



ZURN PEX®

# Residential Fire Protection Systems

*Installation Instructions*



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### Zurn PEX® Residential Fire Protection Addendum to Residential Plumbing Installation Guide (370-004)

This manual is an addendum to the Zurn PEX Residential Plumbing Installation Guide (370-004) and Zurn PEX Commercial Plumbing and Layout Guide (370-060). Its purpose is to provide additional information relevant to using Zurn PEX systems in residential fire protection systems.

## System Overview

Zurn PEX offers multipurpose fire protection systems as described by the National Fire Protection Association 13D standard (NFPA 13D). A multipurpose system is often referred to as a combination system because the piping serves the needs of both the cold domestic water distribution and fire protection system. These types of systems provide an array of benefits including:

- Lower cost than traditional "stand-alone" fire protection systems
- Provides confirmation that the system is working each time cold domestic water is used
- Water is constantly refreshed in the sprinkler piping, eliminating the need for backflow preventers
- Both domestic water and fire systems can be installed by same contractor, eliminating potential scheduling issues
- Utilizes flexible Zurn PEX piping that provides fewer connections, reducing the potential for leaks
- Zurn PEX systems resist freeze damage

### INTENDED PURPOSE

Zurn PEX Fire Protection Systems are intended to be used in product combinations tested by NSF International to UL 1821. Zurn PEX products have only been tested with other Zurn PEX products and are not intended to be used with any other manufacturer's products.

Zurn PEX Fire Protection Systems are UL 1821 listed to be installed when protected by any of the constructions referenced below:

- 3/8" [9.5 mm] thick or thicker gypsum wallboard; or
- A suspended membrane ceiling with lay-in panels or tiles having a weight of not less than 0.35 lb/ft<sup>2</sup> [1.76 kg/m<sup>2</sup>] when installed with metallic support grids; or
- One layer of 1/2" [12.7 mm] plywood or plywood soffits.

The piping and fittings are intended for use in multipurpose systems without a fire department connection.

The piping and fittings are intended to be used in areas where the ambient temperature does not exceed 120°F.



## STANDARDS, RATINGS, AND CERTIFICATIONS

Zurn Fire Protection PEX piping, fittings and copper crimp ring systems are UL 1821 listed for use in multipurpose systems as described in NFPA 13D.

Zurn PEX products are manufactured in accordance with ASTM F876, ASTM F877, ASTM F1807, ASTM F2159, and CSA B137.5 standards and are listed by NSF International as such.

Zurn PEX products are listed to NSF International Standards 14 and 61.

Zurn PEX systems carry the following pressure and temperature ratings:

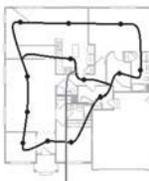
- 160 psi at 73°F
- 130 psi at 120°F (Fire Protection Rating)
- 100 psi at 180°F
- 80 psi at 200°F

## TYPES OF MULTIPURPOSE FIRE PROTECTION SYSTEMS

There are three types of multipurpose systems as described in NFPA 13D-Standard for the Installation of Sprinkler Systems in One and Two Family Dwellings and Manufactured Homes. A multipurpose fire protection system can be installed in accordance with any of these three systems or a combination of each in accordance with NFPA 13D.

### Gridded

System is set up as a grid and is the preferred system type because of its simple design and superior hydraulic characteristics. Sprinklers are supplied with water from both sides, while branch lines help transfer water.



### Looped

Outer sprinklers on the perimeter of the floor level are connected in a loop so water is supplied from both sides. Sprinklers within the loop are supplied with branch tee connections off the loop.



### Straight

Sprinklers are supplied with water in only one direction. Hydraulic characteristics are not as good as other designs, therefore this method is not widely used.

## SYSTEM DESIGN

Design of a residential fire protection system shall be in accordance with all requirements of the NFPA 13D standard. Construction plans, including sprinkler head locations, piping layout, and hydraulic demand data, should be submitted to the local authority having jurisdiction for approval prior to installation. Any deviations or changes in the plans after approval shall have permission by the same authority.

