Installation Guide

RWC Piping Systems

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The RWC Piping Connection System

Reliance Worldwide Corporation (RWC) is a market leader and manufacturer of water control systems and plumbing solutions for residential and commercial applications. Established in 1949, the RWC portfolio includes industry-leading brands: SharkBite™ Push-to-Connect plumbing solutions; HoldRite™ engineered plumbing and mechanical solutions; Cash Acme™ control valves; John Guest™ fittings and fluid dispense products, and EZ-FLO™ and Eastman™ appliance connectors, supply lines, stop valves and gas connectors. Passing down more than 70 years of innovation, products from the RWC family of brands are engineered for quality and efficiency.

RWC Piping Systems comprise of SharkBite PEX-a tubing, SharkBite PEX-b tubing, SharkBite Universal/Max/UXL Push-to-Connect (ASSE 1061/CSA B125.3) fittings, EvoPEX (ASSE 1061/CSA B137.5) fittings, SharkBite Expansion (ASTM F1960/CSA B137.5) fittings and SharkBite Crimp/Clamp (ASTM F1807/F2159/F2098/CSA B137.5) fittings.

PEX Pipe

Crosslinking Methods

PEX (Crosslinked Polyethylene) is a polyethylene material which has undergone a change in molecular structure using a chemical or a physical process whereby a majority of the polymer chains are permanently linked. Crosslinking of polyethylene into PEX for pipe and tubing results in improved properties such as elevated temperature strength and performance, chemical resistance, flexibility, and resistance to slow crack growth. Crosslinking also makes PEX a “semi-thermoset” polymer, providing excellent long-term stability.

Polyethylene can be crosslinked using several manufacturing technologies or extrusion methods. All methods create links or bonds between the single chains of HDPE to form a three-dimensional molecular matrix. The number of links between the polyethylene molecules determines the crosslink density and is an important factor in determining the physical properties of the material.

Peroxide Method

This method employs organic peroxides that, when heated, generate reactive free radicals that splice HDPE chains together during extrusion. This is sometimes referred to as the PEX-a Process.

Silane Method

This method involves grafting a reactive silane molecule to the backbone of the polyethylene. This is sometimes referred to as the PEX-b Process.

Electron Beam Method

This method involves subjecting the extruded HDPE pipe to a dose of high-energy electrons. This is sometimes referred to as the PEX-c Process.

Classification of Crosslinked Polyethylene

	Typology	Method	Symbol
A	Chemical	Peroxide crosslinking	PEX-a
B	Chemical	Silane crosslinking	PEX-b
C	Physical	Electron Beam crosslinking (beta)	PEX-c

Note: These letter designations are not related to any type of performance rating system. PEX pipe and tubing produced by each of the three methods must meet the same technical requirements as specified in the relevant PEX standards (e.g. ASTM F876/ASTM F877/CSA B137.5).

PEX Properties

Chemical Resistance and Compatibility

Plastic pipe and fitting materials are generally resistant to attack from many chemicals. This inherent property makes them suitable for use in numerous fluid and gas transport applications. However, there are certain chemicals that may damage plastic pipes, either through exposure on the outside of the pipe to chemicals, on the internal surface of the pipe during the transport of such chemicals, or with exposure to inert fluids containing chemicals in various concentrations. Each material has unique resistance to chemicals in various situations. The suitability of a pipe or fitting system for use in a particular fluid or gas application is a function of several factors. These factors can be referenced with PPI technical report TR19. RWC Piping System components are suitable for domestic cold water, domestic hot water, and domestic hot water recirculation systems.

PEX Properties

Common PEX Pipe Manufacturing Processes

RWC Piping System Solutions offer two different styles of PEX tubing, both intended for domestic water: PEX-a and PEX-b.

	PEX Pipe Types		
Traits	**a**	**b**	**c**
Flexibility	Best	Good	Better
Bend Radius	6 times the OD of the tubing	8 times the OD with the coil and 20 times the OD against the coil	8 times the OD in any direction
Tensile Strength	Good	Best	Better
Burst Pressure	Good	Best - 10-15% higher than PEX-a	Better
Kink Repair with Reheating	✓*	x	x
Crosslinking Level	80%	around 70%	around 70%
Crosslinked Polyeythylene	✓	✓	✓
Freeze Resistance	✓	✓	✓
Chlorine Resistance	✓	✓	✓
ASTM Standards	✓	✓	✓
Maximum Working Pressure (psi)	160	160	160
Maximum Working Temperature (F)	200	200	200
Crossliinked Process	Peroxide	Silane	Electron Beam

*PEX-a has a thermal memory due to being crosslinked during the amorphic (melted) state of the polyethylene

PEX has distinct advantages over metal and other polymer pipes.

- Resists pitting and stress corrosion
- Resists scaling and deposit build-up when used with both hard and softened water
- Minimizes noise that is transmitted through pipes

Interpolated Hydrostatic Temperature and Pressure Rating

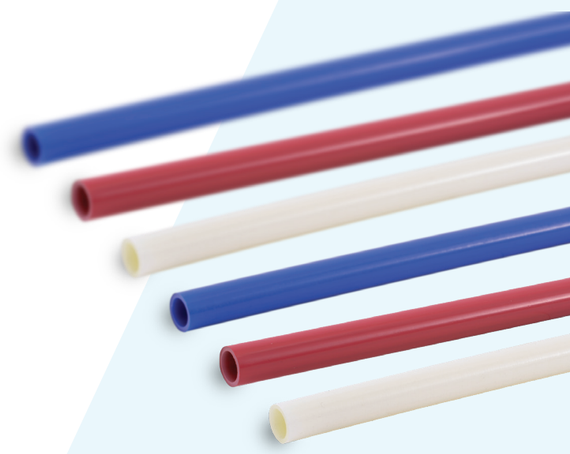
In accordance with ASTM F876, SharkBite PEX tubing complies with the Excessive Temperature and Pressure Capacity requirements of 210°F and 150 psi for 720 hours (30 days) to accommodate short-term water heating system malfunctions.

°F/°C	Pressure Rating psi/bar
200.0/93.3	80/5.5
190.0/87.8	90/6.2
180.0/82.2	100/6.9
170.0/76.7	106/7.3
160.0/71.1	111/7.7
150.0/65.6	117/8.0
140.0/60.0	123/8.5
130.0/54.4	128/8.8
120.0/48.9	134/9.2
110.0/43.3	139/9.6
100.0/37.8	145/10.0
90.0/32.2	151/10.4
80.0/26.7	156/10.8
73.4/23.0	160/11.0
60.0/15.6	168/11.6
50.0/10.0	173/11.9
40.0/4.4	179/12.3

Temperature and Pressure

Hydrostatic Design Stress (HDS)- The recommended maximum hoop stress that can be applied continuously with a high degree of certainty that failure of the pipe will not occur.

ASTM F876 Temperature and Pressure Ratings for SDR9 PEX		
°F/°C	Hydrostatic Design Stress (HDS) psi	Pressure Rating for Water psi
73.4°F/23°C	630	160
180°F/82°C	400	100
200°F/93°C	315	80



SharkBite™ PEX Piping
Technical Data

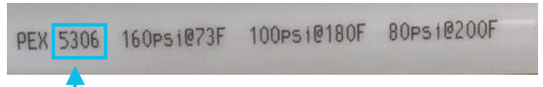
SharkBite PEX Pipe Marking. All SharkBite PEX Pipe is marked with the appropriate print stream. Example below:

Pipe Length | Manufacturer | Optional For Oxygen Barrier Pipe Only | Pipe Size & Identification | Chlorine Resistance | Manufacturing Location & Date

0025 ft SHARKBITE 02 BARRIER 1/2" SDR9 PEX5306 160PSI@73F - 100PSI@180F C1 WG 6.12.14=16:00

Code Evaluation

CSA B137.5 ANSI/AWWA C904 ASTM F876/877 (ASSE 1061, ASTM F1960, ASTM F1807, ASTM F2159, ASTM F2098)



Material Designation Code

- The first digit of the PEX material designation code is for chlorine resistance when tested in accordance with ASTM F2023 and evaluated in accordance with ASTM F876 (tubing):
  - Chlorine resistance
  - 1 = 25% of recirculating time at 140˚ F
  - 3 = 50% of recirculating time at 140˚ F
  - 5 = 100% of recirculating time at 140˚ F
- The second digit of the PEX material designation code is used to indicate the level of UV resistance for the PEX material when tested in accordance with ASTM F2657 and evaluated in accordance with ASTM F876:
- UV resistance
  - 1 = 1 month
  - 2 = 3 months
  - 3 = 6 months
- The last two digits of the PEX material designation code represent the PPI recommended Hydrostatic Design Stress at 73ºF (23ºC) divided by one hundred. PEX pipe and tubing materials use a Design Factor of 0.5.
- 06 = Hydrostatic Design Basis (temperature/pressure limits)
  - 160 psi @ 73.4˚ F
  - 100 psi @ 180˚ F
  - 80 psi @ 200˚ F

Fire-Restrictive Construction

- RWC piping systems solutions are certified through QAI to the following standards:
  - ASTM E84 – Standard test method for surface burning characteristics of building materials
  - CAN/ULC S102.2 – Method of test for surface burning characteristics of flooring, floor coverings, and miscellaneous materials and assemblies
  - ASTM E119 – Standard test methods for fire tests of building construction and materials
  - CAN/ULC S101 – Standard methods of fire endurance tests of building construction and materials
  - UL 263 – Fire tests of building construction and materials

Quality and Testing

- RWC Piping System Solutions are all third-party tested through IAPMO or NSF to the following standards:
  - ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing
  - ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Hot and Cold-Water Distribution Systems
  - CSA B137.5 Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications
  - NSF/ANSI 14 Plastic Piping System Components and Related Materials
  - NSF/ANSI 61 Drinking Water System Components and Related Materials
  - NSF/ANSI 372 Drinking Water System Components – Lead Content (complies with the lead-free requirements of the U.S. Safe Drinking Water Act)
  - RWC piping systems comprised of SharkBite PEX-a and PEX-b piping, SharkBite EvoPEX 1061/CSA B137.5 fittings, SharkBite Brass Push-To-Connect ASSE 1061/CSA B125.3 fittings, SharkBite crimp ASTM F1807/CSA B137.5 brass fittings and ASTM F2159/CSA B137.5 fittings, SharkBite clampASTM F2098/CSA B137.5 fittings are listed for installation in return-air plenums as tested in accordance with ASTM E84 and CAN/ULC S102.2.

Approved Fittings

Push-to-Connect
ASSE 1061

Expansion
ASTM F1960

Crimp
ASTM F1807/F2159

Clamp
ASTM F2098

RWC Piping Systems

Fitting	Pipe Compatibility	Certification	Fitting Material Offering	Sizes	Immediate Pressure Testing	Max Pressure Rating	No tools or rings required for connection
 **SharkBite Brass** **Push-to-Connect**	Copper, CPVC, PEX, PE-RT, HDPE SDR 9 Transitions available for Sched 40 PVC and Polybutylene	ASSE 1061/CSA B125.3	Brass (SS 316 retainer)	1/2" - 2"	√	SharkBite Universal UXL 200 psi SharkBite Max 250 psi	√
 **SharkBite EvoPEX** **Push-to-connect**	PEX	ASSE 1061/CSA B137.5	Polymer (SS 316 retainer)	1/2" - 1"	√	160 psi	√
 **John Guest ProLock** **Push-to-Connect**	Copper, CPVC, PEX, PE-RT	ASSE 1061	Polymer	1/2" - 1"	√	160 psi	√
 **Brass/Polymer** **Expansion**	PEX-a	ASTM F1960/CSA B137.5	Brass and Polymer	1/2" - 2"	x	160 psi	x
 **Brass/Polymer** **Crimp/Clamp**	PEX	ASTM F1807 (brass) ASTM F2159 (poly) ASTM F2098 (clamp) CSA B137.5	Brass and Polymer	Poly 1/2" - 1" Brass 1/2" - 2"	√	160 psi	x

Pipe	Compatible Fittings	Certification	UV Rating	Chloramine Resistance	Bend Radius (unsupported)	Manufactured	Sizes	Coil lengths	Stick lengths	Color Options	Compatible with HoldRite Pipe Supports	Plenum/Fire Resistance
 **PEX-a**	ASSE 1061, ASTM F1960, ASTM F1807, ASTM F2159, ASTM F2098	ASTM F876, ASTM F877 and CSA B137.5	6 months	Highest rating (5): Continuous recirculation hot water at 140F, 100% of time	6 x O.D.	Cullman, Alabama and Spain	1/2" - 1" **1-1/4", 1-1/2" and 2"coming soon**	100', 300' (1/2" and 3/4") 100' (1" and 1-1/4")	10' (USA & CAN) 20' (USA only)	blue, red and white	√	ASTM E84, CAN/ ULC S102.2 and ASTM E119, CAN/ ULC S101
 **PEX-b**	ASSE 1061, ASTM F1807, ASTM F2159, ASTM F2098	ASTM F876, ASTM F877 and CSA B137.5	6 months	Highest rating (5): Continuous recirculation hot water at 140F, 100% of time	8 x O.D.	Cullman, Alabama	1/2" - 2"	100', 300', 500' (1/2" and 3/4") 100', 300', 500' (1") 100' (1 ¼" - 2")	10' (USA & CAN) 20' (USA only)	blue, red and white	√	ASTM E84, CAN/ ULC S102.2 and ASTM E119, CAN/ ULC S101

*Pre-Sleeved PEX-a pipe is available in ½" and ¾" (300' coil) in Red and Blue sleeve colors with White internal PEX-a pipe.

Making a Connection: Push-to-Connect

SharkBite 1/4" - 1"

The combination of SharkBite push-to-connect fittings and PEX pipe offers the fastest, easiest installation from meter to fixture.

Step 1

Measure the desired length of pipe.

- Make a square cut perpendicular to the length of pipe.

Step 2

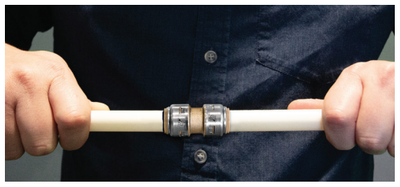
Deburr the end of copper or CPVC pipe to remove any sharp edges.

- Inspect fitting and pipe for damage, dirt and debris.

Step 3

Mark the pipe.

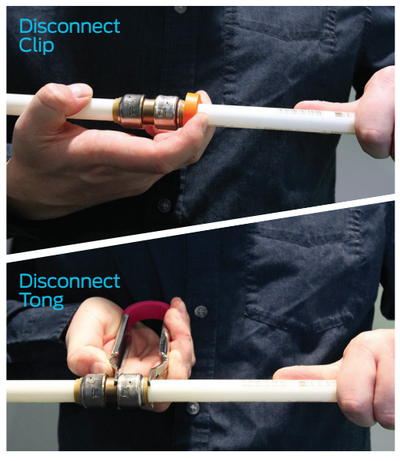
- Use the pipe insertion depth chart to determine where to mark the pipe.



Step 4

Push the pipe into the fitting.

- Mark should rest against the edge of the release collar.



Step 5

Remove fittings with disconnect clips.

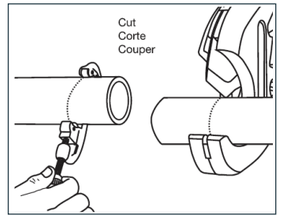
- Place disconnect clip against the end of the fitting.
- Push the disconnect clip, compressing the release collar.
- Pull pipe away from fitting using a slight twist.

Disconnect tongs can also be used.

- Position smaller opening of tongs on pipe at release collar, larger opening will go on body of fitting.
- Compress tongs handle.
- Pull pipe away from fitting using a slight twist.

Note: Install SharkBite fittings at least 1 inch apart to enable disassembly of the joint.

