

FEATURE I

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HDPE vs PVC, What's the Difference?

Over the years there have been many "latest and greatest" ideas in the irrigation business that have not really worked out. They sounded like the thing to do at the time, but they turned out to be a liability down the road. Anyone that has epoxy coated steel fittings knows what I mean.

One of the "latest and greatest" things people keep asking us about is High-Density Polyethylene (HDPE) pipe. The truth is, it's not new; it's just becoming more popular in golf course irrigation systems. It has many attributes that Polyvinyl Chloride (PVC) does not. So, how do you determine if it's right for your golf course?

HDPE – What Is It?

High-density polyethylene is a ductile, durable, virtually inert thermoplastic composed of ethylene polymers. It begins as a translucent, tough solid. In pipe-grade resins, ethylene-hexene copolymers are usually specified with carbon black pigment for weather resistance.

HDPE can bend and curve, without fittings, at angles that would exceed manufacturer specifications and cause PVC pipe to break. Furthermore, HDPE has a much higher impact resistance than PVC. This is helpful both in new construction and in exposed crossings.

In theory, there are virtually no joints in an HDPE-piping network. The change-of-direction sections are fused to the pipe either by butt fusion or electrofusion. The system is monolithic once the fusion process is complete.

HDPE pipe can tolerate freezing much better than rigid pipe, an important consideration in northern climes. PVC pipe has a crystalline temperature of 32°F, at which point it becomes brittle. HDPE pipe has a crystalline temperature of -180°F, which means less potential for failure. In fact, water can freeze and thaw repeatedly inside of HDPE pipe without causing permanent damage to the pipe. HDPE is more durable and forgiving in most applications than PVC. With proper fusion, HDPE does not have joints that fail. Polyethylene pipe is more flexible and has greater impact resistance than PVC.

For example, a scratch as deep as 10% of the wall thickness doesn't reduce the pressure rating of HDPE pipe. PVC is notch-sensitive, meaning it has a greater tendency to fracture because of the presence of a notch, crack, or scratch.

Moreover, HDPE piping systems are more surge tolerant than PVC, which means fewer repairs caused by pressure surges. If an HDPE piping system is in need of repair, electrofusion couplings are the simplest way to facilitate repairs. The days of thrust blocks and joint restraints are gone, because everything is fused together.

From an environmental stand point, if you are using fertigation, HDPE is inert and will not readily react with other chemicals. Furthermore, the production of HDPE is far less destructive to the environment than the manufacture of PVC. The disposal of chemicals used in PVC, including chlorine, has become an environmental issue.

HDPE pipe has been used in water-works for more than 50 years, so it has a proven track record of reliability.

Types of Fusion – Butt Fusion

Butt fusion – the most common type of fusion – is used to connect lengths of pipe and to connect fittings to pipe. When two pieces of pipe are to be joined, a fusion machine holds them stationary. The edges of both pieces of pipe are shaved to ensure they are clean and straight. A heating element is lowered between the two pieces of pipe and left there for a pre-determined period of time, based on pipe size and wall thickness. After the ends are adequately heated, the heating element is removed and the two pieces of pipe are pushed together. Once the pipe has cooled, the fused joint becomes as strong as the pipe itself.

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... and Electrofusion

Electrofusion is a simple method that works well for repairs or in locations where a fusion machine won't work. The fitting is placed on the pipe and a machine is hooked to electrodes on the fitting. When the machine is turned on, the fitting is fused to the pipe by energy passing through the electrodes.

Applications for HDPE

In the past, HDPE was used primarily in bridge crossings, or for bores under creeks, lakes or roads. The fact that it was monolithic and flexible made it the perfect fit for these applications.

Cost prevented people from using HDPE for their entire system. Pipe, fittings, labor and the unknown all contributed to what used to be exponentially higher installation costs. As time has passed, and contractors have become more familiar with the pipe, the costs have come way down. Some contractors now prefer an HDPE installation over PVC. The gap between an HDPE install price and a PVC install price is minimal these days.

So who should put in an HDPE system? Several factors should be considered. What are your soil conditions? Are they rocky, sandy, shifting, built on a landfill? If you answered yes, these are conditions where the flexibility and strength of HDPE pipe would make it a great choice.

In rocky soils, the scratches that pipe can sustain are less likely to cause problems. Because the piping network has no joints there's less opportunity for pieces to pull free in shifting soils.

HDPE is still the best alternative for a bridge crossing, where a pipe will be exposed to the sun and freezing temperatures. The carbon-black injected into the pipe protects it from harmful UV rays. Boring under roads, cart paths, parking lots, and lakes has become much more affordable and causes very little disruption. These days contractors would prefer to bore with HDPE – they know there will never be a need to repair that pipe.

With all of its good qualities, HDPE still comes at a premium price on installation. Not everyone needs HDPE for their system. PVC systems have been around for a long time. As long as quality fittings, thrust blocks and/or restraints are used – and a good contractor installs it – PVC should last 25 plus years. Superintendents who have endured the nightmare of frequent fitting failure because of a bad installation or the use of epoxy-coated steel fittings will have a harder time being talked into using anything other than HDPE.

As a result HDPE systems are being installed more frequently now than ever before. If you are thinking about a new system and your golf course has the conditions previously described, it might be something to consider. If it doesn't make sense to spend the extra money, and you are not worried about any of the conditions mentioned earlier, PVC has been and will continue to be a perfectly suitable product. The majority of courses are installing PVC systems, and they will last a very long time. But there's another option out there, and this "latest and greatest" is truly a viable option. **-OC**



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