## Product Descriptions

### SPRINKLERS

Only sprinklers listed in accordance with NSF 61 can be used in Zurn PEX multi-purpose systems. In addition, the sprinkler must meet the requirements of NFPA 13D, specifically UL 1626 – Residential Sprinklers for Fire Protection Service.

Residential sprinklers operate under various temperatures ranging from 150°F to 175°F. In addition, all sprinklers vary in their specific K-value, wetting density capability, flow volume, and operating pressure at a specified design coverage area. Sprinklers are available for various installations, and it is up to the designer to specify the appropriate sprinkler and its operating conditions.

Do not store sprinklers, sprinkler cover plates, or sprinkler accessories in areas that may experience excessive heat over 100°F.

### Concealed Sprinklers

These sprinklers are flush against the ceiling and are covered with a special cover plate. In operation, the plate falls off at approximately 135°F and as the heat increases the sprinkler operates. It is important to never paint over the special cap. It may interfere with the operation of the sprinkler.

### Recessed Pendent Sprinklers

These sprinklers are visible on the ceiling and do not have a cover plate. In operation, high heat in the range of 150°F to 175°F will cause the sprinkler to operate.

### Recessed Horizontal Sidewall Sprinklers

These sprinklers are visible on the wall and do not have a cover plate. In operation, high heat in the range of 150°F to 175°F will cause the sprinkler to operate.



## ZURN NON-BARRIER PEX PIPING

Zurn Non-Barrier PEX Tubing in sizes 1" (White only), 1-1/4", 1-1/2" and 2" are certified for use in Multi-Purpose Residential Fire Sprinkler applications.

Chlorine and UV Resistance – 5306 designation, generally a continuously circulating hot water plumbing loop at maximum 140°F and 2 ft/sec maximum velocity. Six month UV rating.

Zurn PEX pipe 2" and smaller meets the 25/50 flame spread index/ smoke density index requirements specified in building codes for use in plenums when encased with an appropriately listed 1/2" thick fiberglass insulation. Un-insulated installations using special accessories may also comply, please consult with the factory for details.

### Zurn PEX Piping Installation Precautions

- Should not be exposed to or stored in direct UV light. When possible, protect the piping with an opaque covering.
- Should not be exposed to a direct flame. Braze, solder, or weld and allow to cool prior to connecting Zurn PEX to metal pipe.
- Should never be used for electrical grounding. Consult the NEC for recommended grounding methods when PEX is used.
- Should not be installed in conditions near extreme heat.
- Painting Zurn PEX is unnecessary. Water-based latex or acrylic paints will not affect Zurn PEX piping; however, oil-based paints or lacquers should never be applied to Zurn PEX piping.
- Should only be installed in operating conditions that are consistent with pressure and temperature ratings that appear on the piping and applicable standards.
- Should not be subjected to prolonged exposure to free chlorine concentrations greater than 4 ppm.
- Zurn PEX piping that has been crushed or scratched should be removed from the system and replaced.
- Should never come into contact with any chemicals, pipe thread compounds, putty, mineral, or linseed oil products.

## ZURN PEX QICK SERT CR® CRIMP FITTING SYSTEM

Zurn PEX Qick Sert CR Crimp fittings are molded from a blend of highly engineered polymers. The inherent qualities of the polymers make Qick Sert CR fittings highly resistant to chlorine and other chemicals present in potable water.



### Qick Sert CR Crimp Fittings Installation Precautions

- Should only be used in operating conditions that are consistent with the temperature and pressure ratings of the pipe as well as applicable standards.
- Should not be painted.
- Should not be exposed to direct UV light. When possible, protect fittings with an opaque covering.
- Male pipe threads must only use PTFE tape as a thread sealant.
- Should not be exposed to cleaners, chemicals, solvents, sealants, or glues as they could be damaged from contact.
- Should always be stored in clean bins or containers, preferably in the original packaging.

## ZURN PEX XL BRASS CRIMP FITTING SYSTEM

With over 30 years of installations, Zurn PEX XL brass crimp fittings are the reliable joining method for flexible piping.



