HAYWARD FLOW CONTROL

TC SERIES TRUE UNION BALL CHECK VALVE
INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

PLEASE READ THE FOLLOWING INFORMATION PRIOR TO INSTALLING AND USING HAYWARD TC SERIES TRUE UNION BALL CHECK VALVE. 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, PP, or PVDF 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, CPVC, PP, and PVDF products should NEVER be used or tested with compressible fluids such as compressed air or nitrogen. Use of PVC, CPVC, PP, and PVDF products in compressible fluid applications may result in product damage, property damage, personal injury, or even death.

WARNING

The TC Series True Union Ball Check Valve is intended for use in liquid service only. Do not attempt to use this valve for controlling 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, CPVC, PP, and PVDF 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 requirements are based on testing of new valves using clean water at 70°F. Valve 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 valve may result in product damage, property damage, personal injury, or even death.

11. Always follow your site and/or company procedures for any safety training and/or site specific precautions or warnings in addition to those in this document.

The most recent revision to this document is available at http://www.haywardflowcontrol.com/images/flowcontrol/PDF/iom/TCIS.pdf

1. INSTALLATION:

1.1. Transporting the Valve:

Valve should be stored inside factory packaging until product is ready to be installed. Packaged valve should be stored indoors, at room temperature, and out of direct sunlight. Avoid storing packaged valve in location where packaging may become wet. Valve should be moved as close to installation site as possible prior to removing from packaging. Do not cut through tape on box any more than necessary to avoid damaging valve. After removing valve from carton, care must be taken not to damage valve or to allow debris to enter valve.

WARNING

System must be depressurized and drained prior to installing valve or performing maintenance. Failure to depressurize and drain system prior to installing or maintaining valve may result in product damage, property damage, personal injury, or even death.

CAUTION

Do not install valve directly to pump outlet. Allow a length of at least 10 pipe diameters between pump outlet and valve.

Do not install valve directly after a reducer / expansion fitting. Install at least 10 pipe diameters from an expansion or reducing fitting.

Pipe must be supported upstream and downstream of the valve. Sound piping system design principles should be applied when installing this valve.

Do not install valve directly into a metal system (see pg. 2). Wherever installation of thermoplastic valves into metal piping systems is necessary, it is recommended that at least 10 pipe diameters in length of thermoplastic pipe be installed upstream and downstream of the thermoplastic valve.

When lifting valve do not lift by the handle.

