

REPORTER

Take another look at polybutylene plumbing

by Kenny Hart, ASHI Technical Committee Member

Several times a month, I get calls from real estate agents and home buyers seeking information about polybutylene (PB) plumbing, a product frequently installed in the Hampton Roads area of Virginia and nationwide during the 1980s and 1990s. They call me because I'm a plumbing contractor and a home inspector, who has been quoted on the topic in local newspaper articles.

The answers to many of their questions can be found in Michael Casey's article, "Checking for Leaks in Polybutylene Piping", published in the 1995 July/August *ASHI Reporter*. Other questions I answer from the knowledge I gained installing PB for nearly eight years, and then repairing and replacing it for 18 more years.

In order to address how PB plumbing is affecting plumbers, real estate agents, insurers and home inspectors today; it helps to know its history, including the original installation practices.

Here comes polybutylene

With more than 25 years in the mechanical trades, I've seen a lot of new products come and go. In 1993 I was introduced to a flexible gray and blue water piping material known as polybutylene. Sold primarily under the brand name "Qest", it was cheap and



Plastic or acetal type fittings with aluminum crimp rings

marketed as easy to install – using it could shave days off the average plumbing job. My plumbing company had been doing quality custom-built homes, primarily those piped with copper. As new home construction increased, I was asked to look at everything – single-family homes, large multi-family townhouse and condominium projects. To get this type of work, we needed to be fast, use code-approved materials, and have the lowest bid. Polybutylene helped many plumbers, including me, get these jobs.

At first PB systems were installed much like a copper or CPVC plastic pipe job, with sections of pipe

cut to fit between two fittings. Turns were made with elbows and branch connections with tees. The actual connection process though was radically different. A new crimping method allowed the pipe and fitting to be put together without glues or solders, and lugging a large acetylene or propane tank from place to place was no longer necessary. The new process simply required crimping a small ring or band around the end of a piece of pipe that had a plastic barbed fitting inserted inside. A two-pipe size combination-crimping tool that looked much like an average bolt cutter was basically the only new tool plumbers needed to add to their toolbox. At a cost of less than \$100, it was a bargain.

Initially, aluminum crimp rings and plastic or "acetyl" fittings



Copper fittings with copper crimp rings



Combination crimp tool

were the standard for polybutylene connections. But over-crimped joints were showing up as split or snapped off fittings. Under crimped or missed crimps were also leaking and there were expansion rate concerns as well. Measures to stop the PB problems were put into place.

Local and national solutions for PB problems appeared to work

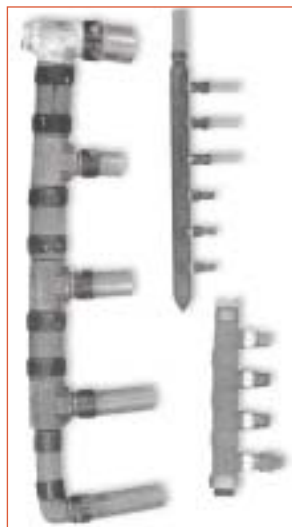
In the early years of polybutylene, it was common for code inspectors to give the okay to cover work following a visual inspection under normal city water pressure. But when quality-looking crimps occasionally leaked and popped joints flooded new homes, code inspectors began insisting on an elevated pressure test before the piping could be wrapped up. The thought was that under the higher pressure a defective or missed crimp would be discovered before the framed walls were covered up, therefore averting a future problem. Hydrostatic hand pumps were used to reach the new pressure demand, – some as high as 200 lbs. It worked! Missed crimps, under crimps and even over-crimped cracked fittings were found when they leaked or blew off during the new rough-in test.

Problematic aluminum rings and the acetyl fittings caused concern after the walls went up. The industries' solution was to use copper or brass fittings along with copper crimp rings. In some localities, bags of the unused parts cart-

ed around in plumbing trucks were simply no longer accepted. However, some areas allowed existing stocks to be used, which could account for homes that have a mix of fittings and rings.