### XL Brass Crimp Fittings Installation Precautions

- Should only be used in operating conditions that are consistent with the temperature and pressure ratings of the pipe as well as applicable standards.
- Should not be used in reverse osmosis systems.
- Should not be used in areas with known localized aggressive water chemistries.



## Making Crimp Connections

### COLD WEATHER INSTALLATION CONNECTIONS

Crimps are intended to be made in general working temperatures above 32°F. However, in extreme temperatures down to 0°F, we recommend more frequent gauging to ensure in specification crimps are being made.

Zurn PEX offers the following crimp systems for the installation of multipurpose fire protection systems: Copper crimp ring and QickCap® copper crimp ring with positioning end cap. To choose the crimp system most appropriate for your installation, consider factors relative to your jobsite priorities.

### COPPER CRIMP RING SYSTEM

- Proven system for over 30 years
- Copper Crimp Ring, QCR\_X, available in 3/8"-2"
- QickCap Copper Crimp Ring with Positioning Cap
- QCR\_XPC, is available in 1/2"-2"
- Go/No-Go Gauge
- 25-year system warranty



#### Listings

By NSF International as meeting the following standards:

- ASTM F877
- ASTM F1807
- CAN/CSA B137.5
- NSF Standard 14

**NOTE:** Using the large crimp tool for anything other than its intended use will void the warranty. For troubleshooting and repair assistance, do not return tool directly to wholesaler. Call Zurn Customer Care for assistance at 1-855-ONE-ZURN. See [www.zurn.com](http://www.zurn.com) for warranty information.

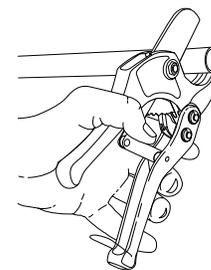
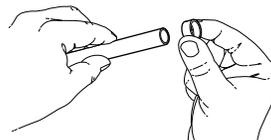
⚠ **WARNING:** Cancer and Reproductive Harm – [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

⚠ **ADVERTENCIA:** Cáncer y daño reproductivo – [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

⚠ **AVERTISSEMENT:** Cancer et effets néfastes sur la reproduction – [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

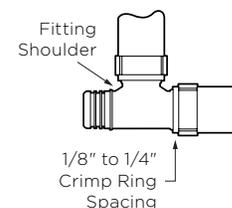
### MAKING THE CONNECTION WITH THE LARGE CRIMP TOOL

- 1 Measure and cut the pipe. Be sure you have a square burr-free cut. An uneven or jagged cut may cause an improper connection.

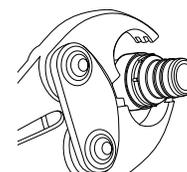


- 2 Next, slip a copper crimp ring onto the pipe. Do not use hose clamps!

- 3 Now insert the fitting into the pipe up to the fitting shoulder. For fittings 1" and smaller, position the crimp ring 1/8" to 1/4" from the end of the pipe. An improperly positioned ring may produce a weak connection. Ring may be squeezed to hold it in place until step 4 is completed. **Note:** Using the QickCap eliminates the need to measure from the end of the tube because the QickCap positions the crimp ring perfectly over the fitting barb. The QickCap also holds the crimp ring in place eliminating the need to squeeze the crimp ring.

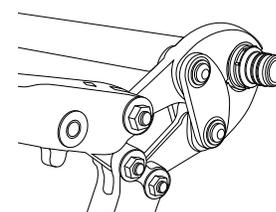


- 4 Position the tool so the crimp ring is completely covered by the tool jaws. Keep the tool at a 90° angle to the fitting and close it completely. Squeeze handles together to complete the crimp.



- 5 Open the tool handles to release jaws from the crimped fitting.

- 6 Measure the crimped ring with Zurn "Go/No-Go" gauge. See table below. Do not measure bumps on ring where jaws met. If "Go" on gage does not fit, or if "No-Go" does fit, then cut out connection, replace fitting and ring, adjust and calibrate the tool, and recrimp.