1.2. Installing the Valve into a System:

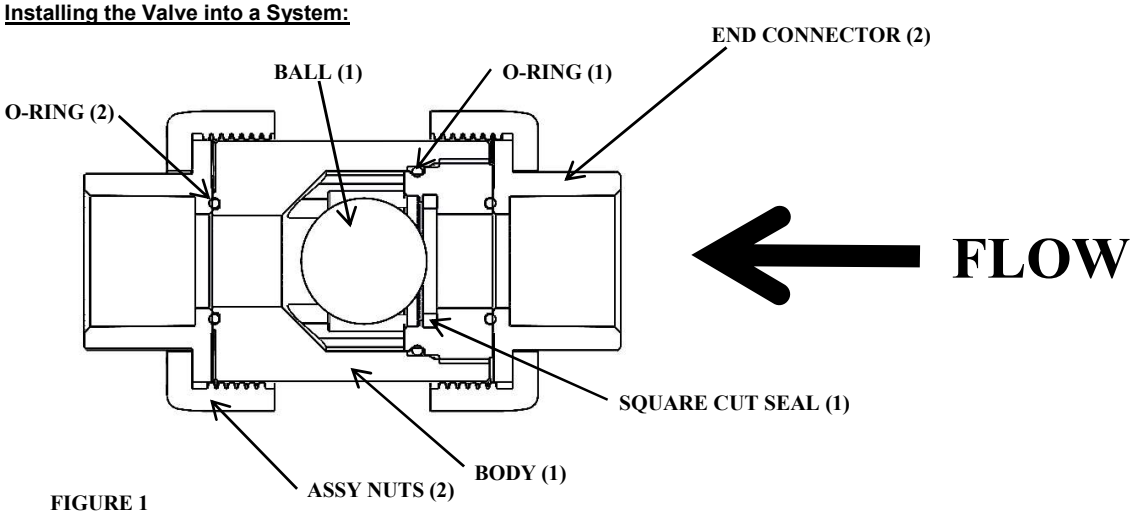


FIGURE 1

NOTE

Hayward TC Series True Union Ball Check Valves with standard balls are uni-directional. There is a flow arrow marked on the valve to indicate proper flow direction.

1.2.1. Remove valve from packaging.
1.2.2. Verify that product is defect free and meets specifications.
1.2.3. Remove the nut and end connector by rotating the nuts counter clockwise. Verify end connector o-rings are installed in their respective grooves.
1.2.4. Place nut over pipe end so that it can engage the end connector once the end connector is connected to the pipe end.

1.2.4.1. Threaded End Connectors:
1.2.4.1.1. Wrap male threads of pipe end with PTFE tape for seal on threaded joints.

WARNING

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

1.2.4.1.2. Thread the end connector onto the threaded pipe end until "hand tight". Using a strap wrench only (never use a pipe wrench), tighten the end connector onto the pipe 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.)**

1.2.4.2. Solvent-Weld End Connectors (PVC and CPVC only):

CAUTION

Valve center cartridge must be disassembled from nuts and end connectors prior to solvent cementing end connections into system, Avoid exposing valve cartridge and end connector o-rings to primer, solvent cement, or their fumes, as damage to the valve could result.

1.2.4.2.1. Refer to solvent-cement manufacturer's instructions and cure times.

1.2.4.2.2. **Do not install valve cartridge until solvent cement has fully cured.** Reinstall end connectors by threading nuts onto body by rotating in a clockwise direction.

1.2.4.3. Fusion-Weld End Connectors (PP and PVDF only):

1.2.4.3.1. Refer to pipe supplier's procedure or your internal fusion procedure.

1.2.4.4. Flange Connections:

1.2.4.4.1. NOTE: When provided with flanges, TC Series True Union Ball Check Valves are provided with an end connection sub-assembly, consisting of an end connector, solvent cemented to a flange, with an assembly nut for connection to the valve.

1.2.4.4.2. Flange bolts should be tight enough to 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 (Figure 1). See Table 1 for recommended torque.

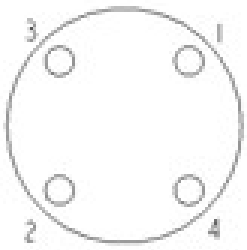


Figure 2: Bolt Tightening Sequence

TABLE 1:

RECOMMENDED FLANGE BOLT TORQUE

FLANGE SIZE	BOLT DIA. (IN)	TORQUE (FT. LBS.)
½"	½	10 – 15
¾"	½	10 – 15
1"	½	10 – 15
1-¼"	½	10 – 15
1-½"	½	10 – 15
2"	5/8	15 – 20
2-½"	5/8	20 – 25
3"	5/8	20 – 25
4"	5/8	20 – 25
6"	3/4	30 – 40

1.2.5. Install valve cartridge between end connectors, match nuts to body threads and turn nut clockwise to thread onto body. Using a strap wrench only (never use a pipe wrench), nut can be tightened ¼ - ½ turn past hand-tight, as needed.

1.2.5.1. Never install valve into system where assembly nuts have to be used to pull system together. This will apply undue loading on the valve body and assembly nuts. Piping system should be properly aligned prior to valve installation.

1.2.5.2. Never install valve into system that must be forcibly separated in order to allow space for body. This will apply undue loading on the valve body.