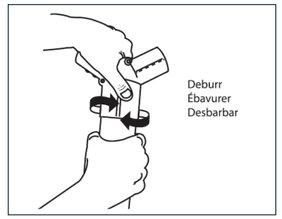
SharkBite 1-1/4"-2"



Step 1

Measure the desired length of pipe.

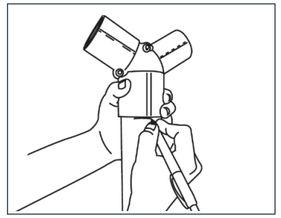
- Make a square cut perpendicular to the length of pipe.



Step 2

Deburr the end of copper or CPVC pipe to remove any sharp edges.

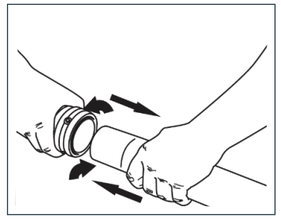
- Inspect fitting and pipe for damage, dirt and debris.



Step 3

Mark the pipe using the depth gauge tool.

- Use the depth gauge opening that corresponds to the pipe's outside diameter.



Step 4

Push the pipe into the fitting.

- For PEX and PE-RT pipe, fully insert stiffener into pipe prior to making connection. Mark should rest against the edge of the release collar.

Pipe Insertion Depth				
SharkBite Fitting Size	Normal Pipe Size	Pipe O.D.	SharkBite Universal/UXL Insertion Depth	SharkBite Max Insertion Depth
1/4"	1/4" CTS	3/8"	13/16" (21 mm.)	
3/8"	3/8" CTS	1/2"	15/16" (24 mm.)	
1/2"	1/2" CTS	5/8"	15/16" (24 mm.)	1" (25 mm.)
5/8"	5/8" CTS	3/4"	1-1/8" (29 mm.)	
3/4"	3/4" CTS	7/8"	1-1/8"(28 mm.)	1-1/4" (32 mm.)
1"	1" CTS	1-1/8"	1-5/16" (33 mm.)	
1-1/4"	1-1/4" CTS	1-3/8"	1-7/8" (48 mm.)	
1-1/2"	1-1/2" CTS	1-5/8"	2-1/16" (52 mm.)	
2"	2" CTS	2-1/8"	2-3/16" (56 mm.)	

Note: Install SharkBite fittings at least 1 inch apart to enable disassembly of the joint.

Making a Connection: Push-to-Connect

SharkBite EvoPEX™

Step 1

Measure the desired length of pipe.

- Make a square cut perpendicular to the length of pipe.

Step 2

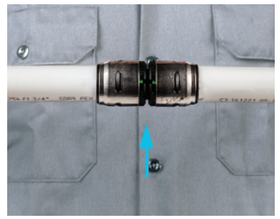
Examine the EvoPEX fitting and SharkBite PEX tubing.

- Ensure that both are free of debris and damage in preparation for making a connection.

Step 3

Push the pipe into the fitting firmly.

- A twisting action reduces insertion force.
- Avoid inserting pipe at an angle.



Step 4

Verify that the pipe is pushed into the fitting fully and engaged properly.

- Check that the green indicatior ring is fully visible.

Closely-Spaced Fittings

- The stainless steel collet retainer represents the depth that pipe must be inserted into the EvoPEX fitting.
- Example: If the pipe is cut at this point, there will be approximately 1/4" of pipe visible after all connections are made.

EvoPEX Connections: Street Tees

- The maximum number of street tees joined together is based on sizing requirements from the local plumbing code.
  - When joining more than two reducing street tees together, use a support on every other tee. RWC recommends HoldRite part number 233/234 or for acoustical requirements, HoldRite part number 255/257.

EvoPEX Connections: Chamfer Tool

- Insert the pipe into the chamfer tool until it bottoms out on the mandrel.
- Rotate the chamfer tool a minimum of three full clockwise rotations.
- Pull the tool away while making third rotation
  - Pulling the tool away while not rotating will result in strands of pipe remaining on the end. If this happens, reinsert pipe and repeat process.
- Inspect the pipe to ensure it is free of debris and then proceed to EvoPEX fitting connection instructions.

John Guest ProLock™

Step 1

Measure the desired length of pipe.

- Make a square cut perpendicular to the length of pipe.

Step 2

Insert pipe fully into fitting.

Step 3

Turn locking cap quarter turn clockwise to locked position.

- Audible click will be heard; indicator marks will be aligned

Disconnect

Depressurize the system.

- Turn locking cap quarter turncounter clockwise. Depress collet against the fitting and remove pipe.

Making a Connection: Expansion

Step 1

Measure the desired length of pipe.

- Make a square cut perpendicular to the length of pipe.

Step 2

Slide your expansion ring over the PEX tubing until it overhangs the end of the tubing by no more than 1/8 inch or until the stop on the ring touches the tubing.

Step 3

Using an approved manual or cordless expansion tool, insert the tool into the PEX pipe and expand the pipe. Note that each pipe size requires a specific expander head, so ensure that it is the correct size before beginning.

- The number of expansions may vary depending on the tool manufacturer recommendations, ambient temperature, and size of pipe. It is important to make sure the expander head rotates after each expansion.

Step 4

Once the tubing is expanded, insert the fitting until it hits the shoulder and allow the PEX to contract around the fitting until secure.

- After several seconds, the tubing will secure around the fitting and your connection is made.
- After a period of 30 minutes, the PEX-a pipe with F1960 fittings will be sufficiently conditioned to start the pressure test.

Cold Weather Expansions

- Temperatures affect the time required for piping and ring to shrink onto the fitting. The colder the temperature, the slower the contraction time.
- Warming SharkBite F1960 fittings and rings reduces contraction time. Put fittings and rings in your pocket prior to installation to keep them warm.
- Fewer expansions are necessary in temperatures below 40°F (4.4°C).

Distance Between Fittings

- When making a SharkBite F1960 expansion connection, there is a minimum distance between each fitting. This distance is to avoid damaging the fittings during the installation process and protect against stress on the pipe and fitting. Refer to the table.

Minimum length of pipe connecting two fittings	
Fitting/pipe size	Min. Length
1/2"	2"
3/4"	2-1/2"
1"	3"
1-1/4"	4-1/2"
1-1/2"	4-1/2"
2"	6"

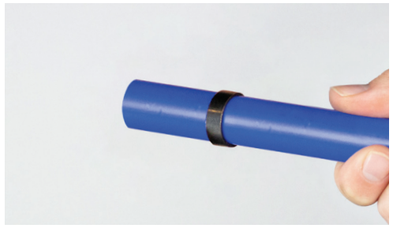
Making a Connection:

Crimp

Step 1

Cut the desired length of pipe.

- Square cut, perpendicular to the length of the pipe.



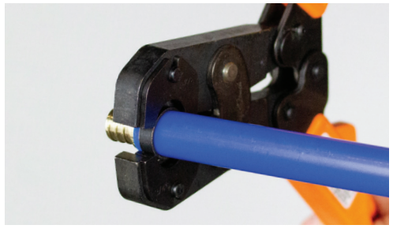
Step 2

Slide the appropriate crimp ring size over the pipe to about 2 inches from the end of the pipe.

Step 3

Push the pipe onto the barbed fitting until it touches the fitting shoulder.

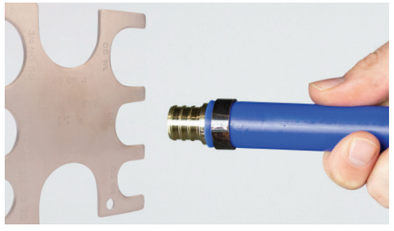
- Position the crimp ring 1/8 to 1/4 inch from the end of the pipe.
- This distance ensures that the crimp ring is positioned directly over the barbs on the fitting.



Step 4

Position the open jaws of the crimp tool over the crimp ring and squeeze.

- The jaws are interchangeable and include sizes for 3/8 in., 1/2 in., 5/8 in., 3/4 in.and 1 in. crimp rings.

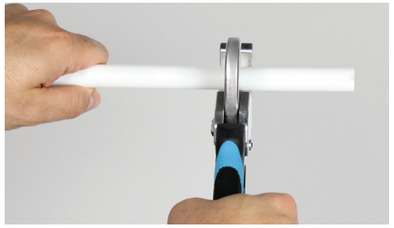


Step 5

Verify that the connection is secure by using the go/no-go gauge.

- The gauge slot that corresponds to the crimp ring size should easily slide onto the compressed crimp ring.

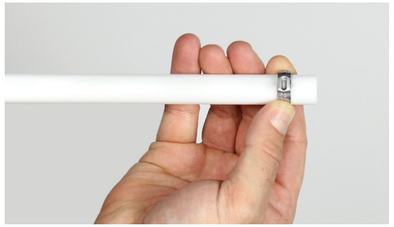
Clamp



Step 1

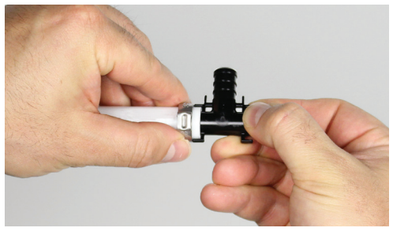
Cut the desired length of pipe.

- Square cut, perpendicular to the length of the pipe.



Step 2

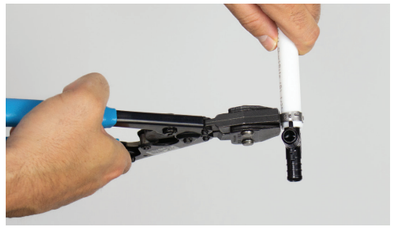
Slide the appropriate clamp ring size over the pipe to about 2 inches from the end of the pipe.



Step 3

Push the pipe onto the barbed fitting until it touches the fitting shoulder.

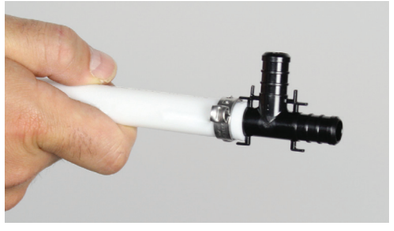
- Position the clamp ring 1/8 to 1/4 inch from the end of the pipe. This distance ensures that the clamp ring is positioned directly over the barbs on the fitting.



Step 4

Position the open jaws of the clamp tool over the raised tabs of the clamp ring and squeeze.

- One clamp tool fits all size clamp rings. It can be operated with one hand, leaving the other hand free to hold the clamp ring in position. The tool cannot be removed until the clamp ring is fully compressed. A properly calibrated clamp tool eliminates the need to check each fitting ring with a go/no-go gauge.



Step 5

Verify the connection is secure by visually checking the clamp tab.

Applications
Installation Requirements

Direct Burial

RWC Piping System fittings are suitable for burial in most applications; however care is required when using fittings in applications that require burial to ensure the correct installation practices are used and due care is given to any environmental factors that may have a detrimental effect on the life expectancy of the fittings and pipe. Burial of the fittings must comply with all local plumbing code requirements.

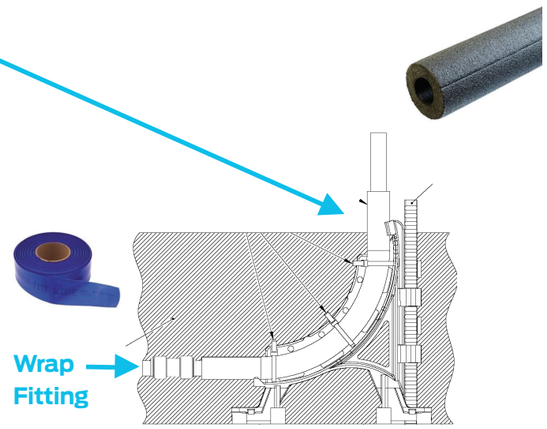
RWC Piping Systems are not suitable for use in areas where the soil is or may become contaminated, including the soil used for back filling.

All RWC fittings must be wrapped with a self-fusing, formaldehyde and chloride-free, fully cured silicone tape with a minimum thickness of 0.020" except EvoPEX fittings with all polymer bodies and Expansion fittings with all polymer bodies.

The soil used for back filling must be free of rocks, debris or any sharp objects that may cause damage to the fitting or pipe through impact or abrasion. Refer to local code requirements for additional steps for burial applications.

Embedded Pipe and Fittings

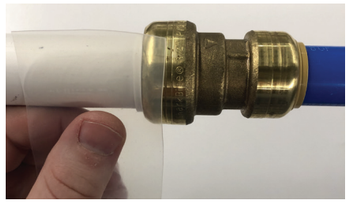
- Refer to local code requirements for embedding PEX tubing directly into concrete.
- All RWC Fittings
  - Common practice is to NOT embed fittings in concrete, however some situations arise that cannot be avoided. Should a situation arise, use a .02," a self-sealing silicone wrap to compltely isolate the fitting from concrete.
- In areas where the pipe enters or exits a concrete slab, the pipe shall be sleeved a minimum of 2" above and in the slab.



SharkBite Silicone Burial Wrap

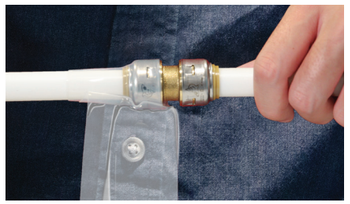
- While leaving the protective film in place, measure the length of tape needed to completely wrap the fitting.
- Wrap the fitting by pulling the tape tight and removing the protective film.
  - Wrap should cover entire fitting and extend over a minimum of 1" of pipe at each end of fitting.
  - Overlap wrap a minimum of 1/4" while applying to fitting and pipe.
- Wrap will bond itself within minutes and will cement to itself within a few hours.

How to Apply Silicone Wrap



Step 1

Start wrapping the 1" before the fitting.



Step 2

Wrap entire fitting making sure to overlap each wrap a minimum of 1/4".

Step 3

Finish by continuing to wrap 1" past the fitting.

Applications

Installation Requirements

Proximity to Lighting Fixtures

- For installation of a SharkBite piping system in concealed spaces near recessed lighting fixtures:
  - 12" - minimum vertical distance from fixture.
  - 6" - minimum horizontal distance from fixture.
  - Further information regarding proximity of plastic piping systems to recessed light fixtures can be found in PPI TN-56 (2018).
- UV exposure from light fixture:
  - SharkBite piping systems shall be installed a minimum of 5' from any incandescent, flourescent, LED light fixture unless protected with a UV-blocking material (i.e. approved insulation or plastic wrap or sleeve).

SharkBite Grounding on Copper Pipe

When connecting a SharkBite Universal fitting to a copper piping system, install a copper jumper cable to ensure proper grounding. SharkBite Universal fittings are not an electrically continuous fitting.

Threaded Connectors

Teflon tape should be used with threaded RWC connectors to make a proper seal.

Galvanized Tubing

RWC push-to-connect fittings (ASSE 1061 connection) should not be installed on galvanized tubing.

SharkBite Soldering

When soldering is required near a RWC PEX connection, make all solder joints first and then make the PEX connections. Flame can cause the pipe to reach high temperatures and should not be used close to RWC PEX.

SharkBite Fitting Reuse

RWC brass push-to-connect and John Guest ProLocK are intended to be a permanent connection and are not designed for repeated connection and disconnection after the initial install.

Storage and Handling

- Store fittings in original packaging or one of the following:
  - Zip-locking closure
  - Smaller bag quantities
- Avoid UV exposure.
  - Store in locations where they will not be exposed to direct UV radiation (light)
  - Once installed, take caution to avoid UV exposure that exceeds the UV rating of the tubing

What to Avoid

- Not approved to convey fuel gases
- Not approved for use in compressed air systems
- Do not use as an electrical ground
- Do not install PEX between tub/shower valve and tub spout (detail drawing)
- Do not install on galvanized pipe or fittings (threaded or push-to-connect)

Applications

Pipe and Fitting Support

SharkBite PEX must be properly supported to protect against excessive strain. For both vertical and horizontal applications we recommend the pipe be supported every 32 inches between supports, leaving a little slack (1/8-1/4 inch) in the pipe to allow for normal expansion and contraction. Always use approved PEX supports, and never use a support that has sharp edges.