STANDARD PIPE SIZE >	3/8"	1/2"	3/4"	1"
Minimum Diameter	0.580"	0.700"	0.945"	1.175"
Maximum Diameter	0.595"	0.715"	0.960"	1.190"

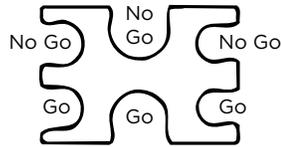
Variation in ring diameter (out-of-round) should not exceed 0.006".



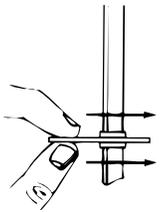
## USING THE ZURN GO/NO-GO GAUGE

After making a crimp connection, use the appropriate opening of this flat "Go/No-Go" Gauge to check your finished crimp. The "Go" opening should go freely across a crimped ring anywhere on its diameter with the possible exception of the upset area on the ring surface caused by the tool jaws closing. Do not force the gauge across the ring. The "No-Go" opening should not go across a crimped ring anywhere. If the crimp fails either test, cut out the fitting and replace.

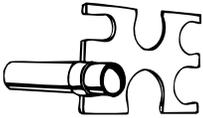
### Go and No Go Openings



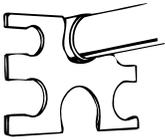
### DO:



Always place the gauge opening on the crimp ring at a 90° angle for an accurate check.

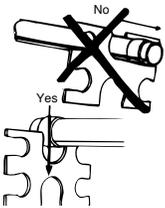


Be certain to use the gauge opening sized for the diameter of your pipe.



We recommend you check every finished crimp with this gauge.

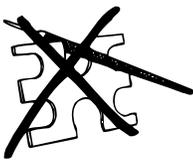
### DO NOT:



Do not slide the gauge onto the connection. Push it directly onto the crimp ring.



Do not try to save time by re-crimping a crimp that does not gauge properly. The fitting must be cut out and replaced.

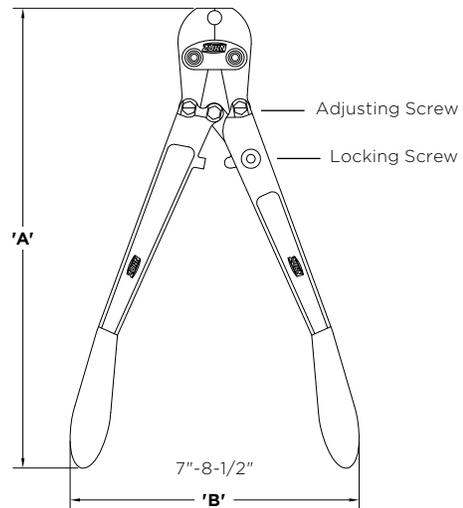


Do not modify the gauge opening for any reason. They have been carefully manufactured to .002" tolerance.

## ADJUSTING THE LARGE CRIMP TOOL

Zurn Crimp Tools are factory set to provide proper crimps. This should be checked before use by making a test crimp connection and checking it with the crimp gauge. As long as the finished crimp connection gauges properly, there is no need to adjust the tool.

- 1 Loosen the bottom Locking Setscrew two turns using the hex wrench provided with the tool.
- 2 Close the tool until the jaws just touch and increased resistance is felt. This is the pre-load point.
- 3 Turn the top Adjusting Setscrew until the distance between the raised "+" marks on the handles is between 7" and 8-1/2" for QCRT2T, 3T, JT, and 4T. The distance for QCRT5T should be 13". Tighten the bottom Locking Setscrew. See Warning for QCRT2T, 3T, JT, 4T, and QCRT5T tool.
- 4 Make a test crimp connection and check it with the "Go" and "No-Go" openings of the gauge. If the "No-Go" opening goes over the crimped ring, the tool is too tight. The distance between the "+" marks should be decreased. If the "Go" opening does not go over the crimped ring, the tool is too loose and the distance between the "+" marks should be increased.
- 5 Apply a light oil to the pivot points each time the tool is adjusted. Failure to lubricate the tool will shorten its life.