The combination crimp tool was the next to go. Though popular when first sold, it wasn't easy to place it around the ring and still get the proper crimp action required to set the joint. The combination tool also had space limitations, and it was difficult to keep it adjusted. By the mid 80s, suppliers stopped selling it, urged plumbers to throw it away and to replace it with a single crimping tool for each pipe size. Plumbers who purchased large quantities of PB pipe sometimes received the new tools free-of charge.

More changes



On site and factory made manifold units

“Home Run Plumbing”, involved pulling a series of 1/2" pipes from the hot and cold service locations behind each fixture to one location in or under the house.

By attaching the pipes to a large battery of tees or a manifold fed by one 3/4" hot or cold supply pipe, water was sent to each fixture through a dedicated pipe. PB was sold in 20-foot lengths and in

New tools and piping methods kept coming. Manifold units, both site built and factory manufactured, became popular. Manifold piping, often called

rolls. Because the rolls of tubing could be purchased at 100 feet or more, the need to install fittings along the way on a manifold system was eliminated – a plus because fewer fittings meant fewer potential leaks.

Although substantially more pipe was required for the manifold system, pipe was inexpensive and the simplicity of the installation method meant pipe could be installed faster than for other systems, saving on labor costs. Some companies trained non-plumbers and laborers to install the pipe, thus cutting labor costs even more.

About the same time, copper stub out fittings – again factory-manufactured and site-built – were being used by some plumbers (including me) so they could plumb a house in a way that little or no polybutylene was exposed to view. This eliminated the cheap look – such as the flimsy wall extensions inherent with the product – and gave the house a more professional appearance. Copper stub out products allowed plumbers to put PB in houses where builders previously insisted on all copper. When the walls went up, the house appeared to be piped entirely in copper. It looked good, and where it was done well, this system of piping confounds many homeowners, real estate agents and even home inspectors today.

Specific PB problems Improperly used fittings

A large compression type fitting was primarily used at yard lines, as a repair part and by do-it-yourselfers. Still sold today, they can be found as tees, elbows and various adapters. Generally easy to install, they rarely leak if just a little more than hand tightened.

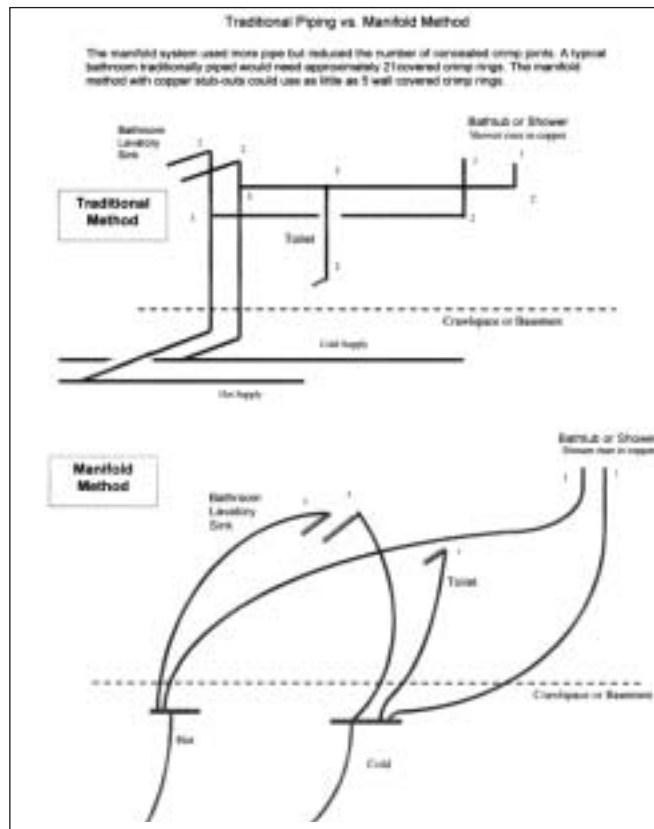
But when misaligned or over-tightened, they can crack and slip off, or the compression ring itself can cut into the pipe.

Although these compression fittings and even the pipe itself is not recommended for use in continuous loop heating systems, both were used by plumbers and HVAC installers on Apollo or Hydro type systems. In the past, both were often approved by some code inspectors even when used in this manner.

