. If floor-mounted studs are used, make sure that they are of sufficient length to clear the top of the grate and/or strut, as well as allow for the height of the washer(s) and nut that will be fastened to the studs.

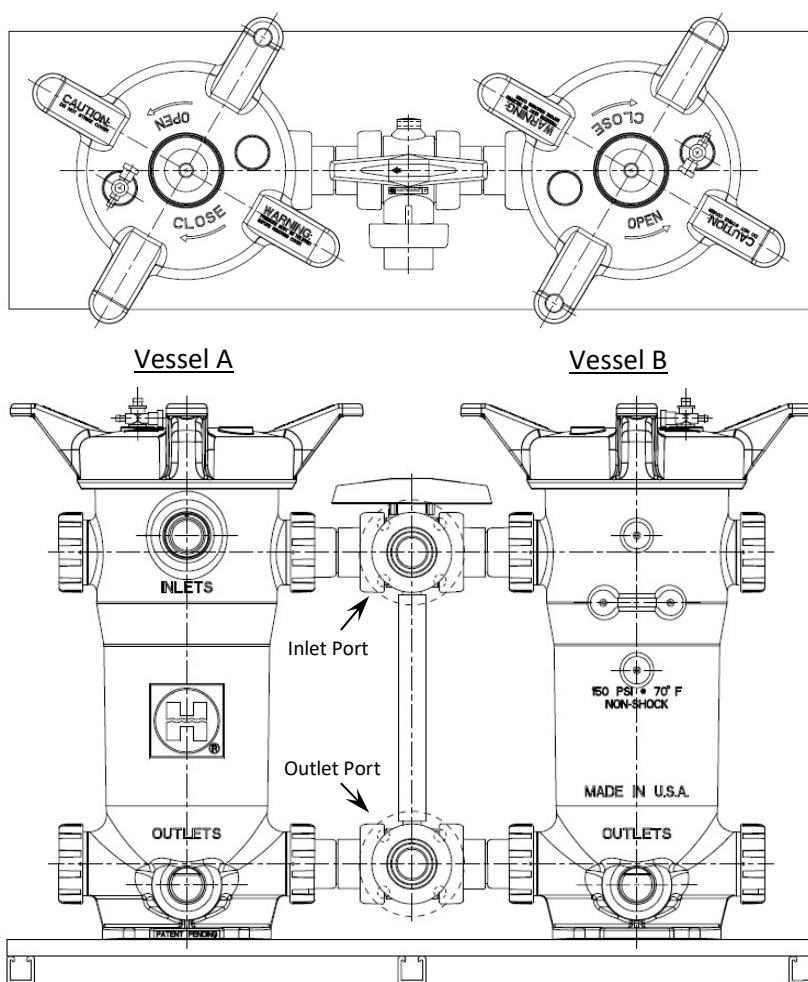


Figure 1: FLV Series Duplex Filter Assembly
(Top and Front Views)

1.3 Installing the Duplex Filter into a System:

CAUTION

Hayward FLV Series GFPP Duplex Filter must be installed in an upright position.

Do not install unsupported piping or risers onto end connectors or flanges.

Do not use Duplex Filter as a pipe support or system anchor. Sound piping system design principles should be applied when installing this vessel.

Do not install metal pipe directly into end connectors or vessel body (see pg. 1).

Use of expansion joints or expansion loops in piping system connected to vessel may be necessary to keep differential thermal expansion/contraction stresses to a minimum.

In addition to the lateral three-way diverter valves provided as part of the Hayward FLV Series GFPP Duplex Filter, Hayward strongly recommends the installation of main shutoff valves, such as the Hayward TBH Series True Union Ball Valve, or the Hayward BYV Series Butterfly Valve, to the inlet and outlet of the Duplex Filter to allow for routine maintenance and isolation of the unit.