**QCRT2T, 3T, JT, 4T**

**▲ WARNING:** Increasing the pre-load distance beyond 9" for the QCRT2T, 3T, JT, 4T or 13" for the QCRT5T will make the tool hard to use and shorten tool life because of excessive stress.

## LARGE DIAMETER COMPACT COPPER CRIMP TOOL OPERATING INSTRUCTIONS (QCRTLDM)

### 1 Cutting Zurn PEX Piping -

Measure and cut the pipe. Be sure you have a square burr-free cut. An uneven or jagged cut may cause an improper connection.



### 2 Install Copper Crimp Ring - Slip a copper crimp ring onto the pipe.



**3 Install Fitting** - Insert the fitting into the pipe up to the fitting shoulder. The copper crimp ring should be positioned 1/8"-1/4" from the end of 1" diameter pipe, 1/4"-3/8" from the end of 1-1/4" and 1-1/2" pipe, and 3/8"-1/2" from the end of 2" pipe. **Note:** Using the QickCap eliminates the need to measure from the end of the tube because the QickCap positions the crimp ring perfectly over the fitting barb.



**4 Crimping** - Load fitting assembly into the tool. Position the tool such that the crimp ring is completely covered by the tool jaws. Confirm the piping is at a 90° angle to the fitting and close jaw. Hand tighten the nut to hold fitting assembly in place.



**5 Drive the nut down with an impact wrench until blue LED light turns on.**



**6 Checking** - Check crimp using the supplied "GO Gauge."



## JAW INSTALLATION INSTRUCTIONS

**1** Open clamp, then press down on the keyed slot to loosen jaw.



**2** Continue to hold in the keyed slot, turn tool around and move key out of position. Remove jaw from clamp.



**3** Insert new crimping jaw.



**4** Rotate key back into position until key clicks to lock jaw in place. Repeat for other jaw.





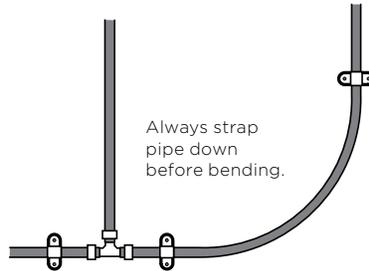
## Piping Installation

### PIPING SUPPORTS AND FITTING

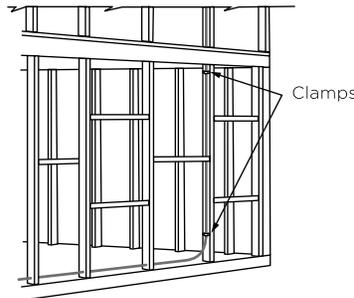
- Do not use supports that have sharp edges which could damage the piping. Pipe supports should allow free piping movement. **Note:** Best results are achieved by using clamps, pipe insulators, and strapping designed for plastic plumbing systems.
- Do not install Zurn PEX within 6" of any gas appliance single wall vent. The exception is when double walled B-vent is used, which has a minimum clearance of 1".
- It is acceptable to run Zurn PEX pipe next to normal HVAC ductwork, provided the piping cannot be cut or abraded by sharp edges of the duct work.
- It is acceptable to install Zurn PEX piping within 12" of recessed light fixtures only when insulation has been installed with the specific purpose of protecting the piping from excessive heat.
- When Zurn PEX piping is free to uniformly expand, it is resistant to freeze damage in an accidental freeze. However, if Zurn PEX piping is to be installed in an area subject to regular freezing conditions, we recommend that the piping be insulated or otherwise protected as required by local code.
- Zurn PEX piping is approved for water distribution only and should not be used for distribution of petroleum based products such as liquid petroleum (LP) or natural gas.

### UNCOILING ZURN PEX PIPING

For ease of installation Zurn recommends using the Zurn PEX dual coil uncoiler, QDISP; the Zurn PEX pipe dispenser, QHD; or the Zurn PEX portable uncoiler.



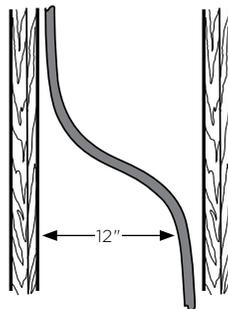
Zurn PEX straps and hangers hold pipe in position and prevent strain on fittings when the pipe is bent.