A loop type heating system uses the house gas water heater to heat the home. It can produce dramatic temperature changes to the pipe and fittings. Unlike water-filled systems that operate on lower water pressures, the fitting can work loose and leak. It's been my experience that leaks occur at the fittings when water-filled systems are used this way. Because a chemical reaction between the pipe and coil may be taking place, leaks occur along the pipe wall as well. Portions, if not all of the hydro system, can be found in attics under house pressure, where a leak can be catastrophic, often bringing down a ceiling.

Hose bib advisory frequently ignored

It says, "Hose bibs shall not be directly connected to PB tubing," in the 1993 Plastic Pipe and Fittings Association's edition of the "PB Handbook ONE". This advice was widely ignored for polybutylene. Barb adapters were often soldered to a hose bib, and the pipe directly attached. When first screwed to the wall covering,



the valves were secure. But once the screws worked loose, the valve could twist off completely or dangle from the wall.

Support issues

To support copper pipe diameters of less than one inch, a strap about every six feet is acceptable for horizontal support. To support CPVC pipe, a strap every three feet is generally acceptable for horizontal support. Polybutylene, however, required a strap every 32", and when filled with water, it still drooped. The sharp edges of some special pipe straps and talons used for PB were a stated concern. I've frequently repaired large dangling clusters of PB fittings in crawl spaces and pipes that were woven through attics like garden hoses, with no strapping at all. It's not unusual to find a cut pipe or pinhole leak at an improper strap.

Backfilling guidelines overlooked

Professional plumbers generally take pride in their pipe installations, but there are circumstances where things get overlooked. While backfilling a trench for example, it's easy for debris to get pushed in with the dirt. Soda cans, stones and wood scraps get dumped in a ditch with the fill dirt. Over the years, I've found these little construction artifacts in the same hole as the site of a leak.

Backfilling guidelines are spelled out in the "PB Handbook One". With regard to PB, the book states, "Do not use clay, silt or rocky backfill. Remove the construction materials or foreign objects from the trench prior to backfilling."

Yet I continue to find trash pressed against the pipe wall when repairing a yard service line leak.

In heavy load traffic areas, a minimum depth of 24" was required to help protect the pipe from crush concerns. But like in many warmer climates, the code in the Hampton Roads Virginia area only required a depth of 18" for freeze protection. So 18" it was.

The "PB Handbook One" manual also states the pipe should be pressurized with water before covering to reveal possible damage to the pipe and to keep it from being compressed into an oval shape. My experience was that plumbers often rolled the pipe from the street to the house, taped off both ends, and then covered it up. Later the pipe would be dug out at the

ends, connected to complete the water service, then pressurized. Slab piping was done much the same way. Plumbers trusted this material straight off the rack. There was rarely a leak with new pipe and pressurizing it before covering it just took up time and wasted fittings. Today, when trying to make an underground service pipe repair on older pipe, I find pipe that is simply too flattened to take a fitting or to hold a fitting leak-free. Sometimes the pipe splits along the sidewall as I try to repair it.

Sunlight – one of several PB enemies

Sunlight, high levels of chlorine, solvents, cutting oils, solder flux and pipe dope are just a few of the known enemies of polybutylene. While recommendations caution against exposing polybutylene to sunlight for more than 30 days, it was often hauled around in an open truck for days. On the building site, it extended above roughed-out slab jobs for several more days or even weeks before being wrapped up and the house built around it. PB doesn't change color or act differently on day 31, and because it has passed through several hands, no one knew how long it had been exposed to UV rays – so it was used.

Information about PB sorely lacking

Getting accurate information about polybutylene problems was itself a problem. Looking back, I'm alarmed by plumbers' lack of information about PB. When it was introduced, I attended a class on installing it, which was more marketing than training. Plumbers were told about PB's outstanding ability to hold up in harsh water situations. Fitting concerns were never mentioned. Now even durability is questioned.

As Michael Casey pointed out in his article, the Uniform Plumbing Code removed PB as an acceptable water distribution material in 1991. Yet, in my 1995 *International Plumbing Codebook*, the product is still listed as approved. At that time it was still going into houses in Virginia Beach, Chesapeake and other Hampton Roads cities. When I recently discovered the pipe in a house built in 1997, I quizzed a local code inspector to determine if the material was still accepted. He said the use of polybutylene isn't actually prohibited. But since manufacturing of the product had stopped, code officials felt it was a moot point. He also confided to me that he had seen service lines installed with PB after 1997.