Support Lengths for Horizontal Applications Per Code			
PEX Sizes	IPC	UPC	NPCC
1/2" - 1"	32"	32"	0.8 m
1-1/4" - 2"	48"	48"	0.8 m

- 1/2" - 1" RWC Piping System fittings and valves may be installed anywhere between supports.
- 1-1/4" - 2" RWC Piping System fittings and valves may be installed anywhere between supports.
- Support required within 6" of multi-port tees or groups of street tees.

Support Lengths for Vertical Applications Per Code			
PEX Sizes	IPC	UPC	NPCC
1/4" - 2"	Base of each floor 7.5 m max		
Mid-story guide	x	x	x

- Strapping/bundling
  - In parallel piping arrangements, SharkBite PEX may be bundled
  - Requires AHJ approval
  - Hot and cold water lines must be bundled separately
  - Bundles shall be supported at code-required spacing
  - Cable ties may be used to group a bundle
- Expansion/contraction
  - Free body expansion rate: 1.1" ” / 10ºF / 100'
  - For pipe sizes 1” and smaller (e.g. final runouts to fixtures), do not pull tubing tight. Allow some room for normal expansion and contraction.
  - Horizontal expansion/contraction control: expansion loops or off-set arms

Expansion/Contraction Loop Methods

SharkBite PEX Pipe Dimensions, Bend Radius and Fluid Capacity				
Nominal Diameter	O.D. (in.)	I.D. (in.)	Bend Radius	Fluid Cap 100'/Gals
3/8"	0.5	0.35	4"	0.53
1/2"	0.625	0.475	5"	0.96
3/4"	0.875	0.671	7"	1.9
1"	1.125	0.885	10"	3.1

Thermal Expansion

Since SharkBite PEX pipe will expand and contract during temperature changes, please allow slack when running the pipe through the building. SharkBite PEX will expand and contract at a rate of approximately 1 inch per 100 feet of pipe for each 10ºF change in temperature (see equation below). We recommend that offsets and expansion loops be used as ways to compensate for expansion and contraction. The change of pipe length due to temperature increase can be calculated as follows:

$\Delta L = \alpha(L \cdot \Delta T)$
where: ΔL = change of length (inches)
ΔT = change of temperature (ºF)
L = original pipe length (feet)
α = coefficient of linear expansion = (8 x 10-5 @ 68ºF)

Example:
ΔT = 10ºF L = 100’ Δ L = 0.08"

Scan for more information on HoldRite Pipe Supports.

Applications
Pipe and Fitting Support

Applications
Pipe and Fitting Support

Applications

PEX-a Kink Repair Protocol

RWC does not recommend the practice of “hot bending” PEX-a tubing to create a tighter bend radius. For a tighter bend radius, RWC recommends the use of a HoldRite bend support. In the event RWC PEX tubing has gone beyond the factory recommended bend radius specified in the Piping Systems Installation Guide and a kink occurs, cut out the kink using PEX tubing cutters and follow RWC factory installation instructions for a new section of pipe and connections.

If this is not possible, you can repair a kink in RWC PEX-a tubing using a heat gun. To do so properly, use the following steps:

1. Shut off water:

Before starting any repairs, shut off the water supply and relieve the pressure to the affected section to avoid water leakage.

2. Identify the kink:

Locate the area of the PEX tubing where the kink is present. Straighten the PEX tubing and remove any stress.

3. Prepare the heat gun:

For best results, use a heat gun with adjustable temperature to avoid damaging the PEX tubing. Set the heat gun to a low or medium heat setting. Do NOT use an open flame.

4. Heat the kink:

Gently heat the kinked area with the heat gun, moving it back and forth and around the tubing to evenly distribute the heat. Be careful not to overheat (above approximately 335ºF) or apply any pressure to the repair area as it can cause damage to the PEX tubing.

5. Remove the kink:

As the PEX exceeds the crystalline temperature approximately 270ºF (approximately 450 watts of power), hold the tubing straight and carefully rub a wet cloth to over the heated section to cool down the tube. The pipe will be hot, so take precautions to avoid burning yourself while you cool the tubing.

6. Allow pipe to cool:

Once the kink has been removed, let it cool down.

7. Inspect the repair:

After the PEX has cooled, check the repaired area to ensure the tubing has returned to its original shape and is free of any remaining kinks or irregularities. The heated section may be slightly expanded because of the dimensional calibration performed during manufacturing. This does NOT affect the tubing performance. Because of RWC UV coating, you may also notice slight discoloration of the tube. This does NOT affect the performance of the PEX tubing.

8. Turn on water:

Once you are satisfied with the repair, turn the water supply back on and check for any leaks or issues.

Bend Supports

Applications

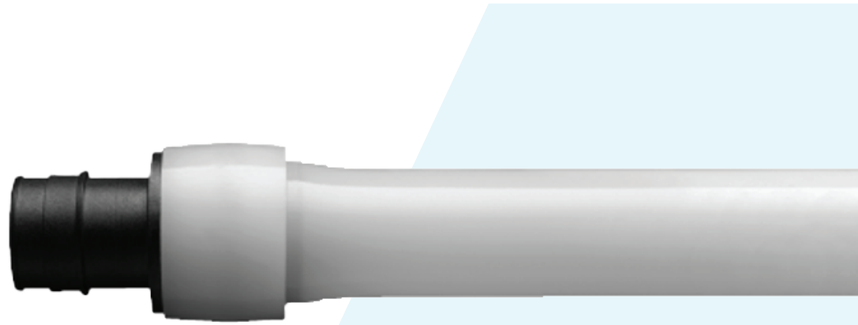
SharkBite PEX Pipe Guidelines

What not to do:

- Do not use sharp instruments to open the SharkBite PEX packaging. You may damage the pipe.
- Do not expose to freezing temperatures, although the pipe is freeze damage resistant. Care should be taken to avoid installations in areas exposed to freezing temperatures. Be sure to carefully pressure test, inspect and repair systems that have been subjected to a freeze before returning them to normal operation.
- Do not pressure test with water in freezing conditions.
- Do not store or install where pipe will be exposed to direct or indirect ultraviolet light (i.e. sunlight).
- Do not expose the pipe to direct flame. Do not install pipe near extreme heat.
- Do not use in excessive operating conditions inconsistent with pressure ratings that appear on pipe and applicable standards.
- Do not subject pipe to prolonged exposure to free chlorine concentrations greater than 4 ppm.
- Do not use in contaminated soils.
- Do not expose to materials that affect the basic properties of cross-linked PEX, brass or copper. Avoid contact with adhesives.
- Do not install through metal studs or concrete without using a protective sleeve.
- Do not install pipe that has defects such as: gouges, cuts, deep scratches, kinks, evidence of grease, tar or any chemical, exposure fading or discoloration.
- Do not use defective fittings with the pipe.
- Do not use supports that may collapse or cut the pipe. Supports should not have sharp edges, which could damage the pipe.
- Do not pull pipe tight at connections. Prevent unnecessary strain on the pipe, fittings and connections with straps or clamps.
- Do not drag the pipe over rough terrain, rocks or any other surface that could abrade, cut, puncture or damage the pipe wall in any way.
- Do not crush or kink the pipe.
- Do not heat kink repair SharkBite PEX-b pipe. Inspect all pipe before and after installation. Do cut out, remove and replace damaged or kinked sections of SharkBite PEX pipe.
- Do not expose to open flame.
- Do not solder, braze, weld or fusion-weld within 18” of any RWC piping system component in the same water line.
  - Complete all solder or fusion connections and allow connections to cool prior to installing any RWC piping system component.
- Avoid contact with solvents, primers, adhesives, adhesive tapes, strong acids, strong bases, or other chemicals that are incompatible with RWC piping system components.

What to do:

- Install SharkBite PEX pipe to the appropriate plumbing code.
- Use in domestic cold water, domestic hot water, and domestic hot water recirculation.
- Keep hot and cold lines separate.
- Use only fittings and accessories that have been tested and approved for the RWC Piping Systems.
- Leave extra pipe at both ends of the run to make connections easier.
- Ensure the pipe is supported properly to prevent undue stress, strain, thermal expansion and contraction.
- Protect SharkBite PEX pipe from damage, both before and during the construction process.
- Pressure test the system upon completion.
- Refer to page 29 or contact RWC for further instructions when repair/reform is needed on kinked SharkBite PEX-a pipe.
- Inspect all pipe before and after installation
- Install RWC brand PEX with RWC brand fittings to achieve full 25 year limited warranty
- Expanding or spray foam insulation – Wrap all fittings
- Firestop caulks, foams, sealants – Wrap all fittings
  - Verify chemical compatibility with PEX tubing prior to application
- Use Teflon tape for threaded transition fittings.
- Connecting to water heater
  - Check local code
  - Uniform Plumbing – No PEX within 18” of piping connected to water heater.
  - International Plumbing – No requirements
- Termiticides and pesticides
  - Spray application of termiticides and pesticides is acceptable
  - Applications where pooling or puddling of these chemicals may occur near the SharkBite piping system shall be avoided.
  - For further information regarding application of termiticides and pesticides scan the QR code below.



Pressure Loss Tables

Uniform Friction Loss at 60°F

Pressure Loss per 100 ft. of Tubing	3/8"		1/2"		5/8"		3/4"		1"		1-1/4"		1-1/2"		2"	
	Velocity ft/sec	GPM	Velocity ft/sec	GPM	Velocity ft/sec	GPM	Velocity ft/sec	GPM	Velocity ft/sec	GPM	Velocity ft/sec	GPM	Velocity ft/sec	GPM	Velocity ft/sec	GPM
0.5				-				-		-	1.5	4.08	1.7	6.44	2.1	13.64
1				-			1.6	1.76	1.9	3.46	2.2	5.98	2.5	9.47	3.0	19.49
1.5			1.5	0.83	1.7	1.42	2.0	2.20	2.4	4.37	2.7	7.34	3.1	11.74	3.7	24.04
2			1.8	0.99	2.0	1.67	2.3	2.54	2.8	5.09	3.2	8.70	3.6	13.64	4.4	28.58
3	1.8	0.54	2.3	1.27	2.6	2.17	3.0	3.25	3.5	6.37	4.1	11.02	4.6	17.24	5.5	35.73
4	2.2	0.66	2.7	1.49	3.0	2.50	3.5	3.86	4.2	7.55	4.8	13.05	5.4	20.27	6.4	41.58
5	2.5	0.75	3.1	1.71	3.4	2.84	4.0	4.35	4.7	8.55	5.4	14.69	6.1	22.92	7.3	47.10
6	2.7	0.81	3.4	1.88	3.8	3.17	4.4	4.85	5.2	9.46	6.0	16.32	6.7	25.38	8.0	51.97
7	3.0	0.90	3.7	2.04	4.1	3.42	4.8	5.29	5.7	10.37	6.6	17.82	7.3	27.66	8.7	56.52
8	3.2	0.96	4.0	2.21	4.5	3.76	5.2	5.70	6.2	11.19	7.1	19.18	7.9	29.74	9.4	61.06
9	3.5	1.05	4.3	2.38	4.8	4.01	5.5	6.10	6.6	11.95	7.5	20.40	8.4	31.82	10.0	64.96
10	3.7	1.11	4.6	2.54	5.1	4.26	5.9	6.47	7.0	12.65	8.0	21.67	8.9	33.72		
11	3.9	1.17	4.9	2.71	5.4	4.51	6.2	6.83	7.3	13.34	8.4	22.84	9.4	35.61		
12	4.1	1.23	5.1	2.82	5.6	4.68	6.5	7.16	7.7	14.01	8.9	24.02	9.9	37.32		
13	4.3	1.29	5.3	2.93	5.9	4.93	6.8	7.49	8.1	14.67	9.2	25.11				
14	4.5	1.35	5.6	3.09	6.1	5.09	7.1	7.80	8.4	15.28	9.6	26.11				
15	4.6	1.38	5.8	3.20	6.4	5.34	7.4	8.13	8.7	15.89	10.0	27.11				
16	4.8	1.44	6.0	3.31	6.6	5.51	7.6	8.41	9.1	16.46						
17	5.0	1.50	6.2	3.42	6.9	5.76	7.9	8.71	9.4	17.04						
18	5.2	1.56	6.4	3.53	7.1	5.93	8.1	8.98	9.7	17.58						
19	5.3	1.59	6.6	3.65	7.3	6.09	8.4	9.26	10.0	18.13						
20	5.5	1.65	6.8	3.76	7.5	6.26	8.7	9.53								
21	5.6	1.68	7.0	3.87	7.7	6.43	8.9	9.81								
22	5.8	1.74	7.2	3.98	7.9	6.60	9.1	10.06								
23	5.9	1.77	7.4	4.09	8.1	6.76	9.4	10.31								
24	6.1	1.83	7.6	4.20	8.3	6.93	9.6	10.56								
25	6.2	1.86	7.7	4.25	8.5	7.10	9.8	10.80								
26	6.4	1.92	7.9	4.36	8.7	7.26	10.0	11.02								
27	6.5	1.95	8.1	4.47	8.9	7.43										
28	6.6	1.98	8.2	4.53	9.1	7.60										
29	6.8	2.04	8.4	4.64	9.3	7.76										
30	6.9	2.07	8.6	4.75	9.4	7.85										
35	7.5	2.25	9.4	5.19												
40	8.1	2.43														
45	8.7	2.61														
50	9.2	2.76														

Uniform Friction Loss at 120°F

Pressure Loss per 100 ft. of Tubing	3/8"		1/2"		5/8"		3/4"		1"		1-1/4"		1-1/2"		2"	
	Velocity ft/sec	GPM	Velocity ft/sec	GPM	Velocity ft/sec	GPM	Velocity ft/sec	GPM	Velocity ft/sec	GPM	Velocity ft/sec	GPM	Velocity ft/sec	GPM	Velocity ft/sec	GPM
0.5				-				-		-	1.7	4.62	1.9	7.20	2.3	14.94
1				-	1.5	1.25	1.8	1.98	2.1	3.82	2.4	6.53	2.7	10.23	3.3	21.44
1.5			1.7	0.94	1.9	1.59	2.2	2.42	2.6	4.73	3.0	8.16	3.4	12.88	4.1	26.63
2	1.6	0.48	2.1	1.13	2.3	1.92	2.6	2.87	3.1	5.64	3.5	9.52	4.0	15.15	4.7	30.53
3	2.0	0.60	2.6	1.41	2.9	2.42	3.3	3.58	3.9	7.09	4.4	11.97	5.0	18.75	5.9	38.33
4	2.4	0.72	3.0	1.66	3.4	2.84	3.9	4.25	4.6	8.28	5.2	14.14	5.8	21.97	6.9	44.82
5	2.8	0.84	3.4	1.90	3.8	3.17	4.4	4.80	5.2	9.37	5.9	16.05	6.6	24.81	7.8	50.67
6	3.1	0.93	3.8	2.10	4.2	3.51	4.8	5.33	5.7	10.37	6.5	17.68	7.3	27.47		
7	3.4	1.02	4.2	2.30	4.6	3.84	5.3	5.79	6.2	11.28	7.1	19.31	7.9	29.93		
8	3.6	1.08	4.5	2.47	4.9	4.09	5.7	6.24	6.7	12.19	7.6	20.67				
9	3.9	1.17	4.8	2.65	5.3	4.42	6.1	6.67	7.2	13.00						
10	4.1	1.23	5.1	2.80	5.6	4.68	6.4	7.09	7.6	13.76						
11	4.3	1.29	5.4	2.96	5.9	4.93	6.8	7.45	8.0	14.49						
12	4.6	1.38	5.6	3.11	6.2	5.18	7.1	7.83								
13	4.8	1.44	5.9	3.24	6.5	5.43	7.4	8.16								
14	5.0	1.50	6.1	3.39	6.7	5.59	7.7	8.53								
15	5.2	1.56	6.4	3.51	7.0	5.84	8.0	8.86								
16	5.4	1.62	6.6	3.65	7.3	6.09										
17	5.6	1.68	6.8	3.78	7.5	6.26										
18	5.7	1.71	7.1	3.90	7.8	6.51										
19	5.9	1.77	7.3	4.01	8.0	6.68										
20	6.1	1.83	7.5	4.13												
21	6.2	1.86	7.7	4.25												
22	6.4	1.92	7.9	4.36												
23	6.6	1.98														
24	6.7	2.01														
25	6.9	2.07														
26	7.0	2.10														
27	7.2	2.16														
28	7.3	2.19														
29	7.5	2.25														
30	7.6	2.28														
35																
40																
45																
50																

