

Plastic piping in industrial applications by David A. Chasis

Would you believe that plastic piping has been in use for almost eight decades? It's true. Plastic piping was introduced as an alternative to more traditional, failure-prone piping materials. In pre-plastic days, underground piping came in an assortment of material: metal, concrete, even wood (yes, in the late 1890s and early 1900s circular lumber was hollowed out and jointed by metal bracketing). But these all ultimately failed when challenged by corrosion and chemical attack. Through the years, in contrast, plastic piping proved its mettle. Today, for its stellar qualities, it has become the leading piping material for such belowground applications as water mains, sewer lines, drainage and waste lines, natural gas distribution, swimming pools, sprinkler irrigation, conduit and trenchless pipe rehabilitation. So why plastic piping?

There are four major characteristics that account for the success of plastic piping: durability, ease and safety of installation, environmental soundness and cost-effectiveness. These are the reasons that architects and engineers have been specifying plastic piping over the last 50 years in aboveground applications. Plastics picked up where metals failed. Why? Because plastics hold up to the rigors of harsh environments and applications, such as chemical waste drainage, surface finishing (plating), salt water use, ultra and high purity water, mining, water and waste treatment and chemical processing.

Even today, as more engineers and installers learn about the benefits of plastic piping systems, they realize that

the use of conventional or exotic metal alloy piping is not always the best solution to handle chemically corrosive fluids. Depending on conditions of service, plastic piping systems can handle almost any fluid imaginable. This includes inorganic and organic acids, bases, salts and slurries. Not only is the plastic piping system chemically resistant, but also the savings in material, installation and maintenance costs produce unmatched savings for the life of the installation when compared to other piping materials.

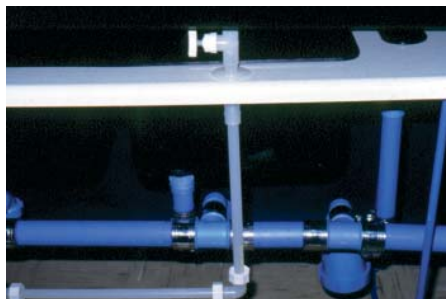
One of the earliest success stories of plastic piping is its use in chemical waste drainage systems. About 40 years ago glass pipe and fittings were the preferred piping materials for this application. Sure, glass has excellent chemical resistance, but when you consider its associated product, transportation and breakage costs, plastic has proven to be a better replacement. Today plastic piping is the market leader in applications of chemical waste drainage systems. Polypropylene (PP), polyvinylidene fluoride (PVDF) and chlorinated polyvinyl chloride (CPVC) are used extensively in laboratory waste systems in schools, research centers and chemical processing plants.

take power plant lines, marine use, fish hatcheries, aquariums, water theme parks and desalination plants. For handling the field challenges of higher temperature salt water applications, CPVC, PP, PE-RT (polyethylene raised-temperature), PEX (cross-linked PE) and PVDF are used.



PVC and CPVC piping system in a chemical processing application

Nascent industries such as the manufacturing of circuit boards, semiconductors and other electronic devices have embraced the use of plastic piping. These industries must process very corrosive chemicals, on one hand, in their manufacturing, but also need applications for handling the purest water possible for cleaning silicon chips and boards. There are PVC, PP and CPVC products to handle the chemical processing applications and PVDF to handle ultra-high purity water. For these high purity water applications, PVDF piping, fittings and valves are cleaned and bagged at the manufacturer's plant



PP chemical waste drainage and high purity piping systems

Salt water wreaks havoc on metal piping products. Not so on plastic piping. Depending on conditions of service, polyvinyl chloride (PVC) and polyethylene (PE) are used extensively on salt water environments below 140°F/60°C in such applications as: intake and out-



Corroded metal piping



Joining ultra-high purity PVDF piping in a semiconductor plant



CPVC chemical waste piping systems

for shipment to a semiconductor site. The piping system is then installed in plant clean rooms using very sophisticated joining equipment that minimizes or eliminates possible joint contamination of any kind. It's a given: when a semiconductor plant is on the drawing board, millions of dollars of PVDF piping systems will be specified.

Another point to keep in mind with plastic piping is that its remarkable durability does not make for much end-of-life material available for recycling. Yet, all the plastics mentioned in this article are completely post-consumer



PP clean room station in a semiconductor plant

recyclable. In post-industrial recycling (materials recycled in the manufacturing process), more than 99 percent of all plastic compounds are incorporated in the final product in most cases.

In the past the lack of easy access to educational programs and literature has been a factor in keeping engineers from specifying more industrial plastic

piping systems. This industry failing has now been remedied. With a simple click, anyone can access excellent websites offering useful information on design, features and benefits, installation, joining techniques, material selection, product availability and market applications. These websites are:

- Plastic Pipe and Fittings Association (PPFA): www.ppfahome.org
- International Association of Plastics Distribution (IAPD): www.iapd.org
- Sustainable Piping Systems: www.sustainablepipingsystems.com
- Plastics Pipe Institute (PPI): www.plasticpipe.org
- Mechanical Contractors Association of America (OPUS): <http://opus.mcerf.org>

The next time you are considering a chemically challenging fluid handling application — think plastics. ■

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