



HAYWARD FLOW CONTROL TB SERIES TRUE UNION BALL VALVE INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

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

- 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.
- 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.
- 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.

- 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.
- 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.
- 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.
- 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.

- Due to differential thermal expansion rates between metal and plastic, transmittal of pipe vibration and pipe loading forces, **DIRECT INSTALLATION OF HAYWARD FLOW CONTROL PRODUCTS INTO METAL PIPING SYSTEMS IS NOT RECOMMENDED.** Wherever installation of Hayward product 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 product to compensate for the factors mentioned above.
- Published operating requirements are based on testing of new products using clean water at 70°F. Performance is affected by many factors including fluid chemistry, viscosity, specific gravity, flow rate, and temperature. These should be considered when sizing Hayward products.
- 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 any Hayward product may result in product damage, property damage, personal injury, or even death.

SOCKET CONNECTION:

Socket end connections are manufactured to ASTM D2467-94. Solvent cementing of socket end connections to pipe should be performed per ASTM specifications D2855-87. Cut pipe square. Chamfer and deburr pipe. Surfaces must be cleaned and free of dirt, moisture, oil and other foreign material. Remove assembly nuts and end connectors from valve body. Slide assembly nuts, with threads facing valve, onto pipe to which the end connector is to be cemented. Apply primer to inside socket surface of end connector. Never allow primer or cement to contact valve ball or end connector o-ring sealing surfaces, as leaking may result. Use a scrubbing motion. Repeat applications may be necessary to soften the surface of the socket. Next, liberally apply primer to the male end of the pipe to the length of the socket depth. Again apply to the socket, without delay apply cement to the pipe while the surface is still wet with primer. Next apply cement lightly, but uniformly to the inside of the socket. Apply a second coat of cement to the pipe, and assemble the end connector to the pipe, rotating the end connector 1/4 turn in one direction as it is slipped to full depth on to the pipe. The end connector should be held in position for approx. 30 seconds to allow the connection to "set". After assembly wipe off excess cement. Full set time is a minimum of 30 minutes at 60 to 100 F. Full cure time should be based on the chart below.

JOINT CURE SCHEDULE:

The cure schedules are suggested as guides. They are based on laboratory test data, and should not be taken to be the recommendations of all cement manufacturers. Individual manufacturer's recommendations for their particular cement should be followed.

Temperature Range During Cure Period(B) °F(°C)	Test Pressures for Pipe Sizes ½" to 1-1/4"		Test Pressures for Pipe Sizes 1-1/2" to 3"		Test Pressures for Pipe Sizes 4" & 5"		Test Pressures for Pipe Sizes 6" to 8"	
	Up to 180 PSI (1240 kPa)	Above 180 to 370 PSI (1240 to 2550 kPa)	Up to 180 PSI (1240 kPa)	Above 180 to 315 PSI (1240 to 2172 kPa)	Up to 180 PSI (1240 kPa)	Above 180 to 315 PSI (1240 to 2172 kPa)	Up to 180 PSI (1240 kPa)	Above 180 to 315 PSI (1240 to 2172 kPa)
60 to 100 (15 to 40)	1 hour	6 hours	2 hours	12 hours	6 hours	18 hours	8 hours	1 day
40 to 60 (5 to 15)	2 hours	12 hours	4 hours	1 day	12 hours	36 hours	16 hours	4 days
20 to 40 (-7 to 5)	6 hours	36 hours	12 hours	3 days	36 hours (A)	4 days (A)	3 days (A)	9 days (A)
10 to 20 (-15 to 7)	8 hours	2 days	16 hours	4 days	3 days (A)	8 days (A)	4 days (A)	12 days (A)

Colder than 10 (-15) Extreme care should be exercised on all joints made where pipe, fittings or cement is below 10°F.

A: It is important to note that at temperatures colder than 20°F on sizes that exceed 3 in., test results indicate that many variables exist in the actual cure rate of the joint. The data expressed in these categories represent only estimated averages. In some cases, cure will be achieved in less time, but isolated test results indicate that even longer periods of cure may be required.

B: These cure schedules are based on laboratory test data obtained on Net Fit Joints (NET FIT=in a dry fit the pipe bottoms snugly in the fitting socket without meeting interference).