In the first installment of this article, I covered what I knew about Polybutylene (PB) piping concerns before 1995. Early concerns primarily focused on fitting and testing changes. When I was first introduced to PB as a plumbing contractor, our information came from salesmen, supply house workers and local code inspectors. Eventually, the TV news program "60 minutes" ran a major piece on polybutylene leaks. To this day, I've never received special bulletins or notices from a manufacturer. The only unsolicited official document I received citing problems with PB was a 1995 notice about

a major class action settlement. By then I had long since stopped installing the product in new construction because of what I'd learned about it from making repairs in the field.

Going to court

As a result of class action settlements surrounding the use of polybutylene, more than a billion dollars has been paid over the years. There have been numerous lawsuits regarding the leaks and the subsequent damage involving PB pipes. The two largest class action settlements are the Spencer settlement and the Cox vs. Shell settlement.

The Spencer settlement was set up with \$120 million from DuPont. Money from the settlement was used to pay 10 percent of a claimant's costs incurred from replacement of a polybutylene system. An equal percentage was earmarked for past damages caused by the leaks.

In 1995, another Civil Action reached a settlement in the Tina Cox, et al, vs. Shell Oil Company. Though the defendants involved in this case, Shell Oil Co. and Hoechst Celanese Corporation denied and apparently still deny that they have any legal liability, the Court did agree to a settlement. In this case, the defendants agreed to give \$950 million to a settlement fund to pay for the

LEAK LIABILITY PERIODS AND FILING DEADLINES		
Dwelling Type	Leak Must Occur Within	Suit Must be Filed Within
All Single-Family	10 Years of PB Water Distribution	10 Years of PB Water Distribution
Multi-Family Units	10 Years of PB Water Service Line Installation	10 Years of PB Water Service Line Installation
Single-Family Units, Multi-Family Units, Condominiums, Hotels, Resorts, and Other Buildings with Multiple Units	10 Years of PB Water Distribution	10 Years of PB Water Distribution
Single-Family Units, Multi-Family Units, Condominiums, Hotels, Resorts, and Other Buildings with Multiple Units	10 Years of PB Water Distribution	10 Years of PB Water Distribution
Apartment Buildings & Commercial Buildings with Apartment Metal Inset Valves	10 Years of PB Water Distribution	10 Years of PB Water Distribution

Courtesy of CPKC

replacement of the pipes, damage to tangible property and for the administrative expenses incurred in managing the settlement.

The eligibility periods and filing deadlines are spelled out in a chart provided by the Consumer Plumbing Recovery Center (CPRC). There are other qualifying requirements for individuals to be approved for a settlement, including when a leak is considered a qualifying leak.

It's not easy to determine what constitutes a qualifying leak. The CPRC should be contacted for specific details. Some of the general considerations follow.

- The leak must have occurred after the first year of installation.
- The leak is not covered under another warranty.
- Leaks in icemaker lines or on fixture supply tubes, or on pipes that can be reached without opening walls, ceilings or floors are not considered qualified.
- Leaks in exterior pipes that can be repaired without excavation, or pipes that are damaged due to out of the ordinary use are not likely to qualify either.

With re-pipes and repairs, some plumbers are benefiting from PB problems. But for real estate agents and home inspectors, there's no good to be found. As a former Realtor®, I'm aware of the many unpaid hours invested in locating just the right home for a perspective buyer, and the polybutylene pipe situation has made it a bit tougher for some to find that home. Because so many of our newer neighborhoods – those built in the 1980s and 1990s – are piped with PB, Hampton Roads agents deal with the issue every day.

In the early 90s when I sold property, agents produced a disclosure form with a dozen or so points of

interest that could affect the buyer from a legal, financial or health and safety position. Since that time the list has more than doubled, offering information on a variety of topics such as environmental concerns, Megan's Law, aircraft noise and accident zones, EIFS and polybutylene pipes.