Hayward FLV Series GFPP Duplex Filters are provided as assemblies consisting of two FLV Series GFPP Filter Vessels mounted to a common grate, and joined together by a common CPVC lateral three-way diverter valve manifold. The CPVC lateral three-way diverter valves are true union valves, and the open, front-facing, end connectors for these valves provide the two connection ports for the Duplex Filter assembly. The top valve provides a common inlet port to both vessels, while the bottom valve provides a common outlet port to both vessels. The top valve and bottom valve are connected via a tandem shaft, such that operation of the top valve also controls the bottom valve, and simultaneously opens, or closes, the inlet and outlet of each vessel. The handle of the top diverter valve controls both the top valve and the bottom valve simultaneously, and directs the flow through either Vessel A, or Vessel B, as identified in Figure 1. **The Hayward FLV Series GFPP Duplex Filter is intended to be operated with one unit "on" and one unit "off" at all times. Other than during operation of the diverter valve to switch flow from one vessel to the other, under no circumstances should the diverter valve be positioned to allow flow to both vessels at the same time.**

NOTE: The lateral three-way diverter valve manifold is only available in CPVC. This limits the operating temperature of the Hayward FLV Series GFPP Duplex Filter to 190°F, which is the operating temperature limit of CPVC.

1.3.1 Units Provided with True Union End Connections:

1.3.1.1 Units with true union end connections are equipped with one inlet port, i.e. the top port, and one outlet port, i.e. the bottom port. (See Figure 1)

1.3.1.2 Remove the nut and end connector from the top or bottom lateral three-way diverter valve by rotating the nut counter clockwise.

1.3.1.3 Place nut over pipe end so that it can engage the end connector once the end connector is connected to the pipe end.

1.3.1.4 Threaded End Connectors:

1.3.1.4.1 Wrap male threads of pipe end with PTFE tape. Proper application of PTFE tape will provide a sufficient seal for PVC, CPVC and PP threaded joints.

WARNING

Do not use "pipe dope", liquid sealant, or thread sealant on any PVC, CPVC, or Polypropylene, threaded connections. Pipe dope and thread sealants may react with the PVC, CPVC, or Polypropylene, weakening the material and potentially resulting in failure of the joint, product damage, property damage, personal injury, or even death.

1.3.1.4.2 Thread the pipe end into the end connector from the lateral valve until "hand tight". Using a strap wrench only (never use a pipe wrench), tighten the pipe into the lateral valve end connector only to the point required to form a seal between the end connector and pipe thread; 1/2 turn past hand tight is typically sufficient to form a seal. **(Caution: Tightening beyond this point may introduce excessive stress that could cause failure of the end connector or the threaded end of the pipe.)**

1.3.1.5 Solvent-Weld End Connectors (CPVC only):

1.3.1.5.1 Refer to solvent-weld manufacturer's instructions and cure times.

1.3.1.5.2 Only solvent cement end connector to pipe end with nut and end connector removed from lateral three-way diverter valve.

1.3.1.5.3 Reinstall end connector by threading nut onto lateral valve body by rotating in a clockwise direction. Do not install solvent cemented end connectors until solvent cement has fully cured.

1.3.1.6 Flange Connections:

1.3.1.6.1 Flange connections are provided with a nut, and a CPVC end connector solvent cemented to a mating flange. The true union nut/flange subassembly does not need to be removed from the lateral diverter valve body for installation. Flanged Hayward FLV Series GFPP Duplex Filters are provided standard with CPVC flanges with ASME/ANSI Class 150 bolt holes and bolt circles. Metric flanges are available, but must be requested at time of order.

1.3.1.6.2 Connect flange to mating system flange. Flange bolts should be tight enough to slightly compress the gasket and make a good seal, without distorting or putting excessive stress on the flanges. Suitable washers should be used between the bolt head and flange and the nut and flange. Bolts should be tightened in alternating sequence. See Table 1 for recommended torque.

