How to Prevent Catastrophic Plumbing Failure

BOSHART INDUSTRIES

9 Ways to Protect Your PEX Plumbing

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Warning

Disclaimer

This eBook is not to be interpreted or utilized, in any way, as an exhaustive guide on preventing plumbing failure of any kind.

Nothing in this eBook is intended to be construed as legal advice, or used as justification for any ramifications that a plumber should encounter as a result of having read this eBook.

Always consult with your local building code for proper regulations on plumbing installations according to your own town, city, province, state, or country.

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We have taken extensive measures to ensure that everything we present is, to the best of our knowledge, factually correct both according to our own experiences as professionals in the plumbing industry since 1955, and according to our knowledge and understanding of the plumbing industry since that time as well.

As with all education taken for free from the internet, proceed with caution. Consult with governing bodies for the specifics that may apply to your jurisdiction.

Preface

Introduction

The introduction of cross-linked polyethylene, commonly referred to as PEX, to the plumbing industry was revolutionary. No longer were plumbers forced to solder expensive copper pipes in order to provide a complete plumbing system in a building.

Of course, the introduction of PEX brought about with it an entirely new set of cautions, warnings, and best practices to learn.

Whether or not you still use the more traditional copper pipe for your plumbing, or you've made the transition over to PEX, we firmly believe there's something for you in this eBook.

Catastrophic plumbing failure is something nobody wants. Thousands, or sometimes millions, of dollars in damages can mean bankruptcy for even the most lucrative business owner.

For that reason, we put together this ebook, *How to Prevent Catastrophic Plumbing Failure*, to help alleviate many of these issues. Even for an experienced pro, there might be something you forget about from time to time that could be the difference between owning a business or not.

By no means is this eBook an exhaustive guide on the topic, because every day, something new is being discovered or invented that can cause issues to appear or disappear in an instant.

It has been our experience that most plumbing failure is the result of a lack of knowledge around proper installation techniques, and this eBook is our contribution to correcting those issues.

Without any further ado, let's jump in.

Chapter 1

Ensure All Connections are Proper

Improperly making the connection between fittings and PEX tubing is one of the easiest ways for things to go wrong. Thankfully, correcting this issue is one of the easiest on the list, and that's why we are starting off with it.

Here are a few of the most common types of connections and how to ensure you have executed them properly:

Pinch Clamps
Most pinch clamp tools will not release without having been fully actuated. As long as your clamp is between 1/8" and 1/4" from the end of the PEX tube and placed squarely over the barbs, your connection should be safe if the jaws of the tool have released.

Of course, these tools may vary from one manufacturer to another. Use caution depending on the particular tool in your toolbox.

Crimp Rings
A GO NO-GO Gauge is one of the most reliable ways to ensure a crimp ring connection has been properly made. A gauge like this will not protect against improper location of your connection, so it is still up to you to make sure the ring is sitting between 1/8" and 1/4" away from the end of the PEX tube. With many poly fittings, there are additional plastic nubs which help you align all the components properly.

Compression Connections
Prior to threading the nut onto the fitting, it should be easy to determine that the PEX tube has been seated fully into the fitting. When you have hit resistance and the tube cannot be inserted any further, you know you are ready to begin fastening the nut.

Quick Connections
A quick connect or push connect fitting is one of the most difficult to ensure a proper connection has been made because the entire end of the tube is covered by the fitting. It is recommended that you make a small mark on the PEX tube with a permanent marker prior to installation so that you will know when the tube has been seated fully. Some manufacturers provide marking on the PEX tube itself, but this requires making cuts at exactly the right locations to utilize them, which is not always possible for many reasons.

Compression Connections
Prior to threading the nut onto the fitting, it should be easy to determine that the PEX tube has been seated fully into the fitting. When you have hit resistance and the tube cannot be inserted any further, you know you are ready to begin fastening the nut.

Click below to watch

Advance Your PEX

Stainless Steel PEX Fittings

Chapter 2

Secure Your Plumbing Properly

To protect your plumbing system, piping must be properly supported to a floor/ ceiling joist, or studs in walls in accordance with applicable plumbing codes. Loose piping can cause countless issues relating to increased tension on joints leading to fitting or joint failure. Improperly supported piping can also result in rattling in walls due to water hammer.

Local plumbing codes dictate the distance between supports, this may vary depending on location, however we recommend not exceeding 30” – 34” horizontally. Any major direction changes, such as bends around corners should also be secured with supports, hangers, strapping, or clamps. Pipe strapping supports should be firm but loose enough to allow the PEX pipe to move as it expands and contracts.