Major topic for Hampton Roads

The Real Estate Information Network, Inc. Consumer Disclosure Information Form for our area, dated 7/1/00, puts PB information at #5 on a list of 25 items. The document suggests that the buyer may want to investigate a potential purchase for the presence of PB pipes, and it states that polybutylene "has been known to fail, resulting in leaks." PB is mentioned again under a "Limitations of Expertise" passage where it notes that along with other areas of concern, real estate agents are not experts on the subject of polybutylene pipes.

To help guide the agents with the polybutylene issue, our local Association of Realtors® and a group of local home inspectors created a brochure for the association members. It expresses the concerns about the product, gives important phone numbers, lists Web sites to pass on to clients, and provides some direction to handling questions that come up about PB. Though many agents believe PB problems are a plastic-fitting problem, it specifically points out the newer fittings may contribute to the deterioration of the pipe and the pipe itself could fail. The handout also notes some hazard insurance companies are backing away from PB piped homes. Companies have canceled policies on homes following major claims.

Experienced listing agents now

alert sellers that the polybutylene issue will likely surface at some point in the sales process, and it could become part of negotiations. When a home has been re-piped or just piped with copper, this positive note is put in the computer listing information, mentioned in home highlight brochures, and quickly made available to potential buyers, other agents and to home inspectors as well.

Identifying the water distribution pipe is important

To avoid PB plumbing, some agents use a "wobble test" to identify concealed piping material in houses built in the last 20 years. It involves grabbing the wall stub-out pipe or the angle stop and wiggling it. If it moves freely, chances are PB is attached in the wall. As a result, some agents strike the property from their primary showing list.

When inspecting a slab home, where there is no PB visible below sinks, behind water heaters, under jetted tubs or in the attic, I recommend trying to check the washing machine utility box. Though some inspectors check at the water meter, this doesn't necessarily determine if the problematic pipe is in the wall. It may indicate the possibility that the yard service line is polybutylene. A common practice for plumbers was to connect the polybutylene piping directly to the service valves (boiler drains), thread the pipe through the 1/2" valve hole at the washing machine box and use a lock nut to secure the valve at to the box.

Remove the trim frame from the washing machine utility box, and cut or chip away a small area of plasterboard or sheetrock. If the plumbing connection is made with PB, it can almost always be discovered. When the frame is re-



1
PB pipes are often not visible in slab homes and wiggling the pipes can be risky. The washing machine utility box is a good place to look for PB pipes.

Lightly mark the edge of the box trim frame and remove it.

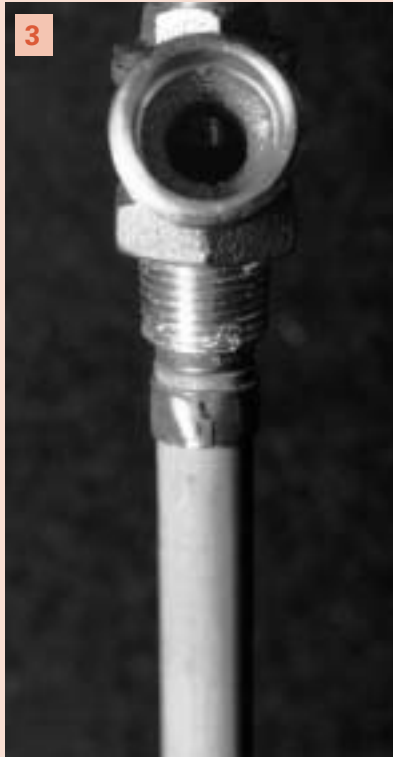
Locating polybutylene pipes



2
Chip or cut away a small section of wall within the frame area using the pencil mark for guidance. Check inside the wall with a flashlight for the gray pipe and metal ring.

On outer walls it may be necessary to pull the pipe wrap from around the pipe. This can usually be done with a screwdriver or other flat edge.

After your check re-install the frame.



3
The removed valve at the left is typical of what you might see, but in some cases a compression fitting might be observed.

installed, the small hole will be covered up without any visible damage at the wall. PB can often be found at this location when there is no other evidence in the house that the pipe exists.

From the buyers' point of view

Occasionally, buyers walk in the door concerned about PB pipes.

