

Polybutylene pipe (sometimes called PB or Poly-B pipe) is a non-rigid, usually gray but at times silver or black, plastic pipe used in plumbing for drinking water supply. PB pipe is not PVC or CPVC, which is a rigid white or off-white plastic pipe. PB was introduced in the late 1970s and has been used in approximately six million mobile homes, apartments, houses and other structures in the U.S. Half of the mobile homes and about 5% of the single-family houses in the U.S. are thought to employ PB for plumbing. The product has been sold under the popular trade names *Qest*, *Thermoguard* and *Flex-Temp*. Polybutylene pipe is a plastic plumbing product manufactured from plastic resin supplied by Shell Oil Company.

By the late 1980s, a number of PB plumbing systems began to experience problems with leaky fittings. Today, there are a number of class action lawsuits against the manufacturers as well as the installers. One of the largest (*Cox v. Shell Oil Co., et al*) has been settled for \$950 million – the deadline for filing a claim is August 20, 1999. As of April 1996, the Shell Chemical Co. no longer supplies polybutylene resin for pipe applications in the U.S. With other class action lawsuits (*Qest*, *Vanguard*), a claim must be made within 13 years [with acetal fittings] or 16 years [with metal fittings] after the date of installation or before the year 2009, whichever comes first.

When the product first came out, **acetal plastic fittings**, made of a hard gray (sometimes white) plastic, were inserted into the pipe and clamped in place with an **aluminum** (and later a **copper**) band connecting the joints. These fittings were prone to cracking and leaks due to the different expansion characteristics of the plastics. As a result, **metal fittings** made of copper or brass were introduced. Although the metal fittings are more reliable, they still may suffer failures. The tools used to crimp these connectors needed to be carefully calibrated. Recent installations of PB piping systems use **compression fittings** that often have a plastic or metal nut to secure the seal. So far, this has solved the problem of leaks at the pipe connections.

There are a number of other factors that contribute to the leaks associated with PB plumbing systems. Although 90% of the leaks are at the joints in the piping due to poor joint connections using plastic insert fittings, 30% of the problems at the leaking joints are due to installation errors. Another defect is the pipe itself. The pipe is usually manufactured to withstand 100 pounds per square inch and a temperature of 180° F (82° C).

#### **FACTORS CONTRIBUTING TO PB PIPING SYSTEMS FAILURES:**

- **ACETAL INSERT FITTINGS (THEY WERE TAKEN OFF THE MARKET IN 1993 IN PREFERENCE FOR METAL FITTINGS)**
- **OVER-CRIMPING OF ALUMINUM BANDS THAT RESULTED IN HAIRLINE CRACKS AT THE JOINTS**
- **POOR INSTALLATION THAT CREATED ADDITIONAL STRESS ON THE PB PIPE**
- **EXPOSURE TO HIGH TEMPERATURES SUCH AS IN ATTICS OF MOBILE HOMES AND HOUSE TRAILERS**
- **LOCALITIES WITH RELATIVELY HIGH LEVELS OF FREE CHLORINE**

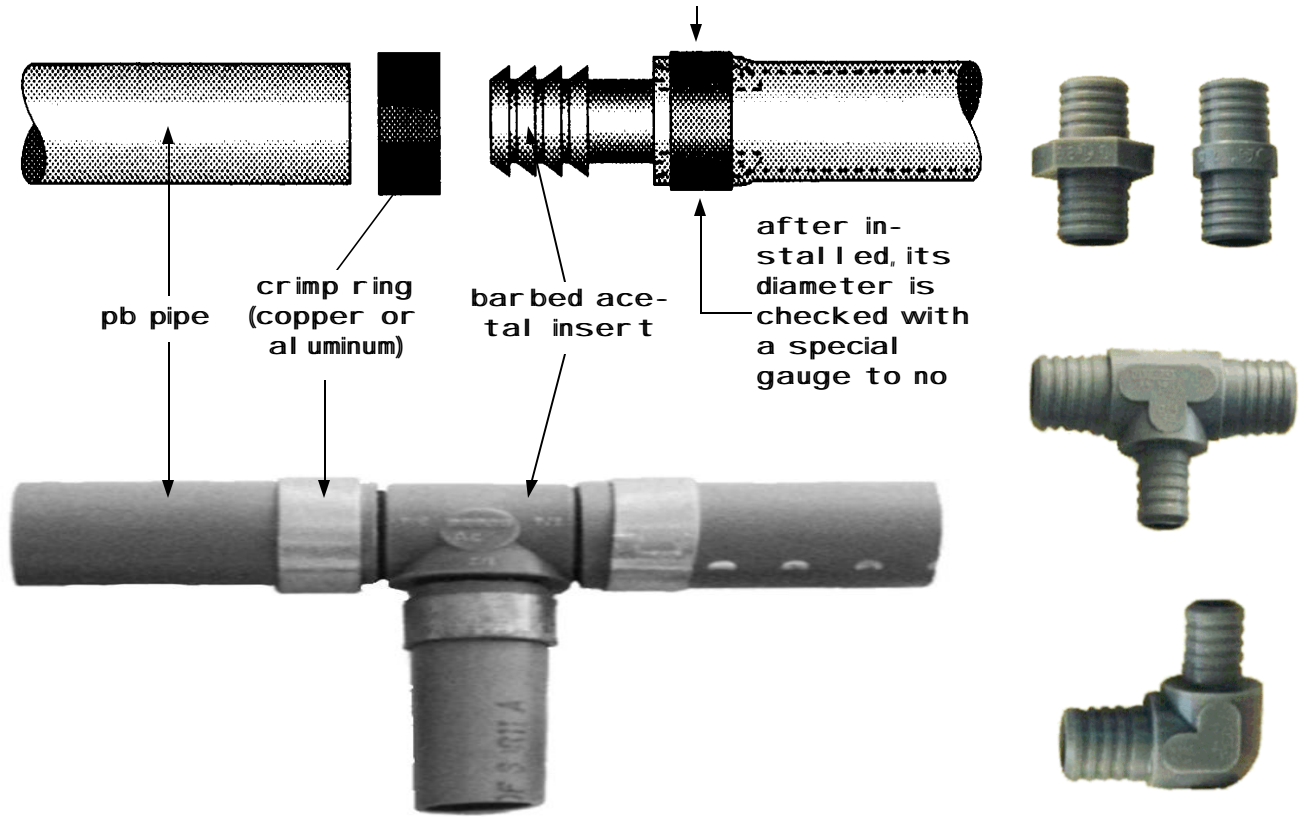
One of the largest manufacturers of PB pipe, Vanguard, also developed the “**manabloc**” system. This installation eliminates the use of T-joints. The PB pipe is run from one common source to each fixture. This system delivers water faster and balances demand on hot water to reduce the possibility of scalding due to temperature surges.