2.0 STARTUP AND OPERATION:

WARNING

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

WARNING

The TC Series True Union Ball Check Valve is intended for use in liquid service only. Do not attempt to use this valve for controlling air or gases. Use of this product in air or gas service may result in product damage, property damage, personal injury, or even death.

WARNING

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

2.1 Start up system.
2.2 Slowly purge air from system as line fills with liquid.
2.3 Look for leaks around assembly nuts and end connections and check for proper valve operation. If any leaks are present, or valve does not perform properly, refer to troubleshooting guide. **Depressurize and drain system prior to performing any maintenance.**
2.4 Periodically check valve for leaks or external damage.
2.5 Periodically check true union nuts and / or flange connections.
2.6 Periodic Operation
  2.6.1 Where possible, for valves that are installed in locations where they are not operated frequently, it is recommended that valves are operated according to a routine maintenance schedule at least once every six months.

3.0 MAINTENANCE:

WARNING

System must be depressurized and drained prior to installing valve or performing maintenance. Failure to depressurize and drain system prior to installing or maintaining valve may result in product damage, property damage, personal injury, or even death.

Refer to Figure 1, page 3 for part descriptions and locations.

3.1 Repairing Valve

3.1.1 Depressurize and drain system.

3.1.2 Remove the assembly nut and end connector from the end opposite of the flow arrow (see Figure 1) on the body, or the complete valve body from the piping system.

3.1.2.1 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.

3.1.3 Rotate the seal retainer completely in the "loosen" direction and remove it from the valve body.

3.1.3.1 Seal, o-rings, and ball can be removed.

3.1.4 O-ring replacement

3.1.4.1.1 Carefully remove the o-rings from their respective locations taking care not to scratch their sealing surfaces.

3.1.4.1.2 Use a non-petroleum base lubricant to lubricate the o-rings, and re-assemble the valve.

3.1.5 Using a plastic pick, carefully remove the old seals. NOTE: Be very careful not to damage the o-ring grooves or valve body.

3.1.6 Clean o-ring grooves with a soft brush or cloth.

3.1.7 Install new o-rings by gently pressing o-ring into groove until o-ring is fully seated.

3.1.8 Install valve cartridge between end connectors, match nuts to body threads and turn nut clockwise to thread onto body. Using a strap wrench only (never use a pipe wrench), nut can be tightened ¼ - ½ turn past hand-tight, as needed.

3.1.8.1 Never install valve into system where assembly nuts have to be used to pull system together. This will apply undue loading on the valve body and assembly nuts. Piping system should be properly aligned prior to valve installation.

3.1.8.2 Never install valve into system that must be forcibly separated in order to allow space for body. This will apply undue loading on the valve body

4.0 TROUBLESHOOTING:

Problem	Cause	Solution
Leak between body and end connector.	Missing end connector o-ring	Replace end connector o-ring
	Damaged end connector o-ring	Replace end connector o-ring
	Assembly nuts too loose	Tighten assembly nut
	Piping system not properly aligned and / or supported.	Properly align and support piping, especially adjacent to valve.
Leak between ball and seat.	Valve not fully closed	Increase back pressure on system.
	Damaged ball	Repair or replace valve
	Damaged seal	Repair or replace valve
	Damaged seal surface	Repair or replace valve
Damaged ball or seats.	Excessive valve cycles.	Replace o-rings and seals. Inspect assembly components. Replace if warranted.
	Water Hammer	Maximum line velocities of 8 ft/sec. recommended for plastic piping systems. Resize system or valve. Reduce line velocity. Reduce speed of operation (i.e. closure) of valve.
	Detrimental solids in process media.	Install a strainer upstream of valve to prevent damage to valve.
	Cavitation in line.	Maximum line velocities of to 8 ft/sec. exceeded. Valve should be installed at least 10 pipe diameters from the nearest pump or fitting. Resize system or valve.
	Process conditions.	Check chemical compatibility of ball and seat material with fluids in system.
		Check that valve was not in service or operated at temperatures above or below recommended operating temperature.
No flow thru valve	Valve installed backwards	Remove valve and install with correct flow direction.