TABLE 1:

RECOMMENDED FLANGE BOLT TORQUE

FLANGE SIZE	BOLT DIA. (IN)	TORQUE (FT. LBS.)
1-1/4	1/2	10-15
1-1/2	1/2	10-15
2	5/8	15-25
2-1/2	5/8	20-25
3	5/8	20-25
4	5/8	20-25

NOTE: USE WELL LUBRICATED METAL BOLTS AND NUTS. USE SOFT RUBBER GASKETS.

2.0 OPERATION:

Hayward FLV Series GFPP Duplex Filters are provided as assemblies consisting of two FLV Series GFPP Filter Vessels mounted to a common grate, and joined together by a common CPVC lateral three-way diverter valve manifold. The CPVC lateral three-way diverter valves are true union valves, and the open, front-facing, end connectors for these valves provide the two connection ports for the Duplex Filter Vessel assembly. The top valve provides a common inlet port to both vessels, while the bottom valve provides a common outlet port to both vessels. The top valve and bottom valve are connected via a tandem shaft, such that operation of the top valve also controls the bottom valve, and simultaneously opens, or closes, the inlet and outlet of each vessel. The handle of the top diverter valve controls both the top valve and the bottom valve simultaneously, and directs the flow through either Vessel A, or Vessel B, as identified in Figure 1.

WARNING

The Hayward FLV Series GFPP Duplex Filter is intended to be operated with one unit "on" and one unit "off" at all times. Other than during operation of the diverter valve to switch flow from one vessel to the other, under no circumstances should the diverter valve be positioned to allow flow to both vessels at the same time. Operating the Duplex Filter with the diverter valve in a partially open position, thereby allowing flow through both units simultaneously, can result in damage to the vessels, or the Duplex Filter, resulting in property damage, personal injury, or even death.

The Hayward FLV Series GFPP Duplex Filter is intended to be used with one vessel "on" and one vessel "off" at all times. This allows access to, and maintenance of, the "offline" vessel (for example, to change filter bags) while the "online" vessel is still operating. The Duplex Filter, therefore, can be used to allow continuous operation of a system, without having to shut the system down for routine filter bag changes.

CAUTION

Extreme caution should be used when utilizing the Hayward FLV Series GFPP Duplex Filter. Operators must follow all instructions in this Installation, Operation and Maintenance Instruction, as well as the Installation, Operation and Maintenance Instruction that was provided with this unit for the individual filter vessels on this assembly (Hayward document *FLV/IO*). In addition, operators must follow their own company safety policies and adhere to any local, municipal, county, regional, state, or national government safety policies, or codes, while using and operating this equipment.

The tandem lateral three-way diverter valve is provided with an orange "T"-handle mounted to the top valve. This "T"-handle is used to operate both the top and bottom diverter valve at the same time. The orange "T"-handle has a position indication arrow molded into the top surface. The position indication arrow points to the vessel that is "on", or is open to flow and is currently filtering. Conversely, the vessel from which the arrow is pointing away is the vessel that is "off", or is closed to flow, and can be depressurized and maintained (i.e. perform a filter bag or cartridge change). The active filter vessel is selected by turning the orange "T"-handle until the arrow on the "T"-handle points directly at the selected vessel and is in line with the inlet port of the selected vessel. Conversely, an active vessel can be turned "off" by turning the handle so that the arrow is aligned with the inlet port of the opposite vessel and points directly away from the vessel that is desired to be turned "off". (See Figure 2)

WARNING

Under no circumstances should the orange "T"-handle be left in an orientation whereby the arrow is not pointing at either Vessel A, or Vessel B, as defined in Figure 2.

