

4. PLASTIC WATER PIPES 101



Plastic water pipes first came on to the market in the 1950s as an alternative to the industry standards at the time: lead, iron, steel, asbestos cement, and vitrified clay. Plastic was thought to be less susceptible to corrosion and more durable than metal pipes, which typically last about 50 years. Lead pipes were not banned by the EPA until 1986, despite the known toxic effects of the metal.

PVC pipes were the first of the plastic pipes to be introduced, and they now account for the majority of all new water and sanitary sewer installations,¹⁰ partially because they are the cheapest. These water pipes are rigid and durable; however, they are susceptible to damage from heat. Chlorinated PVC (CPVC) is polyvinyl chloride with additional chlorine molecules added to create a more durable pipe that can withstand higher temperatures and is more resistant to overall degradation.

Polyethylene pipes are also used for potable water distribution. Several types of water pipe are made from polyethylene, including high-density polyethylene pipes (known as “HDPE”) and cross-linked polyethylene (known as “PEX”). While HDPE pipes are often used for water service lines, PEX pipes are more commonly used for plumbing inside buildings because they are more flexible and require fewer connections. PEX is also able to convey both cold and hot water, while historically HDPE has not had similar hot water performance.

All polyethylene and PVC pipes are plastic resins derived from fossil fuels with many additional synthetic chemicals added to enhance both the manufacturing process and the pipes' final performance, or their ability to convey water in a system. While each of these pipes are chemically and structurally distinct, the starter petrochemical for all of them is ethylene. PVC pipes are created by combining ethylene with chlorine to form ethylene chloride, which is subsequently converted to vinyl chloride. HDPE pipes are formed by creating long chains or polymers of ethylene with a small amount of other hydrocarbons. PEX pipes are similarly made of ethylene polymers, with the addition of increased chemical bonding between the molecules to create a higher-performing material.

Researchers have documented chemical releases from polyethylene-based plastic pipes, as well as from PVC pipes. While a thorough review is beyond the scope of this report, it is worth noting that a potential endocrine disruptor, 2,4-di-tert-butyl-phenol (2,4-DTBP), is one of the predominant chemicals released by HDPE pipes into drinking water.¹¹ 2,4-DTBP is a byproduct of an antioxidant that is added during manufacturing to improve the pipe's performance and slow down its deterioration over time. A range of other organic chemicals, including cancer-causing benzene, have also been identified in water conveyed by HDPE pipes.¹²

The Lifecycle of PVC