Pressure Loss Tables

1/2" SharkBite PEX Pipe

Pressure Loss per 100 feet of Tubing (psi)									
100% Water									
Velocity	Flow Rate	60°F	120°F	140°F	Velocity	Flow Rate	60°F	120°F	140°F
(ft/sec)	GPM	16°C	49°C	60°C	(ft/sec)	GPM	16°C	49°C	60°C
1.5	0.83	1.5	1.2	1.1	5.8	3.20	15.0	12.7	12.1
1.6	0.88	1.6	1.3	1.2	5.9	3.26	15.5	13.1	12.6
1.7	0.94	1.8	1.5	1.4	6.0	3.31	16.0	13.4	12.9
1.8	0.99	2.0	1.6	1.5	6.1	3.37	16.5	13.9	13.3
1.9	1.05	2.2	1.8	1.7	6.2	3.42	16.9	14.2	13.7
2.0	1.10	2.4	1.9	1.8	6.3	3.48	17.4	14.7	14.1
2.1	1.16	2.6	2.1	2.0	6.4	3.53	17.9	15.1	14.5
2.2	1.22	2.8	2.3	2.2	6.5	3.59	18.4	15.5	14.9
2.3	1.27	3.0	2.5	2.4	6.6	3.65	19.0	16.0	15.4
2.4	1.33	3.3	2.7	2.6	6.7	3.70	19.4	16.4	15.7
2.5	1.38	3.5	2.9	2.7	6.8	3.76	20.0	16.9	16.2
2.6	1.44	3.8	3.1	2.9	6.9	3.81	20.4	17.3	16.6
2.7	1.49	4.0	3.3	3.1	7.0	3.87	21.0	17.8	17.1
2.8	1.55	4.3	3.5	3.4	7.1	3.92	21.5	18.2	17.5
2.9	1.60	4.5	3.7	3.5	7.2	3.98	22.1	18.7	18.0
3.0	1.66	4.8	4.0	3.8	7.3	4.03	22.6	19.1	18.4
3.1	1.71	5.0	4.2	4.0	7.4	4.09	23.2	19.6	18.9
3.2	1.77	5.4	4.4	4.2	7.5	4.14	23.7	20.1	19.3
3.3	1.82	5.6	4.7	4.5	7.6	4.20	24.3	20.6	19.8
3.4	1.88	5.9	4.9	4.7	7.7	4.25	24.8	21.0	20.2
3.5	1.93	6.2	5.2	4.9	7.8	4.31	25.4	21.6	20.7
3.6	1.99	6.6	5.5	5.2	7.9	4.36	25.9	22.0	21.2
3.7	2.04	6.9	5.7	5.4	8.0	4.42	26.6	22.5	21.7
3.8	2.10	7.2	6.0	5.7	8.1	4.47	27.1	23.0	22.1
3.9	2.15	7.5	6.2	6.0	8.2	4.53	27.8	23.6	22.7
4.0	2.21	7.9	6.6	6.3	8.3	4.58	28.3	24.0	23.1
4.1	2.26	8.2	6.8	6.5	8.4	4.64	29.0	24.6	23.7
4.2	2.32	8.6	7.1	6.8	8.5	4.69	29.5	25.1	24.1
4.3	2.38	9.0	7.5	7.2	8.6	4.75	30.2	25.7	24.7
4.4	2.43	9.3	7.8	7.4	8.7	4.81	30.9	26.2	25.3
4.5	2.49	9.7	8.1	7.8	8.8	4.86	31.4	26.7	25.7
4.6	2.54	10.0	8.4	8.0	8.9	4.92	32.1	27.3	26.3
4.7	2.60	10.5	8.7	8.4	9.0	4.97	32.7	27.8	26.8
4.8	2.65	10.8	9.0	8.7	9.1	5.03	33.4	28.4	27.4
4.9	2.71	11.2	9.4	9.0	9.2	5.08	34.0	29.0	27.9
5.0	2.76	11.6	9.7	9.3	9.3	5.14	34.7	29.6	28.5
5.1	2.82	12.1	10.1	9.7	9.4	5.19	35.3	30.1	29.0
5.2	2.87	12.4	10.4	10.0	9.5	5.25	36.0	30.7	29.6
5.3	2.93	12.9	10.8	10.4	9.6	5.30	36.6	31.3	30.1
5.4	2.98	13.3	11.1	10.7	9.7	5.36	37.4	31.9	30.7
5.5	3.04	13.7	11.6	11.1	9.8	5.41	38.0	32.4	31.2
5.6	3.09	14.1	11.9	11.4	9.9	5.47	38.8	33.1	31.9
5.7	3.15	14.6	12.3	11.8	10.0	5.52	39.4	33.6	32.4

3/4" SharkBite PEX Pipe

Pressure Loss per 100 feet of Tubing (psi)									
100% Water									
Velocity	Flow Rate	60°F	120°F	140°F	Velocity	Flow Rate	60°F	120°F	140°F
(ft/sec)	GPM	16°C	49°C	60°C	(ft/sec)	GPM	16°C	49°C	60°C
1.5	1.65	0.9	0.8	0.7	5.8	6.39	9.8	8.3	8.0
1.6	1.76	1.0	0.9	0.8	5.9	6.50	10.1	8.6	8.3
1.7	1.87	1.2	0.9	0.9	6.0	6.61	10.4	8.9	8.5
1.8	1.98	1.3	1.0	1.0	6.1	6.72	10.7	9.1	8.8
1.9	2.09	1.4	1.1	1.1	6.2	6.83	11.0	9.4	9.0
2.0	2.20	1.5	1.3	1.2	6.3	6.94	11.4	9.7	9.3
2.1	2.31	1.7	1.4	1.3	6.4	7.05	11.7	9.9	9.6
2.2	2.42	1.8	1.5	1.4	6.5	7.16	12.0	10.2	9.8
2.3	2.54	2.0	1.6	1.5	6.6	7.27	12.3	10.5	10.1
2.4	2.65	2.1	1.7	1.7	6.7	7.38	12.7	10.8	10.4
2.5	2.76	2.3	1.9	1.8	6.8	7.49	13.0	11.1	10.7
2.6	2.87	2.4	2.0	1.9	6.9	7.61	13.4	11.4	11.0
2.7	2.98	2.6	2.1	2.1	7.0	7.72	13.7	11.7	11.3
2.8	3.09	2.7	2.3	2.2	7.1	7.83	14.1	12.0	11.6
2.9	3.20	2.9	2.4	2.3	7.2	7.94	14.4	12.3	11.9
3.0	3.31	3.1	2.6	2.5	7.3	8.05	14.8	12.6	12.2
3.1	3.42	3.3	2.7	2.6	7.4	8.16	15.1	13.0	12.5
3.2	3.53	3.5	2.9	2.8	7.5	8.27	15.5	13.3	12.8
3.3	3.64	3.7	3.1	2.9	7.6	8.38	15.9	13.6	13.1
3.4	3.75	3.8	3.2	3.1	7.7	8.49	16.3	13.9	13.4
3.5	3.86	4.0	3.4	3.2	7.8	8.60	16.6	14.2	13.7
3.6	3.97	4.3	3.6	3.4	7.9	8.71	17.0	14.6	14.0
3.7	4.08	4.5	3.7	3.6	8.0	8.82	17.4	14.9	14.4
3.8	4.19	4.7	3.9	3.8	8.1	8.93	17.8	15.2	14.7
3.9	4.30	4.9	4.1	3.9	8.2	9.04	18.2	15.6	15.0
4.0	4.41	5.1	4.3	4.1	8.3	9.15	18.6	15.9	15.4
4.1	4.52	5.3	4.5	4.3	8.4	9.26	19.0	16.3	15.7
4.2	4.63	5.6	4.7	4.5	8.5	9.37	19.4	16.6	16.0
4.3	4.74	5.8	4.9	4.7	8.6	9.48	19.8	17.0	16.4
4.4	4.85	6.0	5.1	4.9	8.7	9.59	20.2	17.3	16.7
4.5	4.96	6.3	5.3	5.1	8.8	9.70	20.6	17.7	17.1
4.6	5.07	6.5	5.5	5.3	8.9	9.81	21.0	18.1	17.4
4.7	5.18	6.8	5.7	5.5	9.0	9.92	21.5	18.4	17.8
4.8	5.29	7.0	5.9	5.7	9.1	10.03	21.9	18.8	18.1
4.9	5.40	7.3	6.2	5.9	9.2	10.14	22.3	19.2	18.5
5.0	5.51	7.6	6.4	6.1	9.3	10.25	22.7	19.6	18.9
5.1	5.62	7.8	6.6	6.4	9.4	10.36	23.2	20.0	19.3
5.2	5.73	8.1	6.9	6.6	9.5	10.47	23.6	20.3	19.6
5.3	5.84	8.4	7.1	6.8	9.6	10.58	24.1	20.7	20.0
5.4	5.95	8.7	7.3	7.1	9.7	10.69	24.5	21.1	20.4
5.5	6.06	8.9	7.6	7.3	9.8	10.80	25.0	21.5	20.8
5.6	6.17	9.2	7.8	7.5	9.9	10.91	25.4	21.9	21.2
5.7	6.28	9.5	8.1	7.8	10.0	11.02	25.9	22.3	21.5

Pressure Loss Tables

1" SharkBite PEX Pipe

Pressure Loss per 100 feet of Tubing (psi)									
100% Water									
Velocity (ft/sec)	Flow Rate GPM	60°F 16°C	120°F 49°C	140°F 60°C	Velocity (ft/sec)	Flow Rate GPM	60°F 16°C	120°F 49°C	140°F 60°C
1.5	2.73	0.7	0.6	0.5	5.8	10.55	7.2	6.2	6.0
1.6	2.91	0.8	0.6	0.6	5.9	10.73	7.4	6.4	6.1
1.7	3.09	0.8	0.7	0.7	6.0	10.91	7.7	6.6	6.3
1.8	3.27	0.9	0.8	0.7	6.1	11.10	7.9	6.8	6.5
1.9	3.46	1.0	0.8	0.8	6.2	11.28	8.1	7.0	6.7
2.0	3.64	1.1	0.9	0.9	6.3	11.46	8.4	7.2	6.9
2.1	3.82	1.2	1.0	1.0	6.4	11.64	8.6	7.4	7.1
2.2	4.00	1.3	1.1	1.0	6.5	11.82	8.8	7.6	7.3
2.3	4.18	1.4	1.2	1.1	6.6	12.01	9.1	7.8	7.5
2.4	4.37	1.5	1.3	1.2	6.7	12.19	9.3	8.0	7.7
2.5	4.55	1.6	1.4	1.3	6.8	12.37	9.6	8.2	7.9
2.6	4.73	1.8	1.5	1.4	6.9	12.55	9.8	8.5	8.2
2.7	4.91	1.9	1.6	1.5	7.0	12.73	10.1	8.7	8.4
2.8	5.09	2.0	1.7	1.6	7.1	12.91	10.4	8.9	8.6
2.9	5.28	2.1	1.8	1.7	7.2	13.10	10.6	9.1	8.8
3.0	5.46	2.3	1.9	1.8	7.3	13.28	10.9	9.4	9.0
3.1	5.64	2.4	2.0	1.9	7.4	13.46	11.2	9.6	9.3
3.2	5.82	2.5	2.1	2.0	7.5	13.64	11.4	9.8	9.5
3.3	6.00	2.7	2.2	2.2	7.6	13.82	11.7	10.1	9.7
3.4	6.18	2.8	2.4	2.3	7.7	14.01	12.0	10.3	10.0
3.5	6.37	3.0	2.5	2.4	7.8	14.19	12.3	10.6	10.2
3.6	6.55	3.1	2.6	2.5	7.9	14.37	12.5	10.8	10.4
3.7	6.73	3.3	2.8	2.6	8.0	14.55	12.8	11.1	10.7
3.8	6.91	3.4	2.9	2.8	8.1	14.73	13.1	11.3	10.9
3.9	7.09	3.6	3.0	2.9	8.2	14.92	13.4	11.6	11.2
4.0	7.28	3.7	3.2	3.0	8.3	15.10	13.7	11.8	11.4
4.1	7.46	3.9	3.3	3.2	8.4	15.28	14.0	12.1	11.7
4.2	7.64	4.1	3.5	3.3	8.5	15.46	14.3	12.4	11.9
4.3	7.82	4.3	3.6	3.5	8.6	15.64	14.6	12.6	12.2
4.4	8.00	4.4	3.8	3.6	8.7	15.83	14.9	12.9	12.5
4.5	8.19	4.6	3.9	3.8	8.8	16.01	15.2	13.2	12.7
4.6	8.37	4.8	4.1	3.9	8.9	16.19	15.5	13.4	13.0
4.7	8.55	5.0	4.2	4.1	9.0	16.37	15.8	13.7	13.3
4.8	8.73	5.2	4.4	4.2	9.1	16.55	16.2	14.0	13.5
4.9	8.91	5.4	4.6	4.4	9.2	16.73	16.5	14.3	13.8
5.0	9.09	5.5	4.7	4.5	9.3	16.92	16.8	14.6	14.1
5.1	9.28	5.8	4.9	4.7	9.4	17.10	17.1	14.9	14.4
5.2	9.46	6.0	5.1	4.9	9.5	17.28	17.5	15.1	14.6
5.3	9.64	6.2	5.3	5.1	9.6	17.46	17.8	15.4	14.9
5.4	9.82	6.4	5.4	5.2	9.7	17.64	18.1	15.7	15.2
5.5	10.00	6.6	5.6	5.4	9.8	17.83	18.5	16.0	15.5
5.6	10.19	6.8	5.8	5.6	9.9	18.01	18.8	16.3	15.8
5.7	10.37	7.0	6.0	5.8	10.0	18.19	19.1	16.6	16.1