5.0 PRODUCT SPECIFICATIONS:

Maximum Pressure: Refer to Chart 1 and Chart 2 for pressure ratings.

Operating Temperature:

Material	Minimum Operating Temperature	Maximum Operating Temperature
PVC	34°F (1.1°C)	140°F (60.0°C)
CPVC	34°F (1.1°C)	190°F (87.8°C)
PP	20°F (-6.7°C)	180°F (82.2°C)
PVDF	20°F (-6.7°C)	240°F (115.6°C)

Maximum System Flow Velocity: 8 ft/s (2.4 m/s) for thermoplastic piping systems

Flow Capacity; Cv:

Size	Cv
1/4" (DN8)	1.0
3/8" (DN10)	3.0
1/2" (DN15)	4.8
3/4" (DN20)	7.7
1" (DN25)	11.0
1-1/4" (DN32)	25.0
1-1/2" (DN40)	45.0
2" (DN50)	130.0
2-1/2" (DN65)	170.0
3" (DN80)	250.0
4" (DN100)	400.0
6" (DN150)	340.0

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 valves using clean water at 70°F. Valve performance is affected by many factors including fluid chemistry, viscosity, specific gravity, flow rate, and temperature. These should be considered when sizing systems using Hayward products.

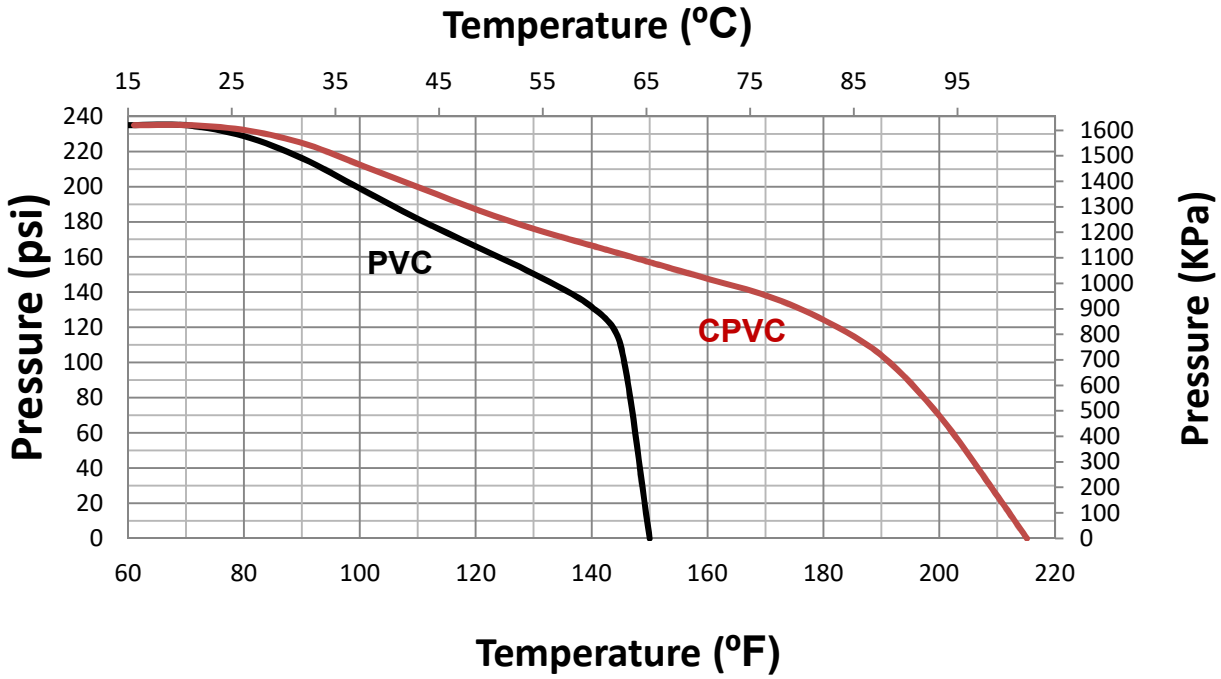


Chart 1: Operating pressures at elevated temperatures for PVC and CPVC up to 2" valve size