Chapter 3

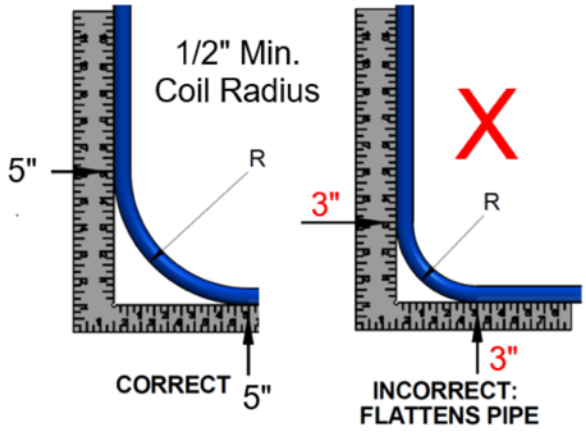
Provide a Proper Radius Around Corners

If you are not careful, plumbing failure can occur in a situation as simple as bending around a corner too sharply. It is especially important not to create kinks in your PEX pipe. Kinks can result when changing direction too suddenly, creating loops too tightly, or trying to bridge the gap too quickly when making offsets.

It is imperative that you never bend PEX pipe around a corner in a radius less then 8x the outside pipe diameter (FIG.3). Doing this will cause the pipe to kink, meaning it is damaged beyond repair. The flattened / damaged section of pipe must be cut out and replaced.

If using coiled PEX pipe that must be bent in a direction against that of the coil, the minimum bending radius is 24x the outside diameter of the pipe (FIG.3).

FIG 3



PEX Pipe Size	Natural "WITH" Coil Radius	"AGAINST" Coil Radius
3/8"	4"	12"
1/2"	5"	15"
3/4"	7"	21"
1'	9"	27"

FIG 4

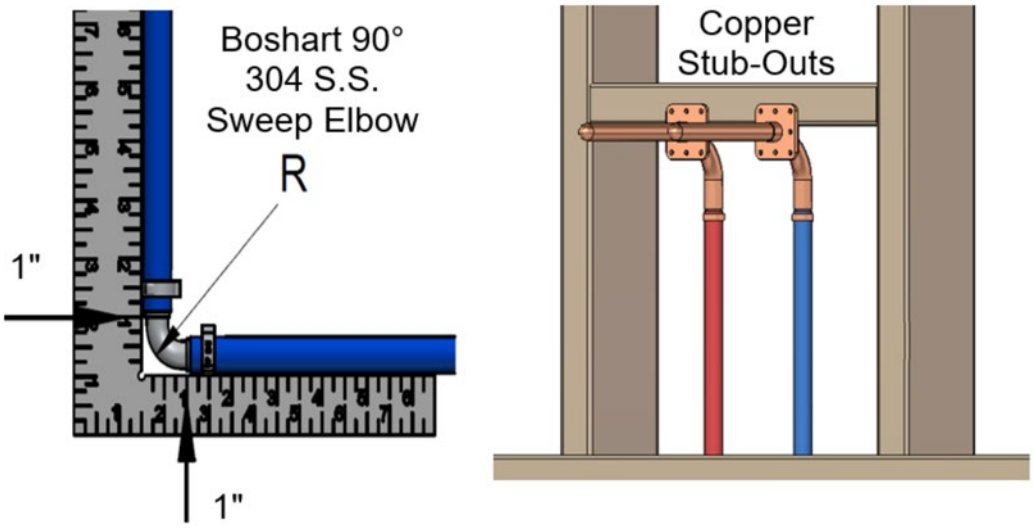
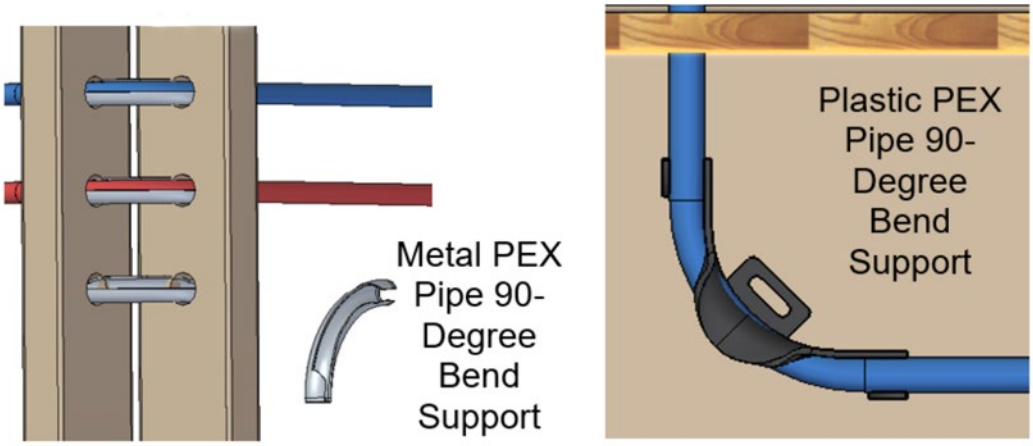