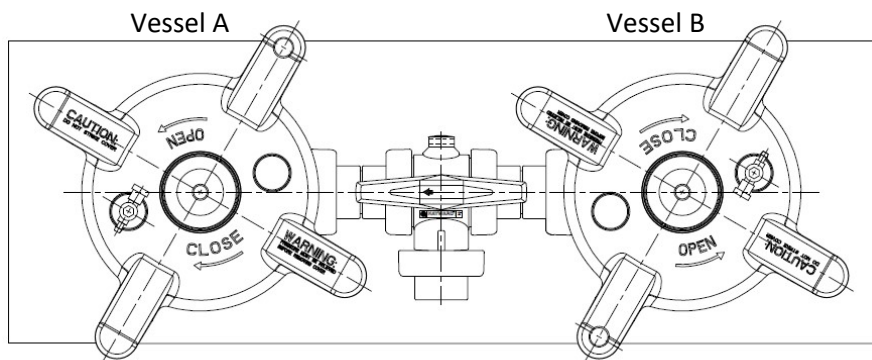


Figure 2A: Top View of Duplex Filter

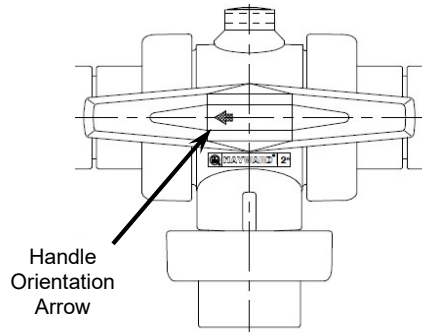


Figure 2B: Detail View of Diverter Valve

2.1 Operating the Tandem Lateral Three-Way Diverter Valves:

- 2.1.1 Depending upon the initial position of the "T"-handle, turn the "T"-handle either clockwise, or counterclockwise, until the arrow on the top surface of the "T"-handle points directly at the vessel to which flow is to be introduced (i.e. the vessel to be turned "on"). (See Figure 2)
- 2.1.2 To switch flow from Vessel A to Vessel B, **SLOWLY** turn the "T"-handle counterclockwise until the arrow on the handle points directly at Vessel B. Fluid will now begin flowing through Vessel B. (Vessel A is now inactive and can be accessed for maintenance or filter bag change. See Hayward document *FLVIOM* for instructions for maintaining the vessel, or performing a filter bag change.)
- 2.1.3 To switch flow from Vessel B to Vessel A, **SLOWLY** turn the "T"-handle clockwise until the arrow on the handle points directly at Vessel A. Fluid will now begin flowing through Vessel A. (Vessel B is now inactive and can be accessed for maintenance or filter bag change. See Hayward document *FLVIOM* for instructions for maintaining the vessel, or performing a filter bag change.)
- 2.1.4 The "T"-handle should **NEVER** be left in an orientation where the arrow is not pointing directly at either Vessel A, or Vessel B.

WARNING

Operating the tandem lateral three-way diverter valves too rapidly can create excess water hammer effect on the Hayward FLV Series GFPP Duplex Filter, or on one, or both, of the filter vessels that are part of this unit. Water hammer effect resulting in product failure can result in property damage, personal injury, or even death. To avoid creating excess water hammer effect in the Hayward FLV Series GFPP Duplex Filter, **ALWAYS** operate the tandem lateral three-way diverter valve "T"-handle **SLOWLY** when operating the valve, and thereby changing flow, from Vessel A, to Vessel B, or from Vessel B, to Vessel A, as defined in Figure 1 and Figure 2 of this document.

2.2 Installing a Bag and Basket:

For instructions on installing a bag and basket into the individual vessels on the Hayward FLV Series GFPP Duplex Filter, please refer to the Installation, Operation and Maintenance Instructions for the vessel, Hayward document *FLVIOM*, provided with this unit.

2.3 Filling and Pressurizing the Duplex Filter:

- 2.3.1 To fill and pressurize Hayward FLV Series GFPP Duplex Filter:

NOTE: For complete instructions regarding the preparation, filling and pressurization of the individual filter vessels on this unit, please refer to Hayward document *FLVIOM*, also provided with this unit. Some steps are repeated here for convenience.