Sometimes a buyer or an agent will express concern about PB piping at the start of an inspection. More often the buyer is under the impression the house is piped in copper, and is noticeably caught off guard when told it's piped in PB, with the visible copper as the stub-outs. Sometimes the inspection ends at that point, but more

often homebuyers discuss other options, including the cost of a re-pipe.

Companies have specialized in marketing this option to homebuyers. Buyers weigh their concerns against other factors including purchase price, how long they intend to stay in the home, and the positive aspects of the property. Home Warranty Plans, casualty insurers and creative financing options are sometimes discussed. Some believe they could get assistance if needed from a class action settlement, and resolve to investigate their chances for help, but few qualify.

PB and points to note during the home inspection

Clients are notified of the existence of PB and the related concerns in different ways. A recent survey of local ASHI Chapter Members revealed the major inspection firms and top inspectors in Hampton Roads are identifying PB plumbing as a problematic piping system to their clients, but emphasizing it in varying degrees. Most use boilerplate or written statements to note concerns. Some offer oral comments as well.

I try to note any visible evidence of a problem-plagued system, such as piles of removed fittings and crimp rings in the crawl space or attic. Patches or stains likely associated with the piping and any comments made by the seller about previous leaks are also reported. Beyond that, I note any potential application or installation problems I observed.

Specific defects or majors concerns that might be noted on the inspection report include the following:

- Obvious leaks
- Poorly supported piping
- Noticeably bad crimps

- Kinked pipe or previous kinks
- Loose hose bibs
- Sunlight exposed pipe at an exterior shower or at improvised work
- Loose tub and shower valves
- Improperly installed fittings
- PB pipe on Apollo type or continuous loop systems
- Pipe too close to major heat sources
- Pipe closer than 18" to the water heater connections
- Loose washing machine hose bibs

Educating real estate agents about polybutylene and having a uniform method of product disclosure is working for our company. Some of the agents we deal with are familiar with the pamphlet, but many are not. Our inspectors carry the information brochure, and offer it to concerned agents they meet in the field. Some of us speak at real estate company meetings and others contribute to print articles as well.

A handwritten statement on our report is now boldly pre-printed below the piping material identification. The statement reads "Note: PB is a problematic tubing involved in several class action settlements." We give each client purchasing a property with PB pipes a copy of the local Real Estate Association's® agent brochure. We suggest they read the pamphlet, research information about the concerns of the product, get expert opinions and determine possible remedies.

Polybutylene concerns

PB was originally embraced because it was believed to be cheap, easy-to-use, and using it

could shave days off the average plumbing job. It was cheap and it did shave days off the average plumbing job. Was it easy to install? Yes. But easy to install properly is another question. The PPFA handbook points out there are at least five ways to make an improper crimp connection. We also know now PB doesn't tolerate abuse well. Couple this with the constant pressure by builders for speedier installations, the employment of lesser-qualified installers, contradictory official information, and material defects, and problems were inevitable.

Polybutylene plumbing systems will affect not only the owners and occupants of PB piped homes, but likely the real estate and insurance industries, plumbers, and home inspectors – probably for years to come. Some insurers are backing away from PB piped homes. The insurance industry is confronting the manufacturers. Some realty associations are quietly making it known with disclosures and brochures that there are problems with this product.

While plumbers enjoy income from repair and replacement work, home restoration and carpet cleaning companies benefit from the leaks.

For home inspectors, money and reputations are at stake. Newspapers and magazines carry heart-breaking stories about polybutylene and its victims. And there's a growing mentality that the home inspector is often to blame.

There is a consensus among plumbing professionals about polybutylene piping. It's no longer a matter of "if" the pipes will leak, but "when" they will leak. Whether

this is true or not remains to be seen. What we do know is there's more than a billion dollars in known settlement payouts and an unknown amount in undocumented costs related to PB. Home inspectors must take special care when reporting on PB plumbing systems, so polybutylene problems don't put a crimp in the business. ■

Kenny Hart is an ASHI Member and serves on the Technical Committee. The former plumber and real estate agent, is currently the Continuing Education director for Homebuyers Inspections, Inc. which operates in Virginia and North Carolina.

Additional artwork provided courtesy of Consumer Plumber Recovery Center (CPRC).

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