Boshart 90°
304 S.S.
Sweep Elbow
R
1"
1"
Copper
Stub-Outs

FIG 5


Metal PEX
Pipe 90-
Degree
Bend
Support
Plastic PEX
Pipe 90-
Degree
Bend
Support

We also recommend not bending PEX pipe within a 3-1/2” stud width. When stubbing out, use a copper stub-out elbow, or bend support bracket or a 90 °Elbow (A sweep type elbow is recommended). Metal or plastic bend supports should be used when making a 90° turn. In any circumstance that you cannot allow the advised minimum radius in a PEX bend, utilize an elbow fitting to protect your tubing.

Click below to watch

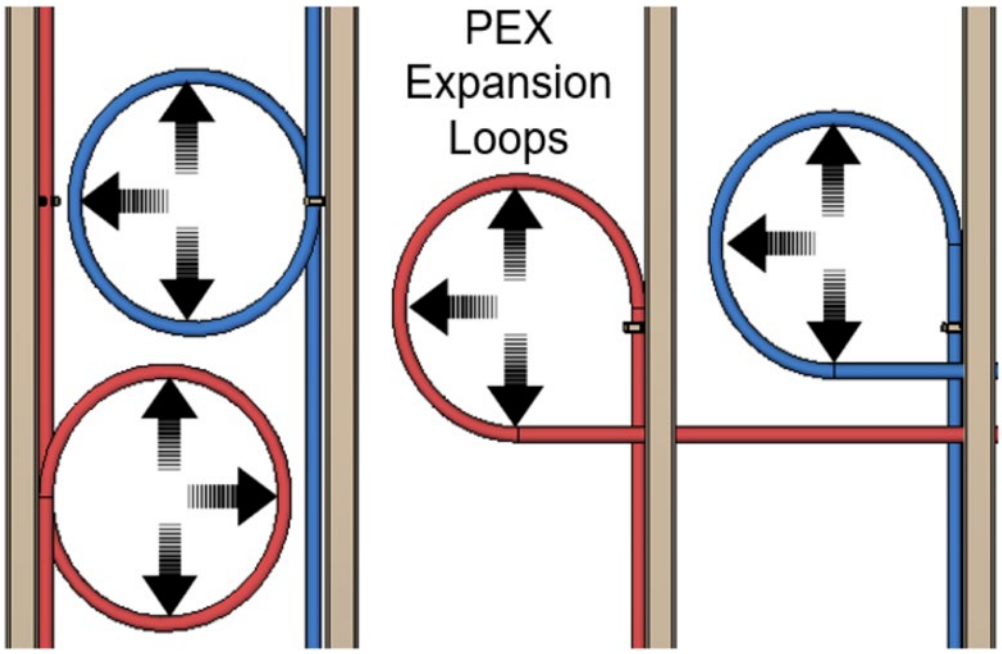
Hidden Strengths of a

Better Gear Clamp

Chapter 4

Anticipate Expansion & Contraction

FIG 6

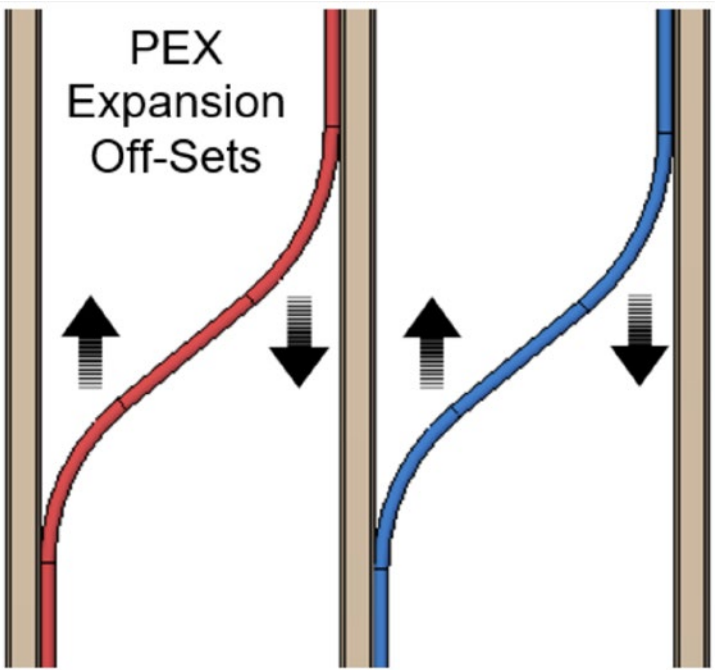


We recommend maintaining slack in PEX systems to accommodate for changing temperatures. Keeping 3-1/2" of slack for every 25' run is a safe ratio in most circumstances. For this reason, it is important to ensure pipe can move within the supports.

It is far better to err on the side of caution when installing pipe, making sure it is long enough to allow for contraction. Keep in mind that if the temperature drops as little as 5.5°C (10°F), it can cause PEX piping to contract by as much as 1" in every 100' of tubing. Cold water, or drops in the ambient temperature, will cause the piping to contract.