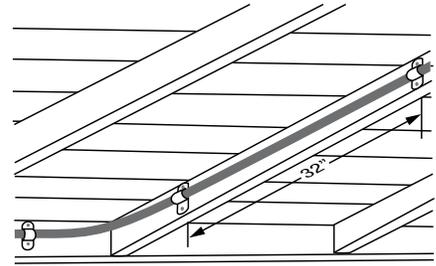
Vertical runs need support at every floor level.

### SUPPORTING ZURN PEX DISTRIBUTION LINES

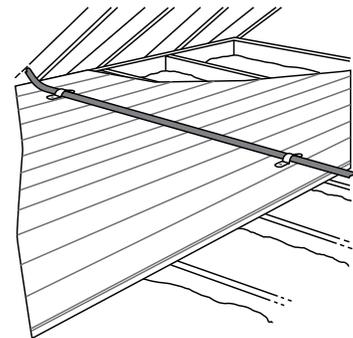
**Note:** Zurn PEX should be supported or strapped every 32" when hung from floor joists or running across rafters. When supporting pipe bundles, use a strap to support the entire bundle.



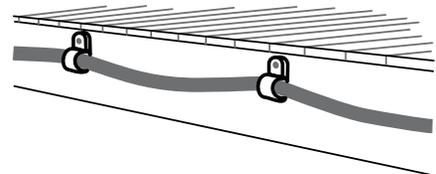
Since Zurn PEX piping expands or contracts 1" for every 100' of pipe for every 10° of temperature change, you must allow for expansion and contraction in long runs with a 12" horizontal offset.



Horizontal runs should be supported every 32".



Straps can be as far as 6' apart if the pipe is continuously supported.



Always cut the pipe longer than necessary to allow some slack for any contraction in the pipe. 1/8" per foot of length is usually enough.

Strapping support should be firm but loose enough to allow the pipe to move back and forth as it expands and contracts.



## PIPING EXPANSION

Zurn PEX piping should not be pulled tight during installation. Adequate slack should be determined in order to prevent the piping from exerting tensile loads on the connections to the fittings.

Allow 1/8" per foot of pipe length as slack. This should cover installations from 35°F to 160°F.

## BENDING ZURN PEX PIPING

The minimum bend radius for Zurn PEX is 6 times the outside diameter of the piping, when bending it with the natural curvature of the coil.

PIPING SIZE	OUTER DIAMETER	MINIMUM BEND RADIUS
3/8"	.500"	3.00"
1/2"	.625"	3.75"
3/4"	.875"	5.25"
1"	1.125"	6.75"
1-1/4"	1.375"	8.25"
1-1/2"	1.625"	9.75"
2"	2.125"	12.75"

**Note:** If you must bend against the natural curvature of the coil, these minimums must be multiplied by 3.

## METAL STUDS

Protective sleeves or bushings should be used on Zurn PEX piping when penetrating metal studs. Sleeves and bushings are not required when penetrating ordinary wood or particle board if the holes are at least 1/8" larger than the pipe size and pipe movement is not restricted.

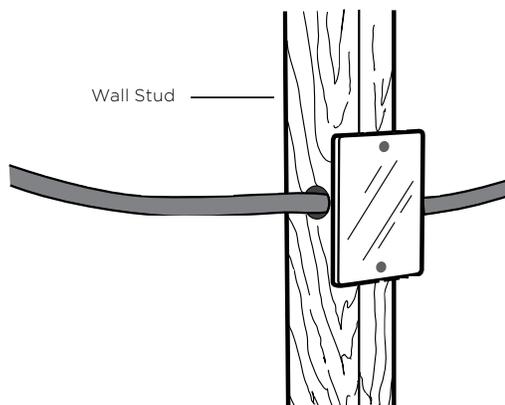
## INSULATING PIPING

Zurn PEX is resistant to freeze damage; however, installation specific variables can affect the performance of the system if it is allowed to freeze up. In general, plumbing codes specify that piping run through attics and exterior walls should be insulated. As such, Zurn PEX piping should be insulated according to code requirements. Insulation that is typically used in copper and CPVC installations would provide equivalent protection for Zurn PEX piping.