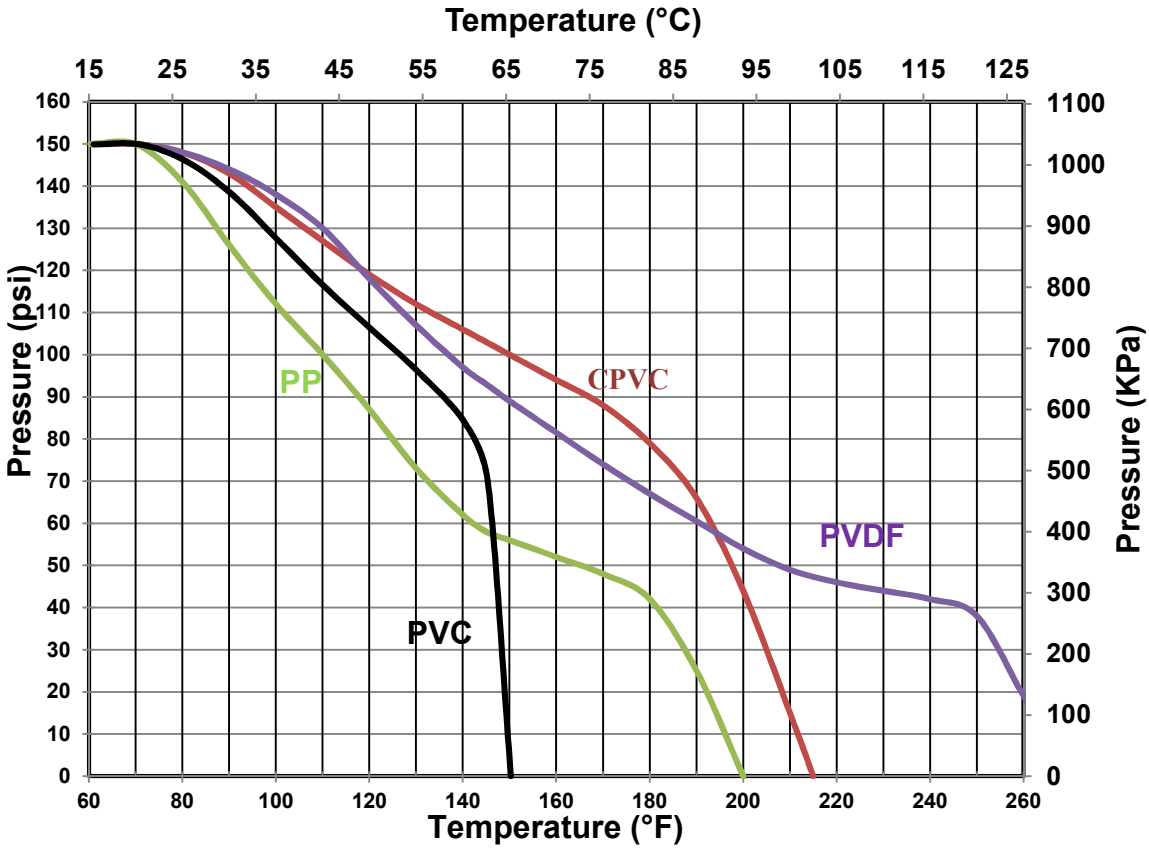
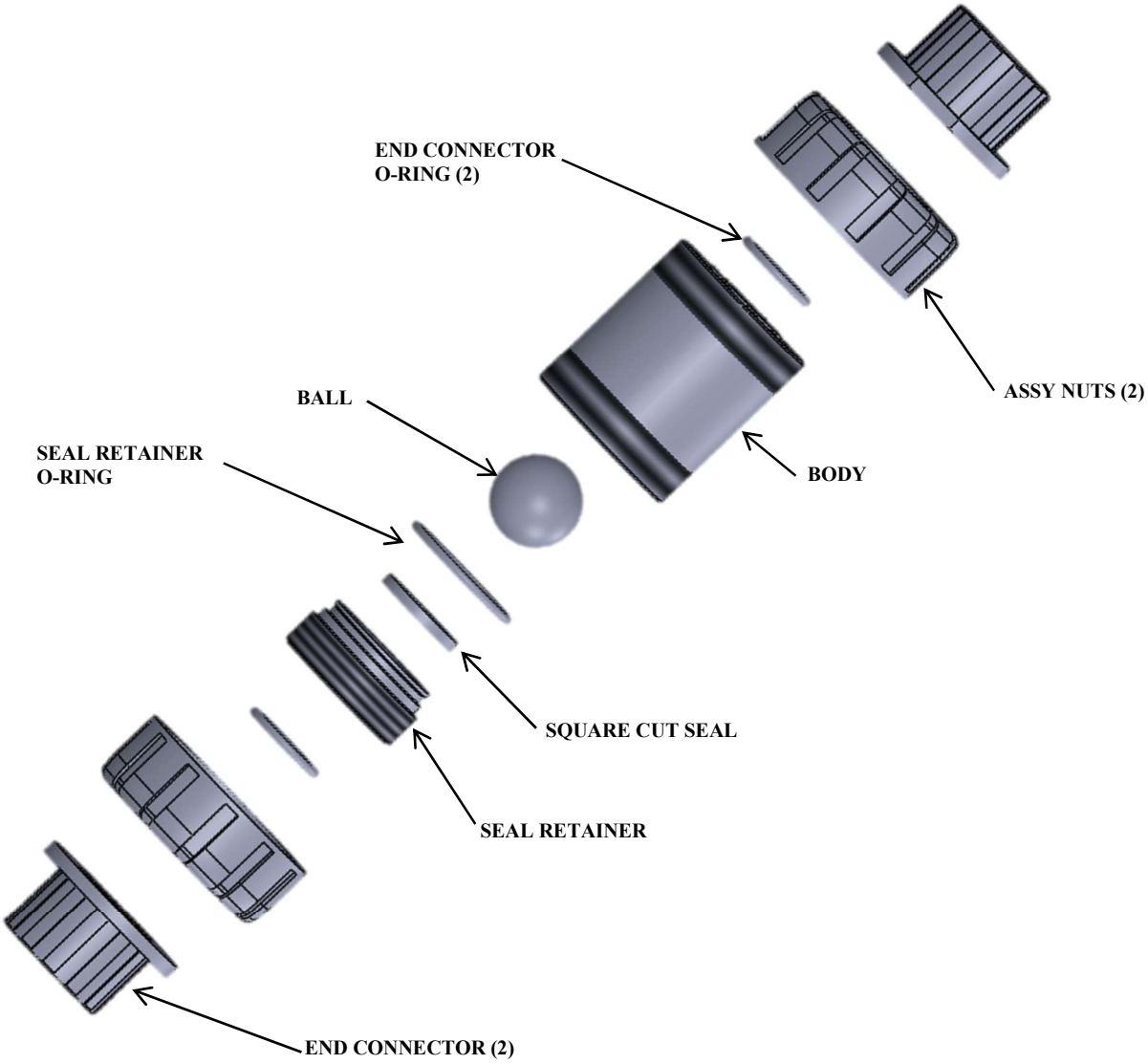


Chart 2: Operating pressures at elevated temperatures for PVC and CPVC 2-½"thru 6" size and for valves in PP and PVDF materials

6.0 PARTS LIST:



7.0 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.**

Notes:

Krytox™ is a trademark of The Chemours Company