How do I properly leave enough slack?
Slack is provided by allowing some sagging between supports and snaking the PEX pipe around obstacles. Pipe strapping supports should be firm but loose enough to allow the PEX pipe to move as it expands and contracts. There are two additional methods to ensure you have enough slack to compensate for expansion and contraction of the PEX piping.

FIG 7



Creating Loops

When possible, especially between floor joists, periodically wrap the tube in a complete circle (that is free-floating to provide space to contract). Do not install the loop so it is touching studs or joists on both sides. These loops will expand when the pipe is heated and contract when the pipe cools or the building is unheated. When bending coiled PEX pipe, against the coil direction, the bending radius must be twenty-four (24) times the outside diameter of the pipe. Refer to chart (FIG. 3, page 16) for proper radius bends.

Creating Offsets

When running the piping down the length of a joist or stud, cross over to the next joist / stud (FIG. 7). Leave enough slack in the pipe to allow for expansion and or contraction before supporting the piping to the stud.

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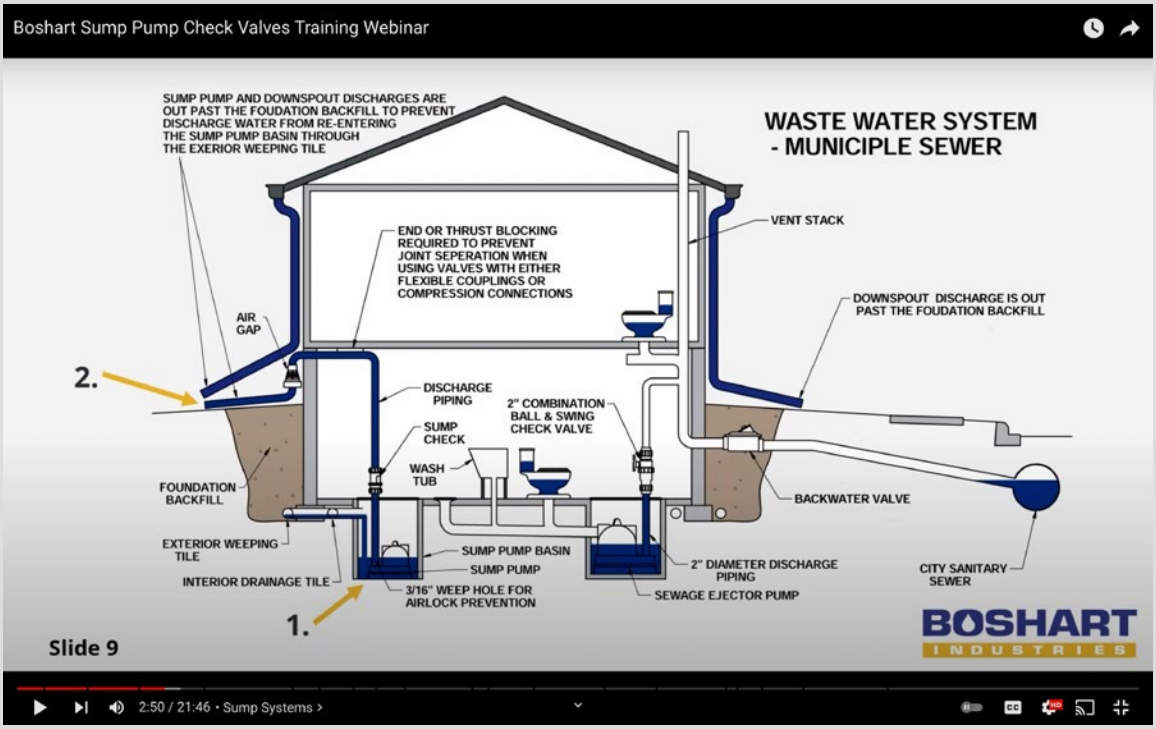