- 2.3.1.2 Verify that cover o-rings, cover o-ring grooves, and cover sealing surfaces of both filter vessels on this unit are clean.
- 2.3.1.3 Verify that cover o-rings on both filter vessels are seated inside o-ring grooves.
- 2.3.1.4 Open vent valve on top cover of each vessel; valve is opened by rotating thumbwheel counter-clockwise.
- NOTE:** Process media will be allowed to escape through outlet of vent valve as vessel is filled. If needed, install 1/4" drain tubing on outlet of vent valve to prevent property damage or personal injury due to contact with process media. Dispose of vented chemicals properly.
- 2.3.1.5 Install cover firmly onto each vessel body.
- 2.3.1.6 Do not strike vessel covers.
- 2.3.1.7 Do not attempt to over-tighten vessel covers.
- 2.3.1.8 The filter vessel covers are sealed by means of a pressure energized face sealing o-ring. Tighten covers hand-tight plus approximately 1/8-turn (i.e. 45°). It is not necessary to tighten cover beyond hand tight plus 1/8-turn.
- 2.3.1.9 Position "T"-handle of tandem lateral three-way diverter valve so that arrow is pointed at the first vessel to be filled first. See section 2.1 above for complete instructions on operation of the diverter valves.
- 2.3.1.10 Slowly open main shutoff valve upstream of the inlet of the Duplex Filter and start system pump (if necessary).
- 2.3.1.11 Allow process media to fill the first vessel; air will be purged through vent valve on top of cover. After all air has been purged, process media will start flowing through vent valve. Close vent valve by rotating thumbwheel clockwise.
- 2.3.1.12 Allow pressure to slowly increase until system operating pressure is reached in the first vessel.

WARNING

Open and close valves upstream and downstream of the Hayward FLV Series GFPP Duplex Filter slowly. Rapid increases in pressure or flow can create excess water hammer effect, resulting in property damage, personal injury, or even death.

- 2.3.1.13 Carefully inspect the first vessel at cover, end connectors, end caps, and vent valve to verify no leaks are present. If any leaks are present, shut down system, relieve system pressure, and drain vessel prior to tightening any connections.
- 2.3.1.14 If no leaks are present on the first vessel, turn the "T"-handle of the diverter valve so that the arrow on the handle points directly at the second vessel, and initiate flow into the second vessel.
- 2.3.1.15 Repeat steps 2.2.1.11 and 2.2.1.12, but applied to the second vessel.
- 2.3.1.16 If no leaks are present on the second vessel, the Duplex Filter is ready for operation.

WARNING

If either vessel is leaking, never try to stop the leak while vessel is under pressure. Doing so can result in property damage, personal injury, or even death.

WARNING

Failure to fill either vessel with vent valve installed and open can result in buildup of pressure and compression of air in the system, resulting in property damage, personal injury, or even death.

2.4 Operating the Duplex Filter:

2.4.1 Valves upstream and downstream of the Duplex Filter should be opened and closed slowly to prevent water hammer on the Duplex Filter.

WARNING

Open and close valves upstream and downstream of the Hayward FLV Series GFPP Duplex Filter, and the tandem lateral three-way diverter valve on the Duplex Filter, slowly. Rapid increases in pressure or flow can create excess water hammer effect, resulting in property damage, personal injury, or even death.

2.4.2 When switching flow through the Duplex Filter from one vessel to the other, operate the "T"-handle of the tandem lateral three-way diverter valves slowly to avoid the generation of pressure spikes or water hammer effect on the vessels and the valve manifold. (See Section 2.1)

2.4.3 Flow can be switched, or diverted, from one vessel to the other on the Hayward FLV Series GFPP Duplex Filter while flow is active and while the unit is under pressure. **Extreme caution must be used when performing this operation!! Read and understand all instructions and warnings prior to operating the tandem lateral three-way diverter valve to switch flow from one vessel to the other.**

2.4.4 Routine maintenance, such as changing an o-ring, or a filter bag, can be performed on the vessel that is "offline" (i.e. flow has been diverted to the other vessel), while flow through the vessel that is "online" is active and the "online" vessel is under pressure. **Extreme caution must be used prior to attempting to perform any maintenance on the "offline" vessel while the "online" vessel is still under pressure and active flow!!**