The company also has produced an alternative product, a cross-linked polyethylene (PEX), with many of the same qualities as PB pipe. One of the defects with PB pipe is the formation of stress cracks, brittle fractures due to the deformation of the tubing under stress and temperature. Stress cracks are greatly reduced with PEX pipes because of the cross-linked molecular structure. Unlike PB, PEX pipes cannot soften by heat once they are formed.

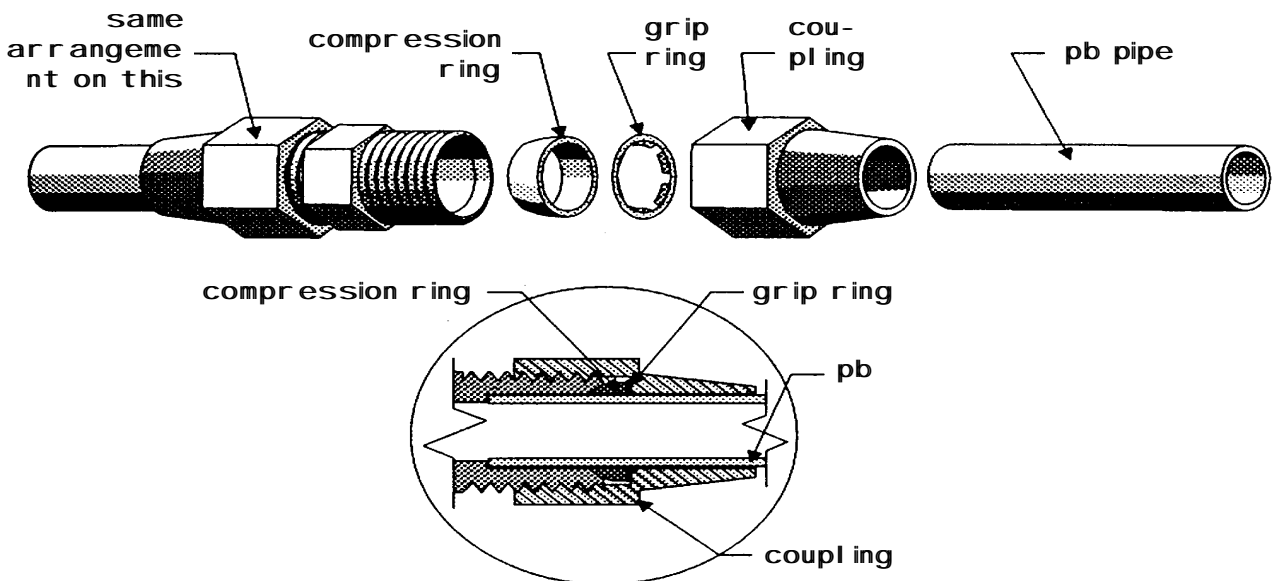
#### **SOME PRECAUTIONS TO TAKE IF YOU HAVE OR ARE INSTALLING PB PIPE:**

- Do not use acetal insert fittings (use metal insert fittings or compression fittings)
- Do not use where water temperature can exceed 180° F (82° C)
- Do not use in swimming pool piping systems or where water contains more than 2 ppm of free chlorine
- Keep pipe at least 6” (15 cm) from hot water tank, heating ducts or flue pipes
- Use a metal connector at least 18” (45 cm) long at the hot water tank
- Do not use in an application where the pipe is exposed to direct sunlight
- Do not expose pipe to direct sunlight for more than 30 days during or

# POLYBUTYLENE PIPE



PB PIPING SYSTEM WITH CRIMP AND ACETAL (PLASTIC) INSERT FITTINGS.



PB PIPING SYSTEM WITH COMPRESSION FITTINGS.