1-1/4" SharkBite PEX Pipe

Pressure Loss per 100 feet of Tubing (psi)									
100% Water									
Velocity (ft/sec)	Flow Rate GPM	60°F 16°C	120°F 49°C	140°F 60°C	Velocity (ft/sec)	Flow Rate GPM	60°F 16°C	120°F 49°C	140°F 60°C
1.5	4.08	0.5	0.4	0.4	5.8	15.77	5.7	4.9	4.7
1.6	4.35	0.6	0.5	0.5	5.9	16.05	5.8	5.0	4.8
1.7	4.62	0.6	0.5	0.5	6.0	16.32	6.0	5.2	5.0
1.8	4.90	0.7	0.6	0.6	6.1	16.59	6.2	5.3	5.1
1.9	5.17	0.8	0.7	0.6	6.2	16.86	6.4	5.5	5.3
2.0	5.44	0.9	0.7	0.7	6.3	17.13	6.6	5.7	5.5
2.1	5.71	0.9	0.8	0.8	6.4	17.40	6.7	5.8	5.6
2.2	5.98	1.0	0.9	0.8	6.5	17.68	6.9	6.0	5.8
2.3	6.25	1.1	0.9	0.9	6.6	17.95	7.1	6.2	5.9
2.4	6.53	1.2	1.0	1.0	6.7	18.22	7.3	6.3	6.1
2.5	6.80	1.3	1.1	1.0	6.8	18.49	7.5	6.5	6.3
2.6	7.07	1.4	1.1	1.1	6.9	18.76	7.7	6.7	6.4
2.7	7.34	1.5	1.2	1.2	7.0	19.04	7.9	6.9	6.6
2.8	7.61	1.6	1.3	1.3	7.1	19.31	8.1	7.0	6.8
2.9	7.89	1.7	1.4	1.3	7.2	19.58	8.3	7.2	7.0
3.0	8.16	1.8	1.5	1.4	7.3	19.85	8.5	7.4	7.1
3.1	8.43	1.9	1.6	1.5	7.4	20.12	8.7	7.6	7.3
3.2	8.70	2.0	1.7	1.6	7.5	20.40	9.0	7.8	7.5
3.3	8.97	2.1	1.8	1.7	7.6	20.67	9.2	8.0	7.7
3.4	9.25	2.2	1.9	1.8	7.7	20.94	9.4	8.1	7.9
3.5	9.52	2.3	2.0	1.9	7.8	21.21	9.6	8.3	8.1
3.6	9.79	2.4	2.1	2.0	7.9	21.48	9.8	8.5	8.3
3.7	10.06	2.5	2.2	2.1	8.0	21.76	10.1	8.7	8.5
3.8	10.33	2.7	2.3	2.2	8.1	22.03	10.3	8.9	8.6
3.9	10.61	2.8	2.4	2.3	8.2	22.30	10.5	9.1	8.8
4.0	10.88	2.9	2.5	2.4	8.3	22.57	10.8	9.3	9.0
4.1	11.15	3.1	2.6	2.5	8.4	22.84	11.0	9.6	9.2
4.2	11.42	3.2	2.7	2.6	8.5	23.12	11.2	9.8	9.5
4.3	11.69	3.3	2.8	2.7	8.6	23.39	11.5	10.0	9.7
4.4	11.97	3.5	3.0	2.8	8.7	23.66	11.7	10.2	9.9
4.5	12.24	3.6	3.1	3.0	8.8	23.93	11.9	10.4	10.1
4.6	12.51	3.7	3.2	3.1	8.9	24.20	12.2	10.6	10.3
4.7	12.78	3.9	3.3	3.2	9.0	24.48	12.4	10.8	10.5
4.8	13.05	4.0	3.5	3.3	9.1	24.75	12.7	11.1	10.7
4.9	13.33	4.2	3.6	3.5	9.2	25.02	12.9	11.3	10.9
5.0	13.60	4.3	3.7	3.6	9.3	25.29	13.2	11.5	11.1
5.1	13.87	4.5	3.9	3.7	9.4	25.56	13.5	11.7	11.4
5.2	14.14	4.7	4.0	3.8	9.5	25.84	13.7	12.0	11.6
5.3	14.41	4.8	4.1	4.0	9.6	26.11	14.0	12.2	11.8
5.4	14.69	5.0	4.3	4.1	9.7	26.38	14.2	12.4	12.1
5.5	14.96	5.1	4.4	4.3	9.8	26.65	14.5	12.7	12.3
5.6	15.23	5.3	4.6	4.4	9.9	26.92	14.8	12.9	12.5
5.7	15.50	5.5	4.7	4.5	10.0	27.20	15.1	13.2	12.8

Pressure Loss Tables

1-1/2" SharkBite PEX Pipe

Pressure Loss per 100 feet of Tubing (psi)									
100% Water									
Velocity (ft/sec)	Flow Rate GPM	60°F 16°C	120°F 49°C	140°F 60°C	Velocity (ft/sec)	Flow Rate GPM	60°F 16°C	120°F 49°C	140°F 60°C
1.5	5.68	0.4	0.4	0.3	5.8	21.97	4.6	4.0	3.9
1.6	6.06	0.5	0.4	0.4	5.9	22.35	4.8	4.1	4.0
1.7	6.44	0.5	0.4	0.4	6.0	22.73	4.9	4.3	4.1
1.8	6.82	0.6	0.5	0.5	6.1	23.11	5.1	4.4	4.2
1.9	7.20	0.6	0.5	0.5	6.2	23.49	5.2	4.5	4.4
2.0	7.58	0.7	0.6	0.6	6.3	23.87	5.4	4.7	4.5
2.1	7.96	0.8	0.6	0.6	6.4	24.25	5.5	4.8	4.6
2.2	8.33	0.8	0.7	0.7	6.5	24.62	5.7	4.9	4.8
2.3	8.71	0.9	0.8	0.7	6.6	25.00	5.8	5.1	4.9
2.4	9.09	1.0	0.8	0.8	6.7	25.38	6.0	5.2	5.0
2.5	9.47	1.0	0.9	0.8	6.8	25.76	6.2	5.3	5.2
2.6	9.85	1.1	0.9	0.9	6.9	26.14	6.3	5.5	5.3
2.7	10.23	1.2	1.0	1.0	7.0	26.52	6.5	5.6	5.5
2.8	10.61	1.3	1.1	1.0	7.1	26.90	6.7	5.8	5.6
2.9	10.99	1.3	1.1	1.1	7.2	27.28	6.8	5.9	5.7
3.0	11.37	1.4	1.2	1.2	7.3	27.66	7.0	6.1	5.9
3.1	11.74	1.5	1.3	1.2	7.4	28.03	7.2	6.2	6.0
3.2	12.12	1.6	1.4	1.3	7.5	28.41	7.3	6.4	6.2
3.3	12.50	1.7	1.4	1.4	7.6	28.79	7.5	6.6	6.3
3.4	12.88	1.8	1.5	1.5	7.7	29.17	7.7	6.7	6.5
3.5	13.26	1.9	1.6	1.5	7.8	29.55	7.9	6.9	6.7
3.6	13.64	2.0	1.7	1.6	7.9	29.93	8.1	7.0	6.8
3.7	14.02	2.1	1.8	1.7	8.0	30.31	8.3	7.2	7.0
3.8	14.40	2.2	1.9	1.8	8.1	30.69	8.4	7.4	7.1
3.9	14.77	2.3	1.9	1.9	8.2	31.06	8.6	7.5	7.3
4.0	15.15	2.4	2.0	2.0	8.3	31.44	8.8	7.7	7.5
4.1	15.53	2.5	2.1	2.1	8.4	31.82	9.0	7.9	7.6
4.2	15.91	2.6	2.2	2.1	8.5	32.20	9.2	8.1	7.8
4.3	16.29	2.7	2.3	2.2	8.6	32.58	9.4	8.2	8.0
4.4	16.67	2.8	2.4	2.3	8.7	32.96	9.6	8.4	8.1
4.5	17.05	2.9	2.5	2.4	8.8	33.34	9.8	8.6	8.3
4.6	17.43	3.1	2.6	2.5	8.9	33.72	10.0	8.8	8.5
4.7	17.81	3.2	2.7	2.6	9.0	34.10	10.2	8.9	8.7
4.8	18.18	3.3	2.8	2.7	9.1	34.47	10.4	9.1	8.8
4.9	18.56	3.4	2.9	2.8	9.2	34.85	10.6	9.3	9.0
5.0	18.94	3.5	3.1	2.9	9.3	35.23	10.8	9.5	9.2
5.1	19.32	3.7	3.2	3.1	9.4	35.61	11.0	9.7	9.4
5.2	19.70	3.8	3.3	3.2	9.5	35.99	11.3	9.9	9.6
5.3	20.08	3.9	3.4	3.3	9.6	36.37	11.5	10.1	9.8
5.4	20.46	4.1	3.5	3.4	9.7	36.75	11.7	10.3	10.0
5.5	20.84	4.2	3.6	3.5	9.8	37.13	11.9	10.5	10.2
5.6	21.21	4.3	3.8	3.6	9.9	37.50	12.1	10.7	10.3
5.7	21.59	4.5	3.9	3.7	10.0	37.88	12.4	10.9	10.5

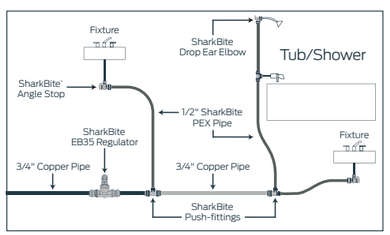
2" SharkBite PEX Pipe

Pressure Loss per 100 feet of Tubing (psi)									
100% Water									
Velocity (ft/sec)	Flow Rate GPM	60°F 16°C	120°F 49°C	140°F 60°C	Velocity (ft/sec)	Flow Rate GPM	60°F 16°C	120°F 49°C	140°F 60°C
1.5	9.74	0.3	0.3	0.2	5.8	37.68	3.3	2.9	2.8
1.6	10.39	0.3	0.3	0.3	5.9	38.33	3.5	3.0	2.9
1.7	11.04	0.4	0.3	0.3	6.0	38.98	3.6	3.1	3.0
1.8	11.69	0.4	0.4	0.3	6.1	39.63	3.7	3.2	3.1
1.9	12.34	0.5	0.4	0.4	6.2	40.28	3.8	3.3	3.2
2.0	12.99	0.5	0.4	0.4	6.3	40.93	3.9	3.4	3.3
2.1	13.64	0.5	0.5	0.4	6.4	41.58	4.0	3.5	3.4
2.2	14.29	0.6	0.5	0.5	6.5	42.22	4.1	3.6	3.5
2.3	14.94	0.6	0.5	0.5	6.6	42.87	4.2	3.7	3.6
2.4	15.59	0.7	0.6	0.6	6.7	43.52	4.3	3.8	3.7
2.5	16.24	0.7	0.6	0.6	6.8	44.17	4.5	3.9	3.8
2.6	16.89	0.8	0.7	0.7	6.9	44.82	4.6	4.0	3.9
2.7	17.54	0.9	0.7	0.7	7.0	45.47	4.7	4.1	4.0
2.8	18.19	0.9	0.8	0.7	7.1	46.12	4.8	4.2	4.1
2.9	18.84	1.0	0.8	0.8	7.2	46.77	4.9	4.3	4.2
3.0	19.49	1.0	0.9	0.8	7.3	47.42	5.1	4.5	4.3
3.1	20.14	1.1	0.9	0.9	7.4	48.07	5.2	4.6	4.4
3.2	20.79	1.2	1.0	1.0	7.5	48.72	5.3	4.7	4.5
3.3	21.44	1.2	1.0	1.0	7.6	49.37	5.5	4.8	4.7
3.4	22.09	1.3	1.1	1.1	7.7	50.02	5.6	4.9	4.8
3.5	22.74	1.4	1.2	1.1	7.8	50.67	5.7	5.0	4.9
3.6	23.39	1.4	1.2	1.2	7.9	51.32	5.9	5.2	5.0
3.7	24.04	1.5	1.3	1.2	8.0	51.97	6.0	5.3	5.1
3.8	24.69	1.6	1.3	1.3	8.1	52.62	6.1	5.4	5.2
3.9	25.33	1.6	1.4	1.4	8.2	53.27	6.3	5.5	5.4
4.0	25.98	1.7	1.5	1.4	8.3	53.92	6.4	5.6	5.5
4.1	26.63	1.8	1.5	1.5	8.4	54.57	6.5	5.8	5.6
4.2	27.28	1.9	1.6	1.6	8.5	55.22	6.7	5.9	5.7
4.3	27.93	2.0	1.7	1.6	8.6	55.87	6.8	6.0	5.9
4.4	28.58	2.0	1.8	1.7	8.7	56.52	7.0	6.2	6.0
4.5	29.23	2.1	1.8	1.8	8.8	57.17	7.1	6.3	6.1
4.6	29.88	2.2	1.9	1.8	8.9	57.82	7.3	6.4	6.2
4.7	30.53	2.3	2.0	1.9	9.0	58.46	7.4	6.6	6.4
4.8	31.18	2.4	2.1	2.0	9.1	59.11	7.6	6.7	6.5
4.9	31.83	2.5	2.1	2.1	9.2	59.76	7.7	6.8	6.6
5.0	32.48	2.6	2.2	2.1	9.3	60.41	7.9	7.0	6.8
5.1	33.13	2.7	2.3	2.2	9.4	61.06	8.0	7.1	6.9
5.2	33.78	2.7	2.4	2.3	9.5	61.71	8.2	7.3	7.0
5.3	34.43	2.8	2.5	2.4	9.6	62.36	8.3	7.4	7.2
5.4	35.08	2.9	2.6	2.5	9.7	63.01	8.5	7.5	7.3
5.5	35.73	3.0	2.6	2.6	9.8	63.66	8.7	7.7	7.5
5.6	36.38	3.1	2.7	2.6	9.9	64.31	8.8	7.8	7.6
5.7	37.03	3.2	2.8	2.7	10.0	64.96	9.0	8.0	7.8

Plumbing Systems Layout

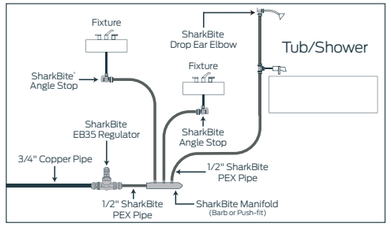
RWC Piping Systems offer the most complete rough-in solution in the industry. RWC's family of brands includes SharkBite, Cash Acme, HoldRite, John Guest, and Eastman. With the superior products available from these brands, RWC can provide a complete piping system from meter-to-fixture. Regardless of the preferred piping system layout, RWC products allow completion of the system including: PEX pipe (PEX-a and PEX-b), multiple fitting systems, many varieties of pipe supports, control valves (pressure regulating, thermostatic mixing, and pressure relief), outlet boxes (washing machine, icemaker, fixture stop boxes). Four of the most common piping system layout options are:

The Trunk and Branch System



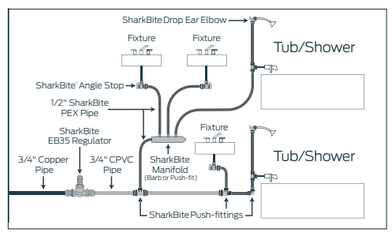
- Uses reducing tees and elbows:
  - Use of PEX tubing allows for reduction in the number of elbows needed by replacing them with sweeps in the PEX piping.
- The flexibility of PEX and faster fitting connections allow for the trunk and branch method to install faster than the same piping layout installed with copper or CPVC.
- Requires more fittings but fewer linear feet of pipe than the Manifold or Combination systems.
- Requires the highest number of pipe to fitting connections of the three layout options.

The Manifold System



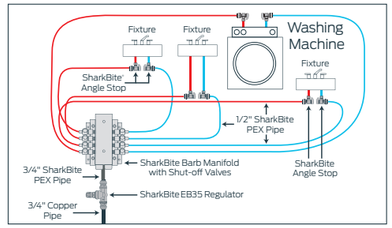
- Central manifolds used to distribute water to fixtures.
  - Manifolds can be a single fitting or can be custom-made from SharkBite EvoPEX reducing street tees.
- Dedicated pipe runs for hot and cold water to each fixture.
- Also takes full advantage of the reduction in elbows needed, due to the flexibility of PEX
- Fewest number of fittings required.
- Fewest number of pipe to fitting connections.
- Requires the most linear feet of pipe, but most all of the pipe is 1/2".

The Combination System



- Uses the best elements of the other two systems.
- 3/4" and larger pipes are used to distribute large volumes of hot or cold water to fixture groups, there mini-manifolds or multi-port tees provide dedicated, shorter runs of pipe to the fixtures.
  - When necessary, reducing tees can be installed in the larger distribution pipes to provide individual fixtures not in fixture groups.
- Slightly more linear feet of pipe than a trunk and branch system, but significantly less than a manifold system.
  - The significant decrease in linear feet of pipe has the additional benefits of reducing material and labor associated with drilling, supporting, and insulating the pipes.