2.4.4.2 **Before attempting any maintenance on the "offline" vessel, check to make sure that the "offline" vessel has been isolated from flow and pressure by:**

2.4.4.2.1 **Checking the position of the arrow on the "T"-handle of the diverter valve to make sure it is pointing away from the "offline" vessel, i.e. the vessel upon which maintenance is being performed.**

2.4.4.2.2 **Opening the vent valve on the "offline" vessel.**

2.4.4.2.3 **Checking any pressure gauges which may have been installed on the cover of the "offline" vessel to determine whether there is any pressure in the vessel.**

2.4.4.3 **If the arrow on the "T"-handle is not pointing away from the "offline" vessel, STOP, and adjust the handle so that the arrow is pointing directly at the active, or "online" vessel.**

2.4.4.4 **If the vent valve is opened on the "offline" vessel and fluid initially flows from the vent valve and then stops, this is an indication that the vessel has been depressurized and is isolated from flow.**

2.4.4.5 **If the vent valve is opened on the "offline" vessel and fluid initially flows from the vent valve and then continues to flow from the vent valve, STOP, as this is an indication that the "offline" vessel is still under pressure and active flow.**

2.4.4.6 **Refer to Section 2.1 for instructions on the proper operation of the diverter valve.**

2.4.5 Refer to Hayward document *FLVIOM* for specific operating and maintenance instructions for the individual vessels installed on this Duplex Filter. Hayward document *FLVIOM* is included in the packaging materials of the Hayward FLV Series GFPP Duplex Filter.

2.4.6 Hayward recommends the installation and use, or monitoring, of gauges upstream and downstream the Duplex Filter in order to monitor the increase in differential pressure that will occur as the bag becomes fouled.

2.4.7 Replace filter bags at 10 psi differential pressure. Filter bags lose efficiency above this level. (See Hayward document *FLVIOM*)

2.4.8 Applications requiring greater than 10 psi differential pressure must use solid basket. (See Hayward document *FLVIOM*)

WARNING

Failure to fully understand and follow the instructions in Section 2.3 of this document and the installation, operation and maintenance instructions in Hayward document *FLVIOM* may result in product damage, property damage, personal injury, or even death.

2.5 Depressurizing and Draining the Duplex Filter:

The Hayward FLV Series GFPP Duplex Filter should always be depressurized and drained prior to installation, and prior to performing any maintenance on the full assembled unit.

WARNING

Failure to depressurize and drain system prior to installing or maintaining Duplex Filter may result in product damage, property damage, personal injury, or even death.

2.5.1 To depressurize and drain the Hayward FLV Series GFPP Duplex Filter:

2.5.1.1 Slowly close main shutoff valves installed to the inlet and outlet of the Duplex Filter.

WARNING

Open and close valves installed to the inlet and outlet of the Hayward FLV Series GFPP Duplex Filter slowly. Rapid increases in pressure or flow can create excess water hammer effect, resulting in property damage, personal injury, or even death.

2.5.1.2 Slowly open the vent valve installed on the cover of both of the filter vessels on the Duplex Filter unit. The vent valve is opened by rotating the thumbwheel counter-clockwise.

NOTE: Process media will be allowed to escape through outlet of vent valve as vessel depressurizes. If needed, install ¼" drain tubing on outlet of vent valve to prevent property damage or personal injury due to contact with process media. Dispose of vented chemicals properly.

2.5.1.3 After all pressure has been relieved from both vessels, remove plug from drain port in the bottom of each filter vessel and allow each vessel to drain completely. Capture and dispose of drained chemicals properly. (See Hayward document *FLVIOM*)

2.5.1.4 For faster draining, the nut of the lower end cap port on each filter vessel can be loosened to allow drainage from this port. Alternatively, a Hayward TBH Series ball valve can be installed to drain the vessel via this lower port. **Caution:** Do not lose o-ring that seals port cap to vessel body.

