

Iron vs. Plastic: The Real Story

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The debate over which DWV pipe to choose has continued for decades. The discussion is generally centered on two piping materials - cast iron soil and plastic. As a representative of the Cast Iron Soil Pipe Institute, I obviously have a strong preference for cast iron. At the same time, I acknowledge the manufacturers of plastic pipe make products which serve useful functions in today's construction industry. Some types of plastic pipe handle acid waste successfully, and some people feel that ABS and PVC pipe offer a lower material cost for economy construction projects. However, significant differences exist between cast iron pipe and plastic pipe, and those differences can be crucial for anyone responsible for selecting piping materials.

Cast iron pipe prevents the spread of fire much better than plastic pipe because cast-iron is not combustible. It will neither support a fire or burn away, leaving a hole through which smoke and flames can rush through a building. On the other hand, combustible pipe such as PVC and ABS, can burn away, creating an opening through which flames can move from one part of the building to the next. Firestopping from combustible pipe is labor intensive, and the materials are expensive, but firestopping for cast iron pipe, a noncombustible pipe, is relatively easy to install and inexpensive.

Another important difference between cast iron soil pipe and plastic pipe is strength. A hubless cast iron soil pipe 4" in diameter can support 4,877 pounds per linear foot without breaking. Furthermore, cast iron pipe is rigid; deflection of the pipe wall is almost nonexistent. Of course, plastic pipe is flexible and can deflect under loads. Deflection of 5% (which seems to be the maximum deflection which most design professionals allow) or more can obstruct flow and threaten the security of joints. In order to control deflection within acceptable limits, the standard for the underground installation of plastic pipe (ASTM D 2321) requires special trench width, special bedding, overexcavation of the trench, and hand compaction, none of which are required for cast iron pipe; and these special requirements can add installation costs for plastic pipe that are unnecessary for cast iron soil pipe.

One of the most impressive qualities of cast iron pipe is its longevity. Because plastic pipe has been installed in large quantities only since the early 1970s, its service life has not yet been determined. However, cast iron pipe has been used since the 1500s in Europe. As a matter of fact, cast iron pipe has been supplying the fountains of Versailles in France for over 300 years. Another area in which cast iron pipe exceeds plastic pipe is quietness. Cast iron's molecular density silences noise, and the rubber gaskets used to join the pipe reduce the transmission of vibration through the system. Independent tests show that cast iron pipe joined by rubber gaskets can reduce plumbing noise 750% better than plastic pipe. Because of this quietness, the October 4,

1977 edition of the Chicago Tribune identifies cast iron soil pipe as one of the "hallmarks of quality" in home construction.

One of the major reasons engineers and architects prefer cast iron soil pipe is for its low coefficient of expansion and contraction. Cast iron expands and contracts at about the same rate as concrete and steel, approximately 1/4 inch per fifty feet within a 70 degree temperature change, contrasted to plastic pipe, which will expand and contract the following lengths: PVC 2.338 inches and ABS 2.362 inches. Consequently, when plastic pipe is used in runs of more than 30 feet, expansion joints are usually required. But no expansion joints are ever needed for cast iron soil pipe systems.

Both cast iron pipe and plastic pipe can be vulnerable to corrosive materials. Cast iron pipe is subject to corrosion when the pH level inside the pipe drops to below 4.3 for an extended length of time, but no sanitary sewer district in America allows anything with pH below 5 to be dumped into its sewer collection system. Only 5% of the soils in America are corrosive to cast iron, and when installed in those soils, cast iron pipe can be protected easily and inexpensively. On the other hand, plastic pipe is vulnerable to numerous acids and solvents and can be damaged by petroleum products. In addition, hot liquids above 160 degrees can damage PVC or ABS pipe systems, but cause no problem for cast iron pipe.

Finally, perhaps the most important advantage of cast iron soil pipe has over plastic pipe is that it is produced with 100% recycled metal, making it an environmentally friendly manufacturing process. In contrast, the plastic in PVC and ABS pipe has minimum value as a recycled product; hence, the production of plastic pipe is somewhat less friendly to the environment.