The Home-Run System



- This system uses central manifolds to distribute water to fixtures and appliances. One dedicated pipe is run to each fixture/appliance for both hot and cold water supplies.

System Design

SharkBite PEX tubing is manufactured to have an outer diameter (OD) equivalent to copper tubing (CTS) with a wall thickness standard dimension ratio (SDR) of 9 (i.e., wall thickness is one-ninth the pipe OD). Even though there is a slightly smaller ID with PEX, the wall is three times smoother than new copper allowing it to be designed at higher velocities, reducing the difference in flow characteristics.

When sizing SharkBite Plumbing Systems, be sure to use the fixture unit, estimating demand and friction loss tables as published in the International Plumbing Code (IPC).

Physical Dimensions and Weight

PEX Size (CTS)	O.D. (in.)	Wall Thickness (in.)	Median I.D. (in.)	Weight Per Ft. (lb)	Volume Per Ft. (gal)
1/4"	0.375 ± 0.003	0.062 + 0.010	0.241	0.030	0.003
3/8"	0.500 ± 0.003	0.070 + 0.010	0.350	0.044	0.005
1/2"	0.625 ± 0.004	0.070 + 0.010	0.475	0.054	0.009
3/4"	0.875 ± 0.004	0.097 + 0.010	0.671	0.103	0.018
1"	1.125 ± 0.005	0.125 + 0.013	0.862	0.170	0.030
1" - 1/4"	1.375 ± 0.005	0.153 + 0.015	1.054	0.274	0.045
1" - 1/2"	1.625 ± 0.006	0.181 + 0.019	1.244	0.387	0.063
2"	2.125 ± 0.006	0.236 + 0.024	1.629	0.660	0.108

RWC Plumbing System Disinfection Guidelines

RWC recommends flushing an RWC PEX piping system with clean, potable water. When system disinfection is required, RWC offers the following guidelines for chemical disinfection. RWC PEX piping and fitting systems allow for chlorine disinfection as prescribed in UPC 2018 section 609.9. Of the two procedures prescribed in the code, RWC only recommends the system be filled with water containing 50 ppm of Chlorine. The system shall be valved off and let stand for 24 hours. Following disinfection, the system shall be flushed with source water to ensure the chlorine level in the entire water distribution system is within the EPA maximum of 4 ppm throughout the system.

Chemical Disinfection

Note, when introducing a chemical into a plumbing system for commissioning, flushing or to treat bacterial or other microbial growth, it's important to understand the potential stress that chemical may have on the system. If the introduction of chemicals is not done properly, they have the potential to reduce the life of the piping system and components (i.e., metal, plastic, elastomer, etc.). Only qualified personnel should perform the disinfection procedure to minimize the risk of damage to the plumbing system and components.

For chemical disinfection, RWC recommends the following guidelines:

- Do not allow system pressures to exceed 80 psi.
- Flush the system with potable water after the disinfection.
- Refer to the following table for RWC-approved disinfection chemicals.

Chemical	Symbol	Concentration of Free Chlorine	Maximum Duration	Maximum Temperature
Sodium Hypochlorite	NaOCl	50mg/L (ppm)	24 hours	Ambient
Chlorine (Gas or Liquid)	Cl2	50mg/L (ppm)	24 hours	Ambient
Hydrogen Peroxide	H2O2	50mg/L (ppm)	24 hours	Ambient
Chloramines	NH2Cl	50mg/L (ppm)	24 hours	Ambient

Important:

- RWC does not recommend long-term or continuous chemical treatments.
- Chemical disinfection treatment should only be done in accordance with UPC 2018 section 609.9. Limit chemical disinfection to four cycles over the life of the pipingsystem.
- Do not use high oxidizing agents such as ozone, chlorine dioxide, etc.
- These guidelines are for disinfection treatment and do not supersede normal operating parameters.

These guidelines are for informational purposes only. It is the responsibility of the facility manager, water management contractor and end-user to maintain system health. It is also the responsibility of these individuals to ensure compatibility and effectiveness of the disinfection treatment within the entirety of the plumbing system.

Water Quality

It is important to understand local water quality conditions for the system. Water quality can change over time and RWC is not liable for any changes to the water quality. RWC Piping Systems are third-party tested and certified for use where drinking water qualities meet the requirements of the EPA National Primary Drinking Water Regulations and the Guidelines for Canadian Drinking Water Quality by Health Canada.

Testing

Pressure Testing

Always refer to local code for pressure testing RWC Piping Systems after installation. Testing must be completed prior to concealing pipe and fittings. Only use dishwashing liquid soap and water to detect plumbing leaks. Avoid using 'Leak Detector' spray products.

Water Testing

When water is used for pressure testing and the building is unheated, the system should be drained after testing to prevent freezing. The test pressure applied to the system must meet the pressure testing requirements of the local code but cannot be lower than the system operation pressure. The pressure with water cannot exceed the following pipe listings:

- 73.4F (23c) at 160psi
- 180F (82.2C) at 100psi
- 200F (93.3C) at 80psi

- It is recommended to test at a pressure of 80psi (unless local code indicates higher pressures). The test duration should not be less than 15 minutes.

Air Testing

When air is used for pressure testing, pressure should be from 40psi to 125psi (common test pressure is 100psi). The duration should not be less than one hour and the pressure shall not drop more than 8psi in one hour (deformation of the tube and slow expansion can cause this drop). If the system pressure falls more than 8psi in one hour, the test needs to be repeated. If system continues to lose pressure, use a soapy solution to detect the faulty connection, replace the connection and repeat the test.

RWC PEX pipe systems where push-to-connect (ASSE 1061) fittings are utilized the system shall be hydrostatically pressure tested as follows:

1. Pressurize section of the piping system to 150 psi and let stand for 30 minutes.
2. Reduce Pressure to 30 psi and let stand for 10 minutes.
3. Repeat Step 1 and let stand for 30 minutes.
4. Read pressure gauge and let stand for 1 hour.
5. Check pressure to see if there has been any pressure drop.
6. If any loss of pressure, note pressure and let stand for 1 hour.
7. Check for any pressure loss.
   - a. Use dish soap and water for leak detection.
   - b. Do not use products specifically designed for detection of leaks.

Fire-Resistant Construction

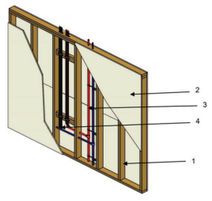
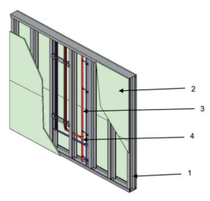
SharkBite PEX-a & PEX-b Rating

ASTM E84 - Surface Burning Characteristics (for plenum applications - US)

- Maximum 2-inch nominal diameter PEX-a or PEX-b piping, installed with rated minimum ½-inch pipe insulation. No spacing requirements between adjacent runs. Maximum SharkBite EvoPEX (k series) and plastic crimp & expansion fitting frequency of 1 every 6 inches, encased with approved pipe insulations. No spacing limitations on brass accessories. SharkBite PEX is listed with QAI complying with ASTM E119, CAN/ULC S101
  - Flame Spread Index: <25
  - Smoke Developed Index: <50

CAN/ULC S102.2 - Surface Burning Characteristics (for High Buildings applications - Canada)

- Maximum 13 mm (1/2-inch) nominal diameter PEX-a piping natural color. No spacing requirements between adjacent runs
  - Flame Spread Index: <25
  - Smoke Developed Index: <50
- Maximum 51 mm (2-inch) nominal diameter PEX-a or PEX-b piping, installed with rated minimum 13 mm (½-inch) pipe insulation. No spacing requirements between adjacent runs. Maximum SharkBite EvoPEX (k series) and plastic crimp & expansion fitting frequency of 1 every 152 mm (6-inches), encased with approved pipe insulations. No spacing limitations on brass accessories.
  - Flame Spread Index: <25
  - Smoke Developed Index: <50
- Approved pipe insulation providers:
  - The following list of insulation types (at minimum thickness of ½" (13 mm)) are approved for use with Cash Acme/SharkBite PEX products (1/2" -2" (13 – 51 mm)). The insulation noted must be listed to ASTM C547 by an approved listing agency: Johns Manville Micro-Lok, Johns Manville Micro-Lok HP and Owens Corning Fiberglass
  - Flame Spread Index: <25
  - Smoke Developed Index: <50

	Wall Framing	Gypsum Wall Board	Non-Metallic Tubing	Manifolds/Fittings	Fasteners
QAI Listing P343-1B **Cash Acme SharkBite PEX Wall Assembly** UL 263, ASTM E119, CAN/ULC S101 1 Hour Fire Resistance Rated Wall Assembly Restricted Load Bearing  	▪ Stud type: wood ▪ Minimum Size: 2" by 6" (38mm x 140mm) ▪ Maximum Spacing: 16" (400mm) on center (OC) ▪ Installation: Cross braced at mid height of the stud and ▪ Penetrations to be fire stopped at the top and bottom	▪ Type: Type X gypsum wallboard complying with ASTM C1396 ▪ Thickness: Single layer of 5/8" (16mm) ▪ Application: Board is to be fastened to studs with 1-5/8" (41mm) length #6 Type S Coarse Thread drywall screws spaced at 8" (200mm) on center around the perimeter, and 12" (305mm) on center spacing in the field. Joints to be taped and mudded, and fastener heads to be mudded as per CSA A82.31-M or ASTM C840 (Minimum Level 3)	▪ Certified Manufacturer: Cash Acme ▪ Certified Product: SharkBite PEX-a or PEX-b Tubing ▪ Nominal Tubing Sizes: 1/2" to 2" (12mm x 51mm) ▪ Installation: Installed to a maximum of 4.85 lbs per linear feet (7.23 kg per linear meter) of cavity. Tubing shall be supported on steel or wood cross-bracing spaced at maximum 48" (1219mm) OC.. Armacell AP Armaflex pipe insulation allowed for installation to maximum density 2.64 lbs/ft (3.93 kg/m).	▪ Certified Manufacturer: Cash Acme ▪ Certified Product: EvoPEX, *MAX, Universal, 2XL, 2XLR, Plastic Crimp (barb) and Brass Crimp (Barb), *Plastic Expansion and *Brass Expansion, Standard Copper Brass or Steel Fittings. ▪ Installation: Installed to a max 4.82 lbs (2.19kg) per cavity.	▪ Max Spacing: 48" (1219mm) *Restricted-Load Bearing – Load rating for this assembly was calculated using the Working Stress Design Method. For jurisdictions employing the Limit States Design Method such as Canada, a load restriction factor shall be used. *MAX, Plastic Expansion, and Brass Expansion fittings are in the process of being added to the listing.
QAI Listing P343-1A **Cash Acme SharkBite PEX Wall Assembly** UL 263, ASTM E119, CAN/ULC S101 1 Hour Fire Resistance Rated Wall Assembly Non-Load Bearing  	▪ Stud Type: Galvanized steel stud and track manufactured in conformance with ASTM C 645 ▪ Minimum Guage: 25 Gauge ▪ Minimum Size: 6" by 1-1/4" (152 mm x 32 mm) ▪ Minimum Spacing: 16" (406 mm) on center (OC) ▪ Installation: Steel studs shall be fastened to the track using min. 5/16 inch (8 mm) pan or wafer head screws	▪ Type: Type X gypsum wallboard complying with ASTM C1396 ▪ Thickness: Single layer of 5/8" (16 mm) ▪ Application: Sheathing is to be fastened to studs with 1-1/4 inch (29 mm) length #6 Type S self drilling fine thread screws spaced at 8 inches (200 mm) on center around the perimeter, and 12 inch (305 mm) on center spacing in the field. Joints to be taped and mudded, and fastener heads to be mudded as per CSA A82.31-M or ASTM C840 (Minimum Level 3)	▪ Certified Manufacturer: Cash Acme ▪ Certified Product: SharkBite PEX-a or PEX-b Tubing ▪ Nominal Tubing Sizes: 1/2" to 2" (12 mm x 51 mm) ▪ Installation: Installed to a maximum of 4.85 lbs per linear feet (7.23 kg per linear meter) of cavity. Tubing shall be supported on steel or wood cross-bracing spaced at maximum 48 inch (1219 mm) OC. Armacell AP Armaflex pipe insulation allowed for installation to maximum density 2.64 lbs/ft (3.93 kg/m).	▪ Certified Manufacturer: Cash Acme ▪ Certified Product: EvoPEX, *MAX, Universal, 2XL, 2XLR, Plastic Crimp (barb) and Brass Crimp (Barb), *Plastic Expansion and *Brass Expansion, Standard Copper Brass or Steel Fittings. ▪ Installation: Installed to a max 4.82 lbs (2.19kg) per cavity.	▪ Max Spacing: 48" (1219mm) *MAX, Plastic Expansion, and Brass Expansion fittings are in the process of being added to the listing.

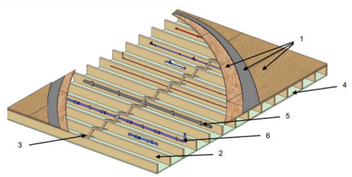
Fire-Resistant Construction

QAI Listing P343-1C

Cash Acme PEX Floor/Ceiling Assembly

UL 263, ASTM E119, CAN/ULC S101

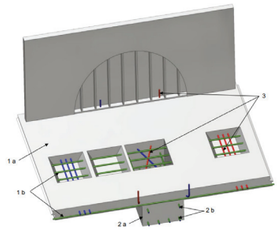
1 Hour Fire-Resistance Rated Unrestrained Floor/Ceiling Restricted Load-Bearing



Flooring System	Floor Joist	Bracing	Gypsum Wall Board
▪ Subfloor – Sheathing Type: 5/8" (16 mm) plywood – Minimum Grade: "C-D" or "Sheathing" – Installation: Face grain of the plywood is to be installed perpendicular to the joists with the joints staggered. Fastened using 8d sinker nails at 8" (204 mm) OC. ▪ Vapier Barrier – Type: 0.010 in. thick commercial rosin-sized pape ▪ Finish Flooring – Sheathing Type: 5/8" (16 mm) plywood – Minimum Grade: "Underlayment" or "single floor" – Maximum Spacing: Face grain of the plywood is to be installed perpendicular to the joists with the joints staggered. Fastened using 8d sinker nails spaced 8" OC. ▪ Topping – Type: Optional: Topping allowed as approved by local authority having jurisdiction as not deteriorating fire resistance of underlying assembly.	▪ Type: 2" by 10" (38 mm x 235 mm) wood joists ▪ Spacing: 16" (406 mm) on center ▪ Application: Effectively fire-blocked in accordance with local codes.	▪ Type: Cross Bracing ▪ Size: As per local codes ▪ Type: Solid Blocking ▪ Size: 2" by 10" (38 mm x 235 mm)	▪ Type: Type X gypsum wallboard complying and listed by approved agency to ASTM C1396 ▪ Thickness: One layer of 5/8" (16 mm) ▪ Application: Installed with the long dimension perpendicular to joists with end joints located under the bottom of joists. End joints in adjacent rows shall be staggered on adjacent joists. Board is to be fastened to joist with or 1-7/8" (48 mm) long, 6D nails spaced 6" (150 mm) OC. with starter nails 1/2" (12 mm) and 3" (75 mm) from board edges. Joints to be taped and mudded, and fastener heads to be mudded as per CSA A82.31-M or ASTM C840 (Minimum Level 3) *Restricted-Load Bearing – Load rating for this assembly was calculated using the Working Stress Design Method. For jurisdictions employing the Limit States Design Method such as Canada, a load restriction factor shall be used.