**Note:** When using expanding foam to insulate piping, please contact Zurn for recommendations. While many expanding foams have been tested and have shown no adverse effects to PEX piping, we cannot guarantee all foams are the same.

## NAILING PLATES

Nailing plates should be used when Zurn PEX piping is passing through a stud within 2" of a nailing surface. Using a nailing plate minimizes the possibility of damage to the pipe from nails or drywall screws.



**IMPORTANT:** When running Zurn PEX piping, be sure to keep it away from potential sources of heat. Maintain a minimum of 12" between Zurn PEX and any recessed light fixture and a minimum of 6" between Zurn PEX and any gas appliance vent.

The use of zip ties to attach Zurn PEX to DWV piping is acceptable so long as the ties leave enough room for free movement of the piping.

**NOTE:** When installing runs of Zurn PEX, it is sometimes necessary to pull one pipe past another. Care should be taken to make sure that the friction of the moving pipe does not burn or wear a notch in the stationary pipe. If this occurs, the notched section of the pipe must be cut out and replaced.



## Sprinkler Adapter Fittings

Zurn PEX offers sprinkler adapter fittings for the installation of its multipurpose fire protection systems. All adapter fittings are designed for side mounting onto a ceiling joist or wall stud. The choice of adapter fitting, sprinkler, and placement shall be in accordance with the approved system design and NFPA 13D requirements.



- 1 Use the design layout to determine the type of sprinkler and adapter fitting required in a specific location. Sprinkler, sprinkler placement, and spacing are dictated by the design.
- 2 The design may call for a general area for sprinkler placement, for example within a 2-foot radius of a specific location. This is intended to leave the installer with the discretion to avoid any obstructions that may interfere with sprinkler discharge such as fans, surface mounted lights, beams, and slopes. Please refer to the applicable sections of NFPA 13D for more specific requirements.
- 3 Attach the sprinkler adapter to the structure using #10 x 1-1/4" deck screws. The height at which the adapter fitting is mounted will vary based on sprinkler type chosen. Please refer to sprinkler manufacturer's technical data sheet for guidance. The slotted screw-hole design will allow for slight modification as necessary. It is recommended that the sprinkler adapter fittings be installed prior to installing the piping.
- 4 Use the procedures from the preceding sections when making a crimp to the sprinkler adapter fitting.
- 5 Install the sprinkler with protective cap using the appropriate sprinkler wrench.

## Testing

### Pressure Testing

Each completed installation must be pressure tested in accordance with NFPA 13D which calls for testing at normal operating pressure. If local code requirements are more stringent, they should prevail.

### Flow Testing

To ensure a properly designed Zurn PEX Fire Protection System has been installed, a flow verification test of the two most hydraulically remote sprinkler heads is necessary. All information must be recorded and filed accordingly. This is the installer's responsibility.

- 1 With the water turned off and drained, carefully unscrew the most hydraulically remote sprinkler head(s) using the appropriate sprinkler head tool.
- 2 Install an appropriate flow test kit by threading 1/2" male adapter fitting(s) into sprinkler adapter fitting using thread seal tape to make a water tight connection.
- 3 Assemble the remaining kit including the properly sized orifice and be sure valve on kit is closed.
- 4 Open main shut off valve and purge out the air in the system using the valve on the flow kit. Once all air is purged the system should be pressurized to its working pressure.
- 5 Record static pressure readings at the manifold and at the test kit.
- 6 Ensure large 30 gallon bucket is properly placed and open valve(s) on flow kit.
- 7 Allow to run until the flow meter stabilizes and the flow rate can be recorded. In addition, record the residual pressure of the flow kit.
- 8 Compare results to designed values.