THREADED CONNECTION:

Threaded end connections are manufactured to ASTM specifications D2464-88, F437-88 and ANSI B2.1. Wrap threads of pipe with PTFE tape of 3 to 3-1/2 mil thickness. The tape should be wrapped in a clockwise direction starting at the first or second full thread. Overlap each wrap by 1/2 the width of the tape. The wrap should be applied with sufficient tension to allow the threads of a single wrapped area to show through without cutting the tape. The wrap should continue for the full effective length of the thread. Pipe sizes 2" and greater will not benefit with more than a second wrap, due to the greater thread depth. To provide a leak proof joint, the pipe should be threaded into the end connection "hand tight". Using a strap wrench only. (Never use a stillson type wrench) tighten the joint an additional 1/2 to 1-1/2 turns past hand tight. Tightening beyond this point may induce excessive stress that could cause failure.

FLANGED CONNECTION:

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.

RECOMMENDED FLANGE BOLT TORQUE

FLANGE SIZE	BOLT DIA.	TORQUE FT. LBS.	FLANGE SIZE	BOLT DIA.	TORQUE FT. LBS.
1/2	1/2	10-15	2	5/8	15-25
3/4	1/2	10-15	2-1/2	5/8	20-25
1	1/2	10-15	3	5/8	20-25
1-1/4	1/2	10-15	4	5/8	20-25
1-1/2	1/2	10-15	6	3/4	30-40

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

ADJUSTMENT:

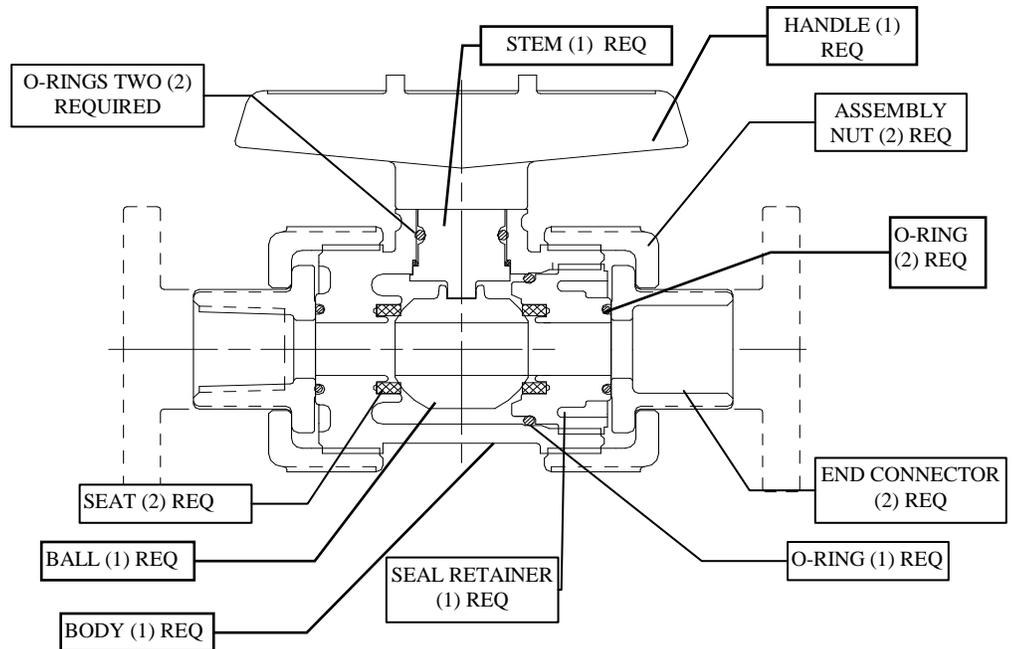
EXTREME CAUTION MUST BE TAKEN WHEN WORKING ON THIS VALVE.

THE PIPING SYSTEM MUST BE DEPRESSURIZED AND DRAINED. PROPER CARE MUST BE TAKEN. CONSULT M.S.D.S. (MATERIAL SAFETY DATA SHEETS) INFORMATION REGARDING YOUR SPECIFIC APPLICATION.