Non-Metallic Tubing	Manifolds/Fittings	Fasteners (Not shown)
▪ Certified Manufacturer: Cash Acme ▪ Certified Product: SharkBite PEX-a or PEX-b tubing ▪ Nominal Tubing Sizes: 1/2" to 2" (12mm x51mm) ▪ Installation: Installed to a maximum of 1.62 lbs per linear feet (074 kg per linear meter) per joist cavity. The minimum spacing between bottom of the tubing and top of the gypsum board shall be 4-1/2" (114 mm). Optional Armacell AP by Armaflex pipe insulation to maximum 2 pipe runs per cavity at 0.25 lbs/ft (0.37 kg/m).	▪ Certified Manufacturer: Cash Acme ▪ Certified Product: EvoPEX Universal, 2XL, 2XLR, Plastic Crimp (Barb) and Brass Crimp (Barb), Standard Copper Brass or Steel Fittings. ▪ Installation: Installed to maximum 0.24 lbs per foot (0.11 kg/m) per joist cavity, or standard copper, brass or steel plumbing fittings.	▪ Installation: Nominal 1/2" to 1" wide perforated steel or copper straps, or steel or copper U or C shaped brackets with a radius conforming to the outer circumference of the tube to be supported. Fasteners are to be nailed to the wood joists with min. 1" long nails to be spaced 16" (406 mm) OC. ▪ Optional: Plastic J-Hooks (ABS or nylon type) can be used as pipe supports, where anchored with noted 1" long nails spaced 16" (406mm) max.

Fire-Resistant Construction

	1a Concrete Floor Slab	1b Concrete Floor Slab Reinforcing	2a Concrete Beam	2b Concrete Beam Reinforcing	3 Non-Metallic Tubing
QAI Listing P343-1D **RWC Load-Bearing[1] Concrete Floor/Ceiling Assembly** ASTM E119, CAN/ULC S101, UL 263 2 Hour Fire-Resistance Rated Restrained and Unrestrained 	▪ Type: 150 lbs/ft3 (2500 kg/m3) density normal weight concrete. ▪ Specifications: 3500 psi (24 MPa) compressive strength at 28 days. ▪ Minimum Thickness: 6" (150 mm). ▪ Installation Description: Design and installation to be in accordance with the applicable codes.	▪ Type: Steel reinforcing (rebar). ▪ Specifications: Minimum Grade 40 ▪ Minimum Size: 15M (16 mm) diameter. ▪ Installation Description: Placement and sizing to be in accordance with Engineering Design following CSA A23.3 or ACI 318. Concrete to be of minimum 1-1/2" (38 mm) depth covering the steel reinforcing members.	▪ Type: 150 lbs/ft3 (2500 kg/m3) density normal weight concrete. ▪ Specifications: 3500 psi (24 MPa) compressive strength @ 28 days. ▪ Minimum Size: 17.5" wide (445 mm) x 8" (204 mm) depth under concrete floor slab (total thickness of 14" (356 mm) for beam). ▪ Installation Description: Design and installation to be in accordance with the applicable codes for supporting floor loads. Minimum size of beam is to be maintained.	▪ Type: Steel reinforcing. ▪ Specifications: Minimum Grade 40 ▪ Minimum Size: 15M (16 mm) diameter. ▪ Installation Description: Placement and sizing to be in accordance with Engineering Design following CSA A23.3 or ACI 318. Concrete to be of minimum 1-1/2" (38 mm) depth covering the steel reinforcing members	▪ Product: Cash Acme/SharkBIte Type PEX-a and Type PEX-b PEX tubing and accessories. ▪ Manufacturer: Reliance Worldwide Corporation dba Cash Acme ▪ Maximum Size: Maximum 2" (51 mm) nominal diameter. ▪ Maximum Density: 0.97% (16.7"³ piping and accessories allowed per 1 ft³ concrete. ▪ Installation: Piping and accessories can be installed in PVC conduits or polyethylene sleeves. Placement is to be over the steel reinforcing perpendicular to reinforcing direction. Tubes can penetrate the floor assembly through a sill plate into the stud cavity as necessary. Note 1: Floor ceiling described above is fire-resistance rated for load-bearing at 100% design load, determined in accordance with CSA A23.3 and ACI 318 method.

Assembly Types With PEX Pipe As The Through Penetrant		Wall	Floor/Ceiling
Wood-Stud/Steel-Stud Assemblies CLASSIFIED C UL US	1 Hour	▪ XHEZ.W-L-2703 ▪ XHEZ.W-L-2723 ▪ XHEZ.W-L-2710 ▪ XHEZ.W-L-2708 ▪ XHEZ.W-L-2714 ▪ XHEZ.W-L-2717 ▪ XHEZ.W-L-2721 ▪ XHEZ.W-L-2710 ▪ XHEZ.W-L-2714 ▪ XHEZ.W-L-2718 ▪ XHEZ.W-L-2721 ▪ XHEZ.W-L-2723	▪ XHEZ.F-C-2496 ▪ XHEZ.F-C-2498 ▪ XHEZ.F-C-2518 ▪ XHEZ.F-C-2486 ▪ XHEZ.F-C-2488 ▪ XHEZ.F-C-2497 ▪ XHEZ.F-C-8053 ▪ XHEZ.F-C-8056 ▪ XHEZ.F-C-8057 ▪ XHEZ.F-C-2497
	2 Hour	▪ XHEZ.W-L-2703 ▪ XHEZ.W-L-2723 ▪ XHEZ.W-L-2710 ▪ XHEZ.W-L-2708 ▪ XHEZ.W-L-2717 ▪ XHEZ.W-L-2721 ▪ XHEZ.W-L-2710 ▪ XHEZ.W-L-2718 ▪ XHEZ.W-L-2721 ▪ XHEZ.W-L-2723	▪ XHEZ.F-C-2486 ▪ XHEZ.F-C-2488
Concrete Assemblies CLASSIFIED C UL US	2 Hour	▪ XHEZ.C-AJ-2862 ▪ XHEZ.C-AJ-2865	▪ XHEZ.F-B-2042 ▪ XHEZ.F-A-2221 ▪ XHEZ.F-A-2306 ▪ XHEZ.F-A-2302 ▪ XHEZ.C-AJ-2862 ▪ XHEZ.C-AJ-2865
	3 Hour	▪ XHEZ.C-AJ-2863	▪ XHEZ.F-A-8034 ▪ XHEZ.F-B-2042 ▪ XHEZ.F-A-5079 ▪ XHEZ.F-A-2367 ▪ XHEZ.F-A-2269 ▪ XHEZ.F-A-2221 ▪ XHEZ.F-B-8016 ▪ XHEZ.C-AJ-2863

Fire Stopping Solutions

There are a wide range of fire stopping solutions that have been tested and listed with PEX pipe; including intumescent caulks, wrap strips, pass-through devices, collars and cast-in-place sleeves.

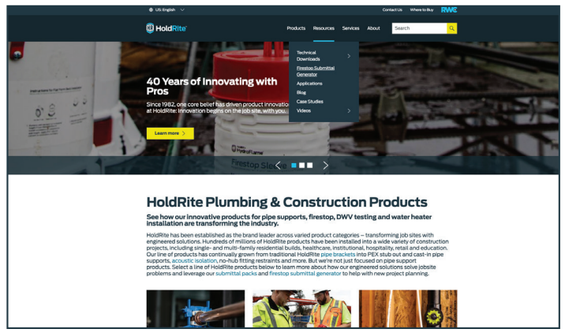
The steps below show an example of how to research and find a listed fire stop assembly for PEX pipe using the Holdrite HydroFlame firestop submittal generator.

Note: Additional fire stop assemblies and listings can be found for Holdrite HydroFlame products as well as other fire stop manufacturers using UL's online search directory at UL.com

Step 1

Visit Holdrite.com, under Resources, select Firestop Submittal Generator. (See Figure 1.)

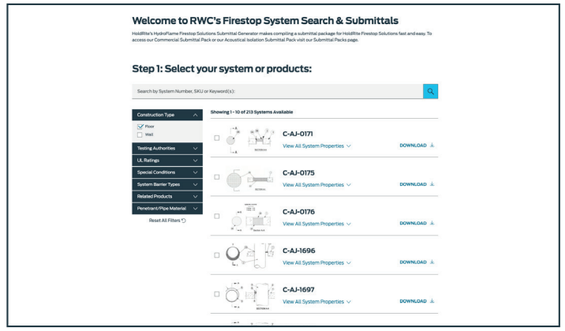
Figure 1: Getting to Holdrite.com firestop submittal generator



Step 2

Select your system or products (if known) or use filters to refine search. First select floor or wall construction type (or Both) to open additional filters.

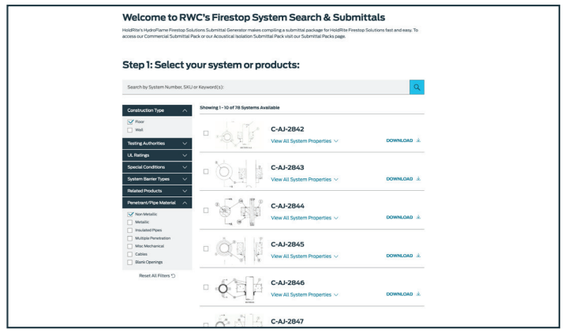
Figure 2: Select Appropriate Features



Step 3

Filter search for PEX tubing, by selecting the Non-Metallic option under the penetrant/Pipe Material drop box.)

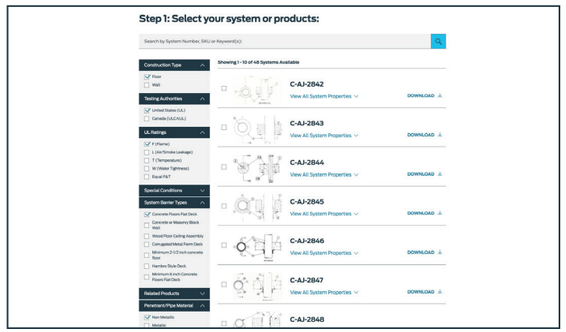
Figure 3: Select Pipe Material



Step 4

Review the system matches for accuracy and consider all available options. Additional filters can be added to further refine your search (I.E. Testing Authorities, UL Ratings, Special Conditions, System barrier types or related products). Download individual listings or select multiple for submittal generation.

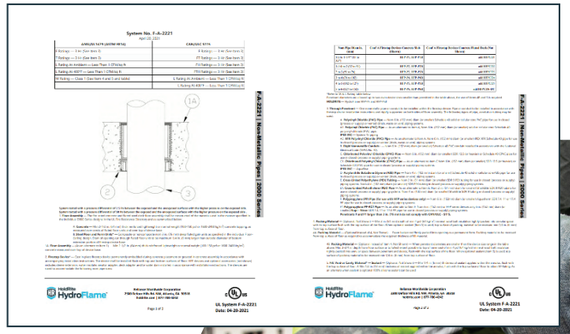
Figure 4: Selecting additional filters



Step 5

Review UL Firestop listings

Figure 5: UL firestop listing

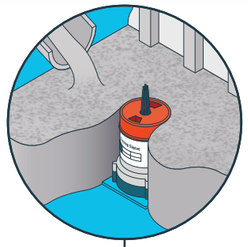


Scan below for the Firestop Submittal Generator

RWC Products
High Rise Multifamily

1: Concrete pour

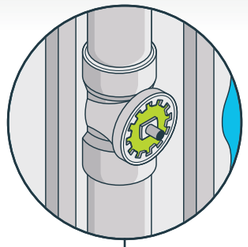
Firestop Systems



In slab popups

2: Drain waste & Vent

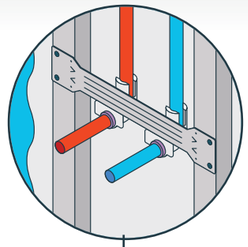
DWV Testing



117 No-Hub Fitting Restraints

3: Potable water systems

Pipe Supports



PEX-a / PEX-b

Fittings

Thermostatic mixing valve

Outlet boxes

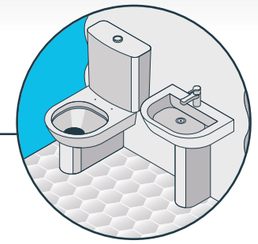
Pressure reducing valve

Water heater connectors

Expansion tanks

Ball valves

4: Fixture top out

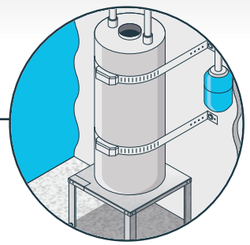


Supply stop

Supply lines

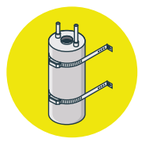
Faucet, Toilet,
Ice Maker, Dishwasher

5: Trim out



Water heater stands

Water heater straps

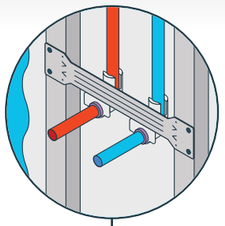


RWC Products

Single Family New Construction

1: Potable water systems

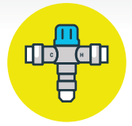
Pipe Supports



PEX-a / PEX-b

Fittings

Thermostatic mixing valve



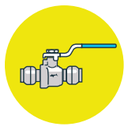
Outlet boxes

Pressure reducing valve

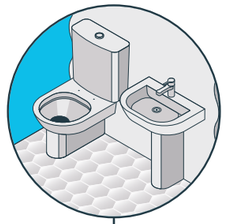
Water heater connectors

Expansion tanks

Ball valves



2: Fixture top out

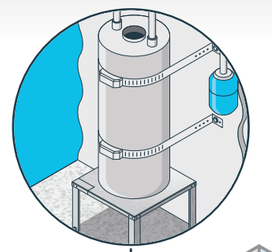


Supply stop

Supply lines

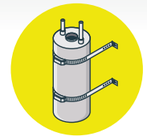
Faucet, Toilet,
Ice Maker, Dishwasher

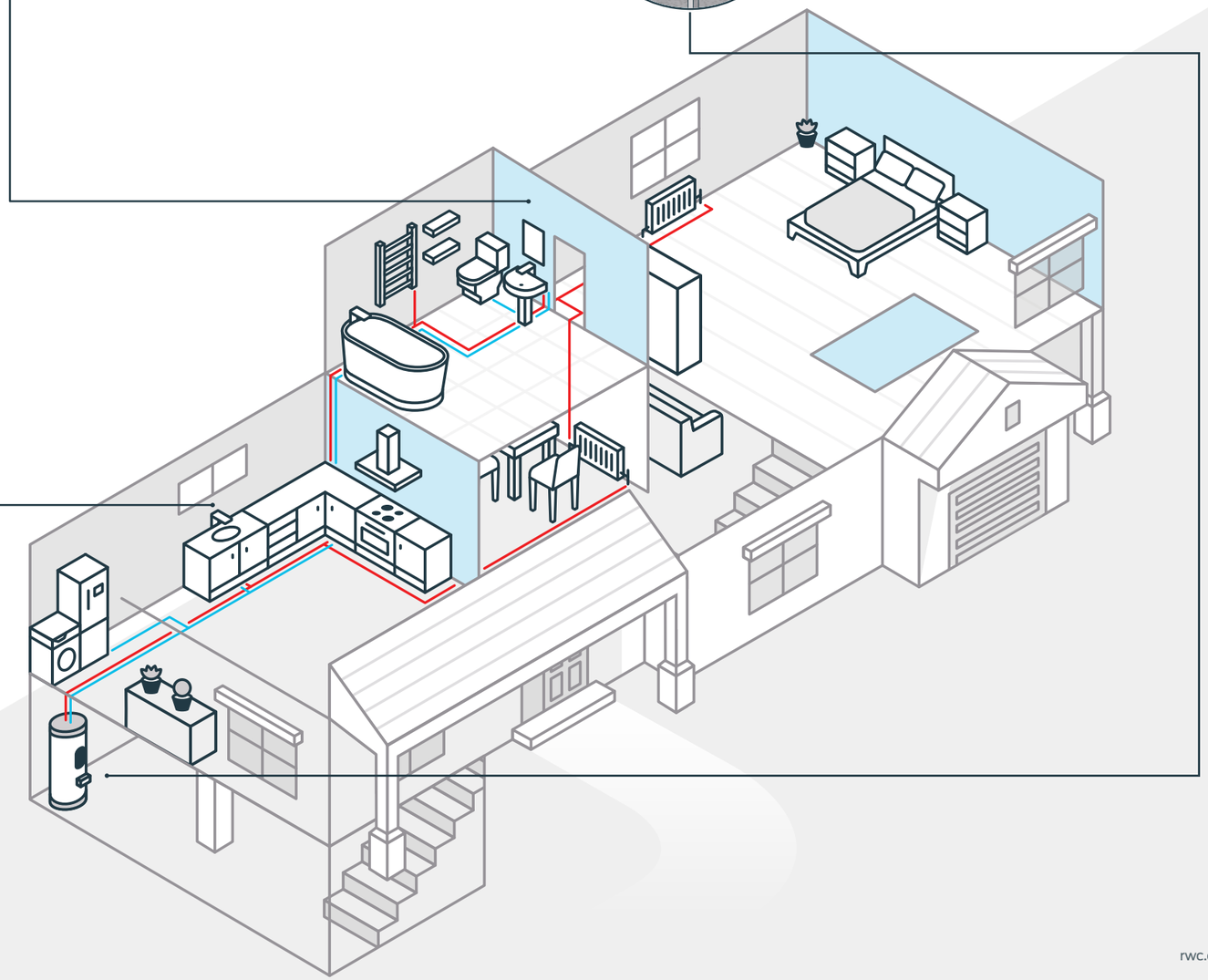
3: Trim out



Water heater stands

Water heater straps





Limited Warranty

SharkBite™, Cash Acme™, HoldRite™, JohnGuest® Products

What does this warranty cover?