Sump Pump Check Valves Training Webinar

Chapter 5

Reduce or Eliminate Water Hammer Problems

Water hammer is one of many enemies to a plumbing system. When a valve closes too quickly in a plumbing system, a shockwave is sent in the reverse direction back down the pipe, causing vibrations and putting immense stress on your plumbing system. Solenoid valves on appliances such as water softeners, washing machines and dishwashers for example are a common cause of water hammer due to the fast-closing action. Toilet valves are also known to cause water hammer.

As with all plumbing materials under some operating conditions, water hammer can occur in PEX plumbing systems. The flexibility of PEX drastically reduces the magnitude of pressure surges compared with metallic plumbing materials. Damage to plumbing components in a PEX system due to these pressure surges is less likely, although noise can sometimes result.

Fortunately, there are solutions to minimize or eliminate water hammer noise.

FIG 8

Water Hammer Arrestor

Installing a water hammer arrestor at fixtures where noise is a problem is a great option to reduce disturbances. A water hammer arrestor installed as close as possible to the fixture will absorb the pressure surge and reduce the noise. It should be noted that even with an arrestor, PEX piping which is clamped or strapped insufficiently may still hit against something as it moves when the water flow is stopped. Water hammer arrestors are available with a wide range of connection types as well as an integral part of some water supply stops.

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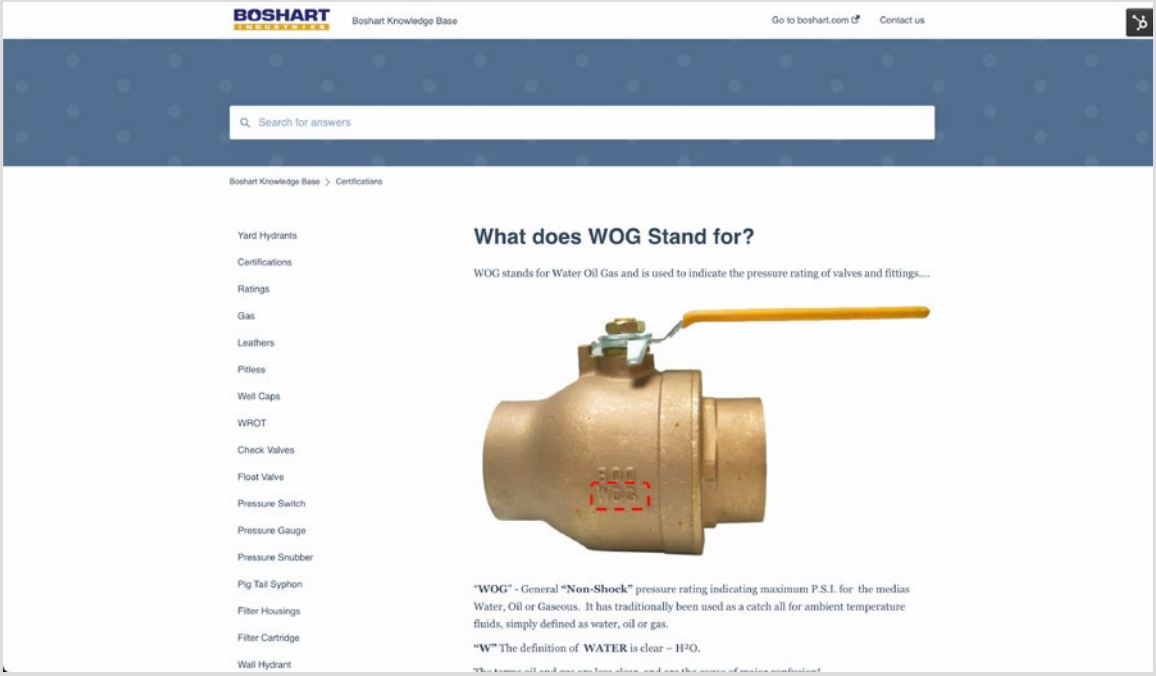