2.5.1.5 Any liquid contained in the tandem lateral three-way diverter valve manifold should drain into one of the filter vessels as the filter vessels drain. Check to make sure that all fluids, chemicals, etc., are fully drained from the manifold prior to performing any maintenance on the Duplex Filter.

3.0 MAINTENANCE:

- 3.1 Conduct periodic routine maintenance on the Hayward FLV Series GFPP Duplex Filter by:
- 3.1.1 Inspecting all joints and connections for leaks.
 - 3.1.2 Inspecting individual filter vessels and components for any signs of damage, or wear, on all parts in general, and more specifically, on body threads, cover threads, and end connection threads of the individual filter vessels, lateral three-way diverter valves and vent valves.
 - 3.1.3 If any parts of the Duplex Filter assembly appear damaged or worn, they should be immediately replaced.
- 3.2 Monitor differential pressure across the inlet and outlet of the Hayward FLV Series GFPP Duplex Filter. If differential pressure across the inlet and outlet of the Duplex Filter exceeds 10 psi, the tandem lateral three-way diverter valve should be operated to turn the “active” vessel off, and then the filter bag should be changed by following the instructions in Hayward document *FLV/OM*.
- 3.3 Clean internal cover threads and external body threads of the vessel each time cover is removed. Threads should be cleaned with a soft brush or cloth. Care should be taken not to damage threads. If cover or nut threads are damaged due to normal “wear and tear”, replace damaged cover or nuts. If body threads are damaged, replace entire unit.

WARNING

Filter vessel should never be pressurized with damaged threads on cover, body, or assembly nuts. Use of filter vessel with damaged threads could result in property damage, personal injury, or even death.

WARNING

If nuts or cover ever fail due to over pressurization or water-hammer failure, entire unit needs to be replaced. Failure to replace unit after water-hammer failure, or failure due to over pressurization could result in property damage, personal injury, or even death.

- 3.4 Clean and inspect o-ring grooves and o-rings each time a vessel cover or end connector is removed. Damaged o-rings should be replaced immediately.

4.0 TROUBLESHOOTING:

Problem	Cause	Solution
Leak between cover and body	Damaged o-ring	Remove cover and carefully inspect o-ring for cuts, impressions, or other damage. Replace o-ring if damaged.
	Debris in o-ring groove	Remove cover and o-ring. Clean o-ring groove using care not to scratch sealing surface. O-ring groove is tapered to center of vessel, and has four drain slots to allow rinsing of groove during vessel maintenance.
	Loose cover / Over-tightened cover	Tighten cover hand tight plus 1/8-turn (45°). Cover should not require tightening beyond this point. Never strike cover. Never use “cheater” bar to tighten or loosen cover.
	Missing o-ring	Remove cover, clean groove, and install new o-ring.
Leak between end connector and body	Damaged o-ring	Remove assembly nut and end connector. Carefully inspect o-ring for cuts, impressions, or other damage. Replace o-ring if damaged.
	Loose assembly nut	Tighten assembly nut hand tight. Using strap wrench, gently tighten assembly nut an additional 1/4-turn (90°).
	Missing o-ring	Remove assembly nut and end connector. Clean o-ring groove and install new o-ring.
Increase in pressure drop	Fouled bag	Replace fouled bag with new bag. Never allow differential pressure across vessel to exceed 10 p.s.i.d.
Reduction in flow through unit	Fouled bag	Replace fouled bag with new bag. Never allow differential pressure across vessel to exceed 10 p.s.i.d.
Bypass of filtered media	Missing or damaged basket ring o-ring	Inspect basket ring o-ring. Replace if damaged or missing.
	Missing bag ring	Install bag ring and engage lockdown handle. If bag ring is lost, consult factory for replacement part.
	Improperly seated bag / bag ring	Check alignment and fit of bag with counter bore of basket ring. See Section 2.5 for bag installation instructions.
	Lock-down handle not engaged against bag ring	Verify that lock-down handle engages bag ring and is in “locked” position.
	Improper bag selection	Review system requirements, use next lowest micron rated bag.