Subject to conditions outlined in this statement, RWC (in the USA, Reliance Worldwide Corporation and in Canada, Reliance Worldwide Corporation (Canada) Inc.) warrants to owners of real property in the United States and Canada that RWC products, when used and installed in accordance with the requirements set forth, shall be free from defects in material and workmanship for the applicable Warranty Period. This Limited Warranty is in effect for installations made after January 1, 2018 and is applicable to products installed in the country in which they were purchased.

Proof of purchase is required to validate the Warranty Period. If proof of purchase is not available, the Warranty Period commencement shall default to the date of manufacture for each product. If the product suspected of a defect does not have a clear date of manufacture on it, a proof of purchasewill be required.

What are the conditions of this warranty?

1. All products must be installed in accordance with all then applicable building, mechanical, plumbing, electrical or other applicable code requirements, good plumbing practice, in accordance with any local, state, provincial or federal requirements, and installed in a potable water or radiant heating application unless a non-potable water service is specifically allowed for in the pertinent product literature.
2. The installer must use construction techniques compliant with then applicable codes to install the product and use the product within the design parameters specified in any installation guidelines and technical notes for the applicable system. This shall include field pressure testing prior to concealing with concrete or by other means and wrapping any brass fitting when buried. Failure to install RWC products according to manufacturer's installation instructions will void all applicable warranties and may result in severe water damage.
3. Products must at all times be used in a manner consistent with their intended use and be used in installations and environments acceptable to their material and design specifications, including not being installed in a system that may operate at temperatures or at pressures that exceed the approved ratings which can be found on the product specification, packaging or installation instructions.
4. Additional product specific conditions of this Limited Warranty and the Warranty Period are documented in the section entitled "HOW LONG DOES THE LIMITED WARRANTY COVERAGE LAST AND WHAT OTHER SPECIFIC CONDITIONS EXIST FOR EACH PRODUCT?".
5. Without limiting the foregoing, this Limited Warranty does not apply and you do not have a right of reimbursement if the product failure or resulting damage is caused by: (a) evidence of tampering, mishandling, neglect, abuse, accidental damage, freeze damage (it is expressly understood that failure as a result of any freezing fluids within the pipes does not constitute a defect in material or workmanship and shall not be covered by this warranty) or unauthorized modifications or repairs that cause damage to warranted products; (b) exposure to harmful, unauthorized, or unanticipated chemicals or substances or corrosive water conditions; (c) exposure to ultraviolet light; (d) improper installation including failure to follow proper burial instructions; (e) damage from abnormal operating conditions including exposure pressures and temperatures beyond the specified operating range; (f) failure to properly test and pass common testing methods (including pressure testing) after the installation and before the product or system is put in service; (g) components not manufactured or sold by RWC; or (h) acts of nature such as earthquakes, fire, flood or lightning.
6. Although RWC provides a plumbing system to facilitate a completeinstallation, other manufacturers pipe and/or fittings may be installed in any given installation provided manufacturing of the pipe and/or fittings demonstrates compliance with the applicable ASTM/ CSA standards, and the product has been certified by a recognized third-party testing agency. The RWC product in the given installation will continue to be covered under this Limited Warranty although limits on Warranty Period may apply. RWC will be responsible only for proven defects in material or workmanship in RWC products. Problems in products manufactured by another company should be reported to that manufacturer."

How do you get service?

In order to be eligible for service under this Limited Warranty you must return the defective product to RWC for inspection and testing within thirty (30) days after detection of alleged failure or defect occurring within applicable Warranty Period (with shipping charges prepaid) to the original place of purchase. If the alleged defect involves a connection or joint with a RWC product, the fitting must be returned with a section of the pipe still inserted. You must include the model number of the product (if available), the original date of purchase, proof of purchase and the nature of the alleged product failure or defect. Products returned without shipping charges prepaid will be refused. For questions or inquiries, in the U.S. call 1(877)700-4242 and in Canada 1(888)820-0120.

What will RWC do?

If, after inspection, we find that a product covered by this Limited Warranty has failed due to a defect in material or workmanship during the specified Warranty Period, we will repair or replace, at our sole option, free of charge, the defective product during normal working hours and through a place of business as determined by RWC.

Notwithstanding anything to the contrary in this Limited Warranty, if RWC determines that any damages to the real property in which a defective product was installed were the direct result of a leak or failure caused by a defect in material or workmanship in any RWC product covered by this Limited Warranty and occurring within the first ten years after date of purchase or project completion date, whichever is later, and if reasonable steps were taken to promptly limit or stop the effects of such leak or failure as soon as it was discovered, when the RWC product was installed by a licensed professional plumbing contractor, RWC will reimburse the property owner for the reasonable costs of repairing or replacing such damaged real property including flooring, drywall, painting and other real property damaged by the leak. Except as specified above or otherwise specifically authorized in writing by RWC, RWC shall not pay for any costs or expenses for transportation, relocation, labor, repairs or any other work associated with removing and/or returning failed or defective products or installing replacement products.

The project completion date is defined as the date when the building or facility wherein applicable RWC products are installed receives the final certificate of occupancy from the controlling government agency. The term for the products listed in the table below will be in effect for the number of years shown in the Limited Warranty Period column. This shall constitute the sole and exclusive remedy for any defective product.

This shall constitute the sole and exclusive remedy for any defective product.

What does this limited warranty not cover?

RWC shall not be responsible for any other incidental, indirect, contingent, special or consequential damages, including without limitation, economic loss, lost profits or the cost of repairing or replacing other property which is damaged if these warranted products do not work properly, other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, adverse chemical environments, or any other circumstances over which RWC has no control. This limitation applies even if RWC could have foreseen or has been advised of the possibility of these damages. This Limited Warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. Any remaining warranty coverage may not be assigned or transferred after the period ending ten years following the installation. RWC does not guarantee or in any way warrant the integrity or workmanship of the contractor/installer.

What does this limited warranty not cover?

Some States/Provinces do not allow limitations on how long an implied warranty lasts, and some States/Provinces do not allow the exclusion or limitation of incidental or consequential damages. Therefore, the above limitations may not apply to you. This Limited Warranty gives you specific legal rights, and you may have other rights that vary from State/Province to State/ Province. You should consult applicable State/Provincial laws to determine your rights.

SO FAR AS IS CONSISTENT WITH APPLICABLE STATE/ PROVINCIAL/ FEDERAL LAW, THE EXPRESS WARRANTY SET FORTH HEREIN IS THE ONLY WARRANTY GIVEN BY RWC WITH RESPECT TO THE SHARKBITE™ AND CASH ACME™ PRODUCTS AND RWC MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND HEREBY SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

This Limited Warranty and any claims arising from breach of contract, breach of warranty, tort, or any other claim arising from sale or use of RWC's products shall be governed and construed under the laws of the State of Georgia. No action on the part of RWC under this Limited Warranty shall be construed as an admission of liability of that the product is not fit for its intended use.

How long does the limited warranty coverage last and what other specific conditions exist for each product?

Classification	Product Category	Limited Warranty Period	Conditions
SharkBite Connection Systems	SharkBite Brass and Poly Expansion Fittings in conjunction with SharkBite PEX-a Pipe and SharkBite Reinforcing Rings	Twenty-Five (25) Years	Must be used with • SharkBite PEX-a Pipe - ASTM F876/CSA B137.5 • SharkBite Reinforcing Rings – ASTM F1960
	SharkBite Brass and Poly PEX Crimp Fittings in conjunction with SharkBite PEX Pipe and SharkBite Copper Crimp Rings/ Stainless Steel Clamp Rings	Twenty-Five (25) Years	Must be used with • SharkBite PEX Pipe - ASTM F876/CSA B137.5 • SharkBite Copper Crimp Rings – ASTM F1807 or F2159 • SharkBite Stainless Steel Clamp Rings – ASTM F1807 or F2098
	SharkBite EvoPEX Fittings in conjunction with SharkBite PEX Pipe	Twenty-Five (25) Years	Must be used with SharkBite PEX Pipe - ASTM F876/CSA B137.5
SharkBite, Cash Acme, HoldRite, and John Guest Products	SharkBite Brass Push-To-Connect Fittings in Applications with Copper, PEX and CPVC	Twenty-Five (25) Years	Must be used with: • Copper–ASTM B 88 hard drawn copper tube K, L, and M • PEX–ASTM F876/CSA B137.5 • CPVC–ASTM D2846 or CSA B137.6
	SharkBite PEX Pipe	Twenty-Five (25) Years	When used with Fitting and Clamps/Rings that conform to ASSE 1061, ASTM F1807, ASTM F2098, ASTM F2159 Fittings, and/or ASTM F1960 Rings.
	SharkBite ProLock Fittings	Twenty-Five (25) Years	Must be used with: • Copper–ASTM B 88 hard drawn copper tube K, L, and M • PEX–ASTM F876/CSA B137.5 • CPVC–ASTM D2846 or CSA B137.6
	John Guest Black ProLock CTS Fittings	Twenty-Five (25) Years	Must be used with: • PE-RT - ASTM F2769 • Copper–ASTM B 88 hard drawn copper tube K, L, and M • PEX–ASTM F876/CSA B137.5 • CPVC–ASTM D2846 or CSA B137.6
	John Guest Speedfit Twist & Lock CTS Fittings	Twenty-Five (25) Years	Must be used with: • Copper–ASTM B 88 hard drawn copper tube K, L, and M • PEX–ASTM F876/CSA B137.5 • CPVC–ASTM D2846 or CSA B137.6
	SharkBite Home Run Manifolds	Ten (10) Years	Must be installed per installation instructions
	SharkBite Brass Push-To-Connect Fittings in Application with HDPE	Five (5) Years	Must be used with HDPE SDR-9 ASTM D2737
	SharkBite Poly Expansion Fittings	Five (5) Years	When used with Non-SharkBite PEX-a Pipe that conform to ASTM F876 CSA B137.5, and Reinforcing Rings ASTM F1960
	SharkBite Brass Expansion Fittings	Five (5) Years	When used with Non-SharkBite PEX-a Pipe that conform to ASTM F876 CSA B137.5, and Reinforcing Rings ASTM F1960
	SharkBite Poly PEX Barb Fittings	Five (5) Years	When used with Non-SharkBite PEX Pipe that conform to ASTM F876 CSA B137.5, PE-RT that conform ASTM F2769, and Clamp/Rings ASTM F2159
	SharkBite Brass PEX Barb Fittings/ Copper Manifold	Five (5) Years	When used with Non-SharkBite PEX Pipe that conform to ASTM F876/CSA B137.5, that conform ASTM F2769 and Clamp/Rings – ASTM F1807
	SharkBite EvoPEX Fittings	Five (5) Years	When used on Non-SharkBite PEX Pipe that conform to ASTM F876/CSA B137.5
	SharkBite and Cash Acme Thermostatic Mixing Valves	Five (5) Years	Must be installed per installation instructions
	SharkBite Accessories (Ball Valves, Supply Hoses, Supply Stops, Supply Valve Box Systems, Kits, Copper Manifolds, etc.)	Two (2) Years	Must installed per installation instructions with the pipes below: • Copper–ASTM B 88 hard drawn copper tube K, L, and M • PEX–ASTM F876/CSA B137.5 • CPVC–ASTM D2846 or CSA B137.6
	Other SharkBite and Cash Acme Valves	Two (2) Years	Must be installed per installation instructions
	HoldRite Outlet Boxes	Two (2) Years	Must be installed per installation instructions
	HoldRite HydroFlame Pro	Two (2) Years	Must be installed per installation instructions
	SharkBite Tools	One (1) Years	From date of purchase
	John Guest Fluid System OD Fittings	One (1) Years	Must be used with Polyethylene, Nylon, PEX, or Soft Copper (must be round and in good condition)
	John Guest LLDPE Tubing	One (1) Years	Must be installed per installation instructions
	SharkBite Quick-Connect POM Plastic Fittings	One (1) Years	Must be used with Polyethylene, Nylon, PEX, or Soft Copper (must be round and in good condition)
	HoldRite Products	One (1) Years	Must be installed per installation instructions
	HoldRite QuickBrand Products	One (1) Years	Must be installed per installation instructions
	HoldRite Testrite	One (1) Years	Must be installed per installation instructions

Glossary

PEX (Crosslinked Polyethylene): a polyethylene material which has undergone a change in molecular structure using a chemical or physical process whereby a majority of the polymer chains are permanently linked.

Universal: Standard SharkBite Push-to-Connect fitting

MAX: SharkBite next generation Push-to-Connect fitting

UXL: Large diameter (above 1") SharkBite Push-to-Connect fitting

ASTM: American Society for Testing and Materials

ASSE: American Society of Sanitary Engineering

ANSI: American National Standards Institute

AWWA: American Water Works Association

CSA: Canadian Standards Association

NSF: National Sanitation Foundation

UL: Underwriters Laboratories

IAPMO: International Association of Plumbing and Mechanical Officials

IPC: International Plumbing Code

NPCC: National Plumbing Code of Canada

PPI: Plastics Pipe Institute

TR19: Plastics Pipe Institute Technical Report 19

TN-56: Plastics Pipe Institute Technical Note 56

Corrosion: deterioration in metals caused by oxidation or chemical action

Elasticity: a measure of material stiffness or the ability of the material to stretch or deform temporarily under a load

Fitting: a device or connection that allows the PEX pipe to change direction or size, such as a tee, elbow, or coupling

Fixture: a device or appliance at the end of a water supply distribution pipe line. Example: lavatory, water closet, tub/shower, dishwasher

Joint: the connection of the PEX pipe to a fitting, fixture, or manifold

Manifold: a device having a series of ports that are used to connect distribution lines for several fixtures

Scaling: process of mineral buildup on the interior of a pipe

Ultraviolet: high energy light waves found in sunlight that lead to the degradation of many plastics and materials (UV)

Water hammer: a banging noise heard in a water pipe following an abrupt alteration of the flow with resultant pressure surges

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