## Appendix

**TABLE 1: PRESSURE DROP FOR ZURN PEX PIPE - PSI/FOOT**

GPM	1"		1.25"		1.5"		2"	
	PRESSURE DROP	VELOCITY (FT/SEC)						
5	0.017	2.7	0.006	1.8	0.003	1.3	0.001	0.8
8	0.041	4.4	0.015	2.9	0.007	2.1	0.002	1.2
10	0.062	5.5	0.023	3.7	0.010	2.6	0.003	1.5
11	0.074	6.0	0.028	4.0	0.012	2.9	0.003	1.7
12	0.087	6.6	0.033	4.4	0.015	3.2	0.004	1.8
13	0.101	7.1	0.038	4.8	0.017	3.4	0.005	2.0
14	0.116	7.7	0.044	5.1	0.020	3.7	0.005	2.2
15	0.132	8.2	0.049	5.5	0.022	4.0	0.006	2.3
16	0.148	8.8	0.056	5.9	0.025	4.2	0.007	2.5
17	0.166	9.3	0.062	6.3	0.028	4.5	0.007	2.6
18	0.184	9.9	0.069	6.6	0.031	4.8	0.008	2.8
19	0.204	10.4	0.077	7.0	0.034	5.0	0.009	2.9
20	0.224	11.0	0.084	7.4	0.038	5.3	0.010	3.1
21	0.245	11.5	0.092	7.7	0.041	5.5	0.011	3.2
22	0.267	12.1	0.100	8.1	0.045	5.8	0.012	3.4
23	0.290	12.6	0.109	8.5	0.049	6.1	0.013	3.5
24	0.314	13.2	0.118	8.8	0.053	6.3	0.014	3.7
25	0.338	13.7	0.127	9.2	0.057	6.6	0.015	3.8
26	0.364	14.3	0.137	9.6	0.061	6.9	0.016	4.0
27	0.390	14.8	0.147	9.9	0.066	7.1	0.018	4.2
28	0.417	15.4	0.157	10.3	0.070	7.4	0.019	4.3
29	0.445	15.9	0.167	10.7	0.075	7.7	0.020	4.5
30	0.474	16.5	0.178	11.0	0.080	7.9	0.021	4.6
31	0.504	17.0	0.189	11.4	0.085	8.2	0.023	4.8
32	0.534	17.6	0.201	11.8	0.090	8.4	0.024	4.9
33	0.565	18.1	0.213	12.1	0.095	8.7	0.026	5.1
34			0.225	12.5	0.101	9.0	0.027	5.2
35			0.237	12.9	0.106	9.2	0.028	5.4
40			0.303	14.7	0.136	10.6	0.036	6.2
45			0.377	16.5	0.169	11.9	0.045	6.9
50					0.206	13.2	0.055	7.7
55					0.245	14.5	0.066	8.5
60					0.288	15.8	0.077	9.2
65					0.334	17.2	0.090	10.0
70					0.383	18.5	0.103	10.8
75							0.117	11.5
80							0.132	12.3
90							0.164	13.9
100							0.199	15.4
110							0.237	16.9
120							0.278	18.5

**TABLE 2: FITTING EQUIVALENT LENGTH - FEET OF PIPE**

CRIMP FITTING	SIZE				
	1" XL BRASS	1" CR PLASTIC	1-1/4" XL BRASS	1-1/2" XL BRASS	2" XL BRASS
Tee Run	1.65	6.93	2.95	3.11	3.32
Tee Branch	10.76	24.55	13.12	15.74	21.14
Elbow	9.98	23.61	13.17	14.44	20.85
Coupling	1.45	6.79	1.90	2.09	2.29
FST - Run*	1.84	-	-	-	-
FST - Branch*	20.23	-	-	-	-

\*FST - Fire Sprinkler Tee

### How Fitting Equivalent Length Is Calculated

Zurn PEX fire protection fittings are flow tested according to the requirements laid out in UL 1821 and ANSI/ISA-S75.02 - 1996. Fitting and pipe samples were subjected to five different flow velocities between 10 and 18 ft/second. The measured pressure loss across each fitting was divided by the pressure loss of 1 foot of pipe tested at the same flow velocity to calculate the equivalent length. The equivalent lengths of the five flow velocities were averaged to determine the fitting equivalent length.

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