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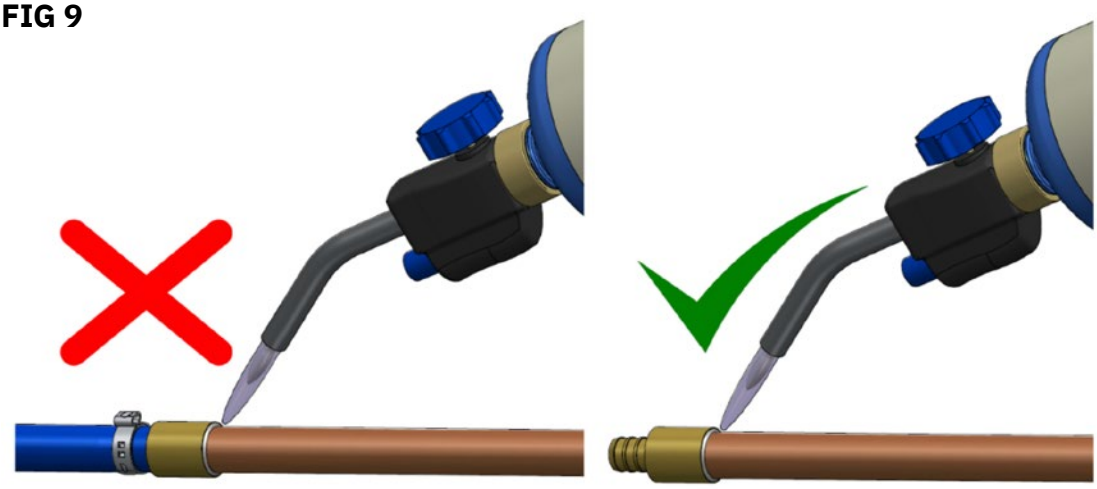
Chapter 6

Sweat Copper & Brass Fittings

FIG 9



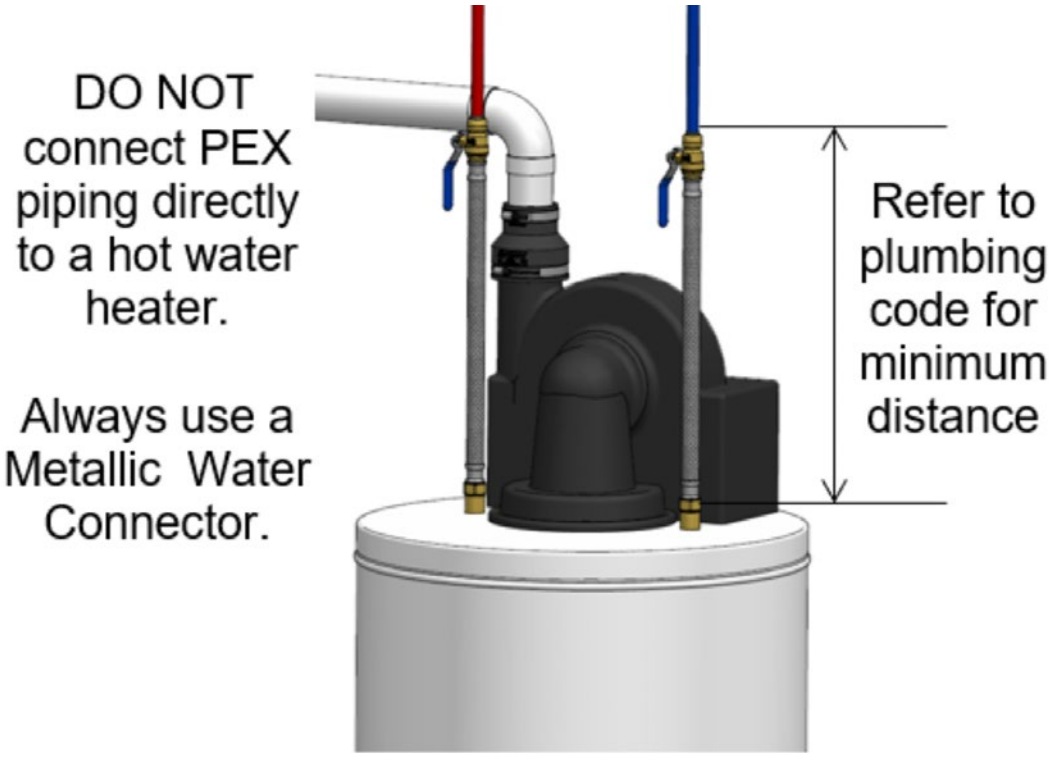
When transitioning to PEX piping, always solder sweat adapter fittings into place—allowing them to cool—before attaching PEX pipe. Heat damage to PEX may result if it is attached during the heating process.