Remove the assembly nut and end connector from the "adjust" end of the body, or the complete valve body from the piping system. The front face of the seal retainer indicates which direction of rotation tightens or loosens the seal retainer, with the word "tighten" and a directional arrow, and the word "loosen" and a directional arrow. Direction of rotation may vary depending on date of manufacture. The Assembly nut should be installed on the valve "hand tight". Using a strap wrench only the joint may be tightened 1/2 to 3/4 of a turn past hand tight.

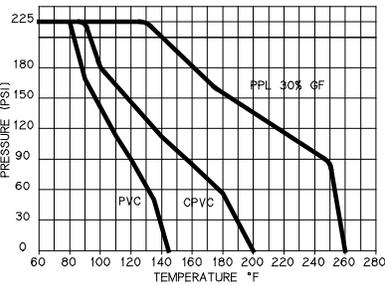
REPAIR:

Follow the adjustment sequence and information above, but rotating the seal retainer completely in the "loosen" direction and remove it from valve body. The o-rings and seals are now accessible for replacement using a "seal" repair kit. Carefully remove the o-rings from their respective locations taking care not to scratch their sealing surfaces. Insert o-rings and re-assemble. See table below.



OPERATING PRESSURE TEMPERATURE

TRUE UNION, TRUE CHECK, & SINGLE ENTRY ONLY



Recommended valve stem torque to rotate the ball 360° when valve is reassembled.

VALVE SIZE	TORQUE IN*LB
1/2"	40
3/4"	50
1"	60
1 1/2"	70
2"	80
3" & 2 1/2"	140
4" & 6"	170

HAYWARD INDUSTRIAL PRODUCTS, INC.

2-1/2", 3", 4" and 6" TB SERIES TRUE UNION BALL VALVES

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

PLEASE READ THE FOLLOWING INFORMATION PRIOR TO INSTALLING AND USING HAYWARD TB SERIES TRUE UNION BALL VALVES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PRODUCT DAMAGE, PROPERTY DAMAGE, PERSONAL INJURY, OR EVEN DEATH.

1. Hayward Industrial Products, Inc. (Hayward) 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 or CPVC 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.

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 VALVES INTO METAL PIPING SYSTEMS IS NOT RECOMMENDED.** Wherever installation of plastic valves 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 torque requirements are based on testing of new valves using clean water at 70°F. Valve torque is affected by many factors including fluid chemistry, viscosity, flow rate, and temperature. These should be considered when sizing electric or pneumatic actuators.
10. Systems should always be depressurized and drained prior to installing or maintaining any Hayward product.

SOCKET (SOLVENT CEMENT) CONNECTIONS:

- a) Socket end connectors are manufactured to ASTM Specification D2467 for PVC products and to ASTM Specification F439 for CPVC products.
- b) Solvent cementing of socket end connections to pipe should be performed per ASTM Specification D2855 for PVC and ASTM Specification F493 for CPVC.
- c) Perform pipe preparation per solvent cement manufacturer's recommended procedure.
- d) Remove nuts and end connectors from valve assembly and slide assembly nuts, with threads facing valve, onto pipe to which the end connector is to be cemented. **(Caution: Fumes from primer and solvent cement can attack seats and seals inside the valve. Always remove end connectors and nuts from valve prior to applying primer and solvent cement to the end connector.)**
- e) Apply primer and solvent cement to pipe and end connector per solvent cement manufacturer's recommended procedure. **(Caution: Never allow primer or cement to contact valve ball or end connector o-ring sealing surfaces, as damage to the valve may result.)**
- f) Assemble the end connector to the end of the pipe, rotating the end connector 1/4 turn in one direction while simultaneously pushing the end connector onto the end of the pipe until the pipe end is inserted to the full depth of the socket of the end connector.
- g) All solvent cemented joints have a recommended "set" time and cure time. After assembling the end connector to the end of the pipe, hold the end connector in position for the set time recommended by the solvent cement manufacturer's procedure. After assembly, wipe off excess cement. **(Note: Set times and cure times are dependent upon type of cement and temperature at time of application. Consult solvent cement manufacturer's procedure for proper set and cure times at specific temperatures.)**

THREADED CONNECTIONS:

- a) Threaded end connectors are manufactured to ASTM Specification D2464 for PVC, ASTM Specification F437 for CPVC, and ASME/ANSI B2.1.
- b) Wrap male threads of pipe end with Teflon[®] tape. Proper application of Teflon[®] tape will provide a sufficient seal for PVC and CPVC threaded joints.