5.0 PRODUCT SPECIFICATIONS:

Max. Pressure: 150 psi @ 70°F (see Chart 1 for operating pressures at elevated temperatures).

For pressure versus temperature derating for the Hayward FLV Series GFPP Duplex Filter, use the CPVC curve in Chart 1, as the maximum pressure and temperature ratings are determined by the use of CPVC as the material of construction for the tandem lateral three way diverter valve manifold.

Max. Temperature: **The maximum service temperature of the Hayward FLV Series GFPP Duplex Filter is 190°F.**

This limitation is due to the use of CPVC valves, pipe and unions to manufacture the tandem lateral three-way diverter valve manifold. The maximum service temperature of CPVC is 190°F, thus the maximum service temperature of the Hayward FLV Series GFPP Duplex Filter is 190°F.

Max. Flow Rate: 1-1/4" – 2": 100 GPM, Size 1 (16") and Size 2 (32") vessels

2-1/2" – 4": 150 GPM, Size 2 (32") vessels

NOTE: Flow rate may be limited by bag selection.

WARNING

The maximum recommended fluid velocity through any plastic piping system is eight feet per second (8 ft/s). Higher fluid velocity can create excess water hammer effect, resulting in property damage, personal injury, or even death.

CAUTION

Published operating requirements are based on testing of new vessels using clean water at 70°F. Vessel performance is affected by many factors including fluid chemistry, viscosity, specific gravity, flow rate, and temperature. These should be considered when sizing Hayward products.

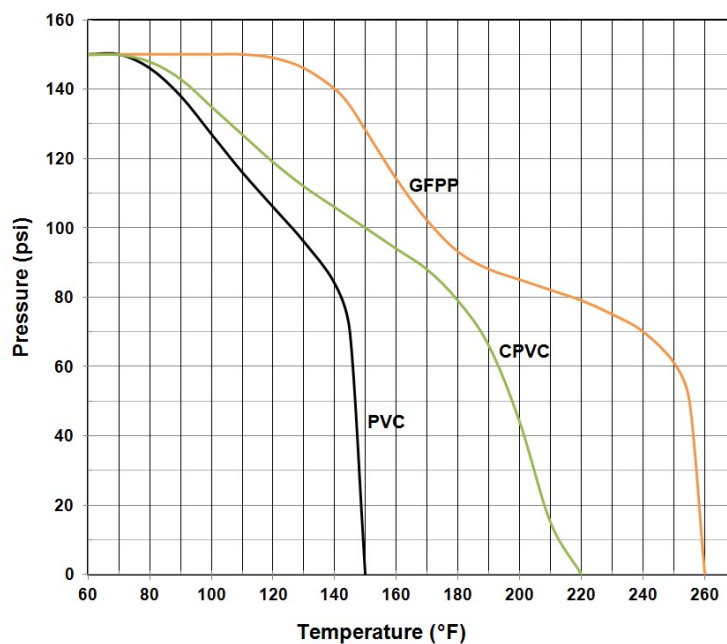


Chart 1: Operating pressures at elevated temperatures

6.0 WARRANTY TERMS AND CONDITIONS:

TWO YEAR WARRANTY: All products manufactured by Hayward are warranted against defects in material or workmanship for a period of two years from date of shipment. Our sole obligation under this warranty is to repair or replace, at our option, any product or any part or parts thereof found to be defective. **HAYWARD MAKES NO OTHER REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** The warranty set forth above is the only warranty applicable to Hayward products and in no event shall Hayward be liable for any delay, work stoppage, cartage, shipping, loss of use of equipment, loss of time, inconvenience, loss of profits of any direct or indirect incidental resulting from or attributable to a breach of warranty. **The remedies under this warranty shall be the only remedies available. OUR MAXIMUM LIABILITY SHALL NOT IN ANY EVENT EXCEED THE CONTRACT PRICE FOR THE PRODUCT.**