As a rule, never expose PEX to direct flame or high temperatures. Proper installation procedures can help ensure the long life of the PEX plumbing system.

Chapter 7

Provide Ample Space Around High-Heat Areas

FIG 10

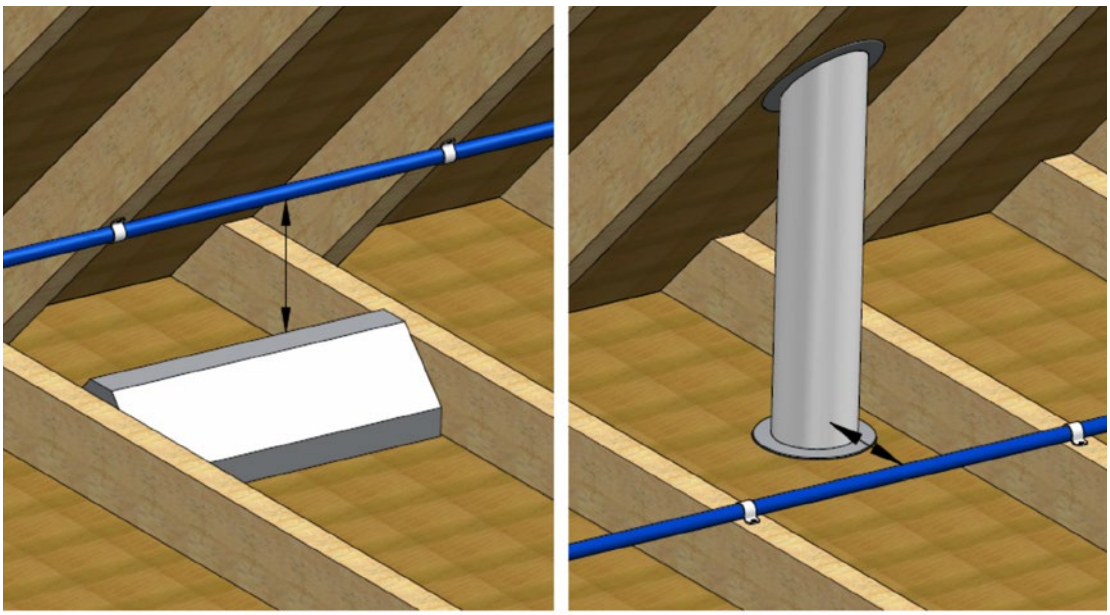


Water heaters are an area of concern when it comes to plumbing failure.

Gas / Electric Water Heaters
It is recommended, to install a metallic connector to attach PEX piping to a water heater. Ensure that your metallic connector between the water heater and PEX meets the minimum length / requirements as defined in the plumbing codes for your area.

PEX piping must be kept away from all high heat sources. Always refer to plumbing code for minimum distance requirements. Some common sources of high heat include gas flue vents, heating appliances of any kind, electric motors, recessed lighting fixtures and many others. Metal forced air ducts are not considered to be high heat in most scenarios, but exercise judgment on a case-by-case basis. PEX piping can also be run in a return air duct. When further construction takes place, the installer of the PEX system must ensure that installations of other equipment does not damage or affect the PEX piping in anyway.