WARNING

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

- c) Thread the end connector onto the end of the pipe until "hand tight". Using a strap wrench only (never use a pipe wrench), tighten the joint an additional 1/2 to 1 turn past hand tight. **(Caution: Tightening beyond this point may introduce excessive stress that could cause failure of the end connector or the threaded end of the pipe.)**

FLANGED CONNECTIONS:

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. Flat washers should be used between the bolt head and flange, and flat washers and lock washers between the nut and flange. Bolts should be

tightened in an alternating and crossing sequence. Use well lubricated metal bolts and nuts, and soft rubber gaskets. Recommended flange bolt torque is shown in the following table:

Recommended Flange Bolt Torque

Flange Size (in)	Bolt Diameter (in)	Bolt Torque (ft-lbs)
2-1/2	5/8	20-25
3	5/8	20-25
4	5/8	20-25
6	3/4	30-40

INSTALLATION:

- a) Align one end of the valve with the exposed face of the end connector, slide the nut over the end connector and engage the start of the nut thread with the start of the external body thread. Body and nut threads are right-hand threads.
- b) Assemble nut until hand tight. Repeat assembly of nut to body on second valve end.
- c) Using a strap wrench, continue tightening each nut for an additional 1/4 to 1/2 turn.
- d) Upon system startup, check for leaks between the end connector and body. Tighten nut(s) as needed to obtain sufficient compression of the end connector o-ring.

Installation Notes:

- Hayward TB Series True Union Ball Valves are bi-directional. These valves can be installed independent of flow direction.
- It is not necessary to lubricate the end connector o-ring before assembling the end connector to the valve body via the nut.
- It is not necessary to lubricate the external body threads or the internal nut threads before assembling the nuts to the body.

WARNING

The piping system immediately upstream and downstream from the valve must be properly aligned prior to valve installation. Do not use the valve to pull adjacent piping into alignment. Use of the valve to align the adjacent piping system may result in product failure, system damage, property damage, personal injury, or even death.

WARNING

This valve contains a bottom mounting pad intended for use as a "panel mount" feature. Do not use the bottom mounting pad of the valve to anchor the piping system. Standard practice of spacing and placement of pipe hangers and anchors should be used when designing systems and installing this valve. Use of the bottom mounting pad of the valve as an anchor for the adjoining piping system may result in product failure, system damage, property damage, personal injury, or even death.

SEAT ADJUSTMENT:

WARNING

When performing any maintenance or adjustment on this valve, the piping system must be depressurized and drained. Performing maintenance on any pressurized product, or system, may result in product failure, property damage, personal injury, or even death.

- a) Depressurize and drain system.
- b) Remove the assembly nut, end connector and any adjoining piping from the seal retainer end of the body. The seal retainer end of the body is identified on the product label with an arrow and the phrase "Seat Adjust".
- c) Turn the valve to the fully closed position. **(Note: Seat adjustment should always be conducted with the ball in the closed position.)**
- d) Remove the handle of the valve and engage the "lugs" on the top of the handle with the matching cavities in the face of the seal retainer.
- e) Rotate the seal retainer counterclockwise to increase the compression between the seats and the ball, or clockwise to decrease the compression between the seats and the ball. The front face of the seal retainer indicates which direction of rotation tightens or loosens the seal retainer, with the word "Tighten" and a directional arrow, and the word "Loosen" and a directional arrow. The seal retainer thread is a left-hand thread.
- f) Once the seal retainer adjustment is complete, place the handle back onto the valve stem, and reinstall the valve into the system following the installation steps defined above.

SEAT/SEAL REPLACEMENT:

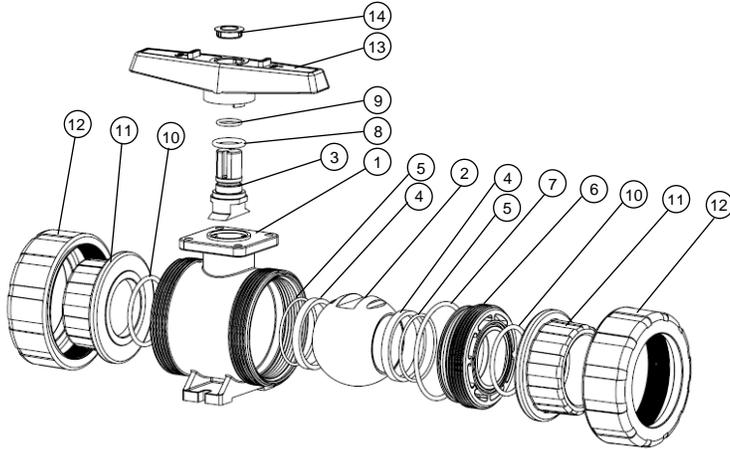
(Note: Hayward recommends the replacement of all internal o-rings and seats whenever a valve is disassembled for repair.)

- a) Follow the adjustment sequence and information above to step "e", but rotate the seal retainer in the clockwise (i.e. "loosen") direction until the seal retainer thread disengages completely from the internal body thread, and remove it from valve body. The o-rings and seats are now accessible for replacement using a Hayward seal repair kit.
- b) Carefully remove the ball, o-rings and seats from the valve body and seal retainer.
- c) If it is necessary to replace stem o-rings, push down on stem and remove it from the valve body.
- d) Install new o-rings and seats in the body and seal retainer (and on the stem, if necessary).
- e) If the stem was removed from the valve body, reinstall the stem, leaving it positioned to receive the ball in the open position.
- f) Place ball into valve body in the open position, while ensuring that the ball slot is properly aligned with the bottom of the stem.
- g) Rotate the ball to the closed position. **(Note: Valve reassembly and seat adjustment should always be conducted with the ball in the closed position.)**
- h) Reassemble the seal retainer to the valve body by engaging the mating threads and rotating the seal retainer in the counterclockwise direction.
- i) Using a torque wrench, measure the torque at the valve stem required to rotate the ball 360°. See the following table for the proper stem torque.
- j) Adjust the seal retainer in either the counterclockwise (tighten), or clockwise (loosen), direction until the proper stem torque is achieved.
- k) Place the handle back onto the valve stem, turn the ball to the open position, and reinstall the valve into the system following the installation instructions above.

Recommended Valve Stem Torque Required to Rotate Ball 360° During Reassembly

Valve Size (in)	Stem Torque (in-lbs)	Valve Size (in)	Stem Torque (in-lbs)
2-1/2"	140	4	170
3"	140	6	170

ASSEMBLY & PARTS LIST:

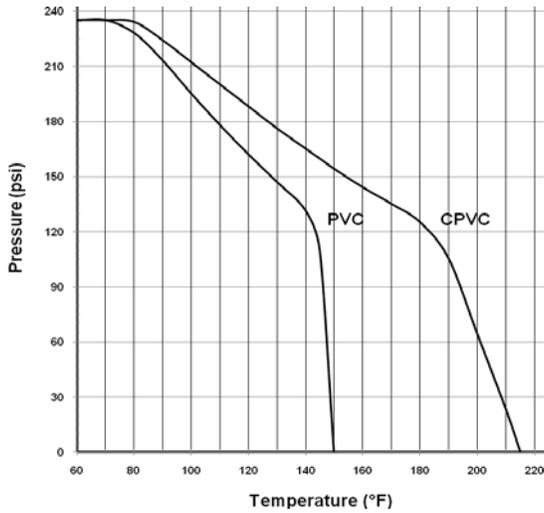


Item	Description
1	Body
2	Ball
3	Stem
4	Seat
5	Seat O-ring
6	Seal Retainer
7	Seal Retainer O-ring
8	Lower Stem O-ring
9	Upper Stem O-ring
10	End Connector O-ring
11	End Connector
12	Nut
13	Handle
14	Bezel

PRESSURE & TEMPERATURE RATINGS:

- Pressure rating of PVC and CPVC products at 70°F non-shock: 235 PSI
- Minimum service temperature of PVC and CPVC: 34°F
- Maximum service temperature of PVC: 140°F
- Maximum service temperature of CPVC: 180°F

Operating Pressure vs. Temperature



Chemical Compatibility Charts:

- Consult the Hayward Industrial Product Guide or www.haywardflowcontrol.com for complete chemical compatibility charts for all materials of construction of the valve.

*Teflon® is a registered trademark of E.I. du Pont de Nemours and Company.