FIG 11



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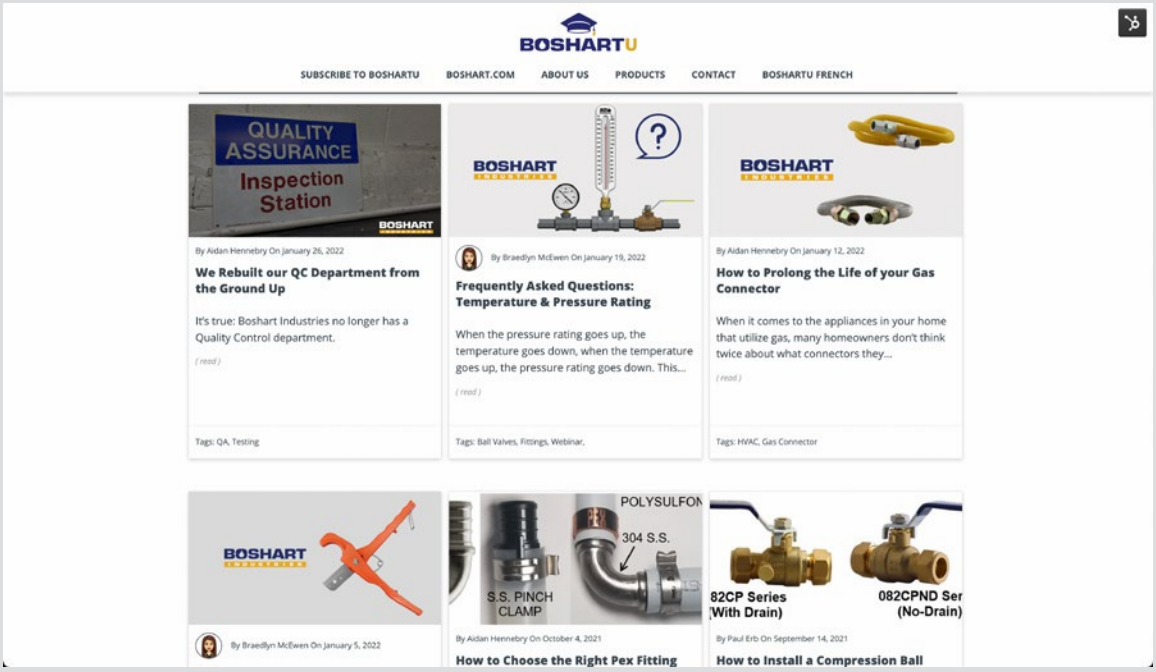

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Chapter 8

Keep Out of Sunlight

Sunlight is not a friend of PEX plumbing.

PEX tubing must not be exposed to direct sunlight and will certainly fail if exposed. This is particularly true for the outdoors. PEX should never be installed outdoors without proper steps to ensure it is protected against the elements. In colder climates where water may freeze in a pipe, for example, this is particularly problematic if you have not prepared for it. Nonetheless, even if freezing is not an issue, pests can also pose a risk for plumbing outdoors. For these and countless other reasons, do not install PEX outside.

Even through a window, it is not advisable to allow PEX to receive any sunlight when installed, so be sure to conceal it if you are at risk for sunlight exposure. We're not saying that PEX is so fragile that it will immediately burst after being exposed to sunlight, but rather that the sun's UV rays will prematurely age the PEX and could cause serious damage or failure if left unattended.

The good news: There are some specially designed UV resistant PEX products on the market. If you are in a situation where you absolutely must install PEX oudoors, contact your PEX pipe supplier to inquire about a suitable product.

Chapter 9

Guard Against Freezing

As we mentioned briefly in Chapter 8, PEX pipe should be carefully installed if you expect freezing temperatures. In general, PEX can be installed in temperatures down to -30° C, but it is important that installers follow the PEX pipe manufacturer's instructions on doing this properly to avoid failure.

Precautions to prevent freezing after installation must be taken. PEX tubing's inherent flexibility already makes it resistant to freezing damage, but PEX should never be intentionally exposed to freezing. Water turning into ice brings about with it expansion, and this can prove very damaging in certain situations.

If your PEX pipe freezes, do not use blow torches or other high-intensity heat sources to thaw rapidly. This can actually cause more damage, and bring you that much closer to a larger repair.

Acceptable methods to thaw piping are hot water (including the use of wet towels), low wattage electrical heating tape. The trick is to warm the water gradually so that your system has time to adjust.

Postface

Summary

Improperly installing plumbing of any kind—be it PEX, copper, or otherwise—can lead to catastrophic damage that leaves you on the hook for liabilities.

No one wants that, and that's why we wrote this eBook.

Whether you're a seasoned pro or a homeowner just trying to learn a thing or two about how to protect yourself, we hope there was something in here that served as a great reminder or a new idea you'd never considered.

Again, we always encourage you to check in with your local building codes and laws regarding plumbing as it varies so much from place to place. The information in this eBook is intended as a general guide, but must be interpreted and applied with the utmost diligence.

Only you have the power to prevent catastrophic plumbing failure. But at least now you also have the knowledge.

Postface

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