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HDPE VERSUS PVC

High density polyethylene (HDPE) pipe has become a popular alternative to poly vinyl chloride (PVC) piping systems for golf course irrigation systems. However, many times, the decision of which type of pipe to use is not based on science or engineering but on trends or salesman recommendations. It is important to look at the technical aspects of the pipe (pressure rating and velocity) for each type of piping system and determine what piping material is best for your golf course. Both PVC and HDPE piping systems will work, but you need to look at the "apples-to-apples" comparison instead of the "apples-to-oranges" comparison that is commonly presented.

For golf course irrigation systems, PVC pipe is usually rated at 200 psi for both mainline and lateral piping. PVC is also available with a 160-psi pressure rating, but is rarely used anymore. HDPE piping also is available in 200-psi pressure ratings as well as a number of other pressure ratings including 125 psi and 160 PSI. Whereas PVC is always using the same resin (1120, 1220) HDPE piping is commonly available in several different resins (4710, 3408 and 3608). As the resin changes, so do the pressure ratings and characteristics of the pipe; therefore, when selecting the proper pressure rating you should also be aware of what resin is being provided. Piping standards require that the system's working pressure be no more than 78 percent of the rated pressure of the pipe. For 200-psi pipe this is 156 psi, and for 160-psi rated pipe this is 125 psi. This is not too much of a problem from a design standpoint unless you have a high-pressure system.

However, let's look at a comparison of the velocities. For example, if your system included a 4-inch pipe carrying 200 gpm (pretty common on a golf course) in a PVC Class-200 system (SDR 21) the velocity would be 4.92 fps. In an HDPE 200-psi (PE4710, DR11) pipe the velocity would be 6.18 fps. If the pipe was HDPE 160 psi (PE4710, DR13.5) the velocity would be 5.67 fps. If you ever had an irrigation class, you were taught that velocities should not exceed 5 fps. Some believe that up to 6 fps or more in HDPE is acceptable, however, the 5 fps limitation is backed up by standards (ASABE 372.6). So for an "apples-to-apples" comparison, good designs have HDPE piping systems with the pipe one size larger than the comparable PVC piping system. In most cases this will give the PVC system a significant price advantage.

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When PVC fittings were first used on golf course irrigation systems, which occurred in the mid-1960s, it took about 15 years for the industry to find out that cyclic surges within the piping system were damaging the fittings over time, which resulted in the cracks in tees and elbows. You may have experienced this phenomenon. To avoid this situation, epoxy steel fittings became popular in the early 1980s, but they had their own set of problems so that is why ductile iron fittings are the standard for golf irrigation systems. At the same time, period the golf industry moved from using 160 PSI pipe to 200 PSI rated pipe. The learning curve for PVC pipe and fittings took about 30 years. HDPE pipe and fittings have yet to have a long-term track record with the impact of cyclic surges yet to be determined and as we all know the higher the velocity, the larger the surge pressures.

With the help of your designer, you need to consider many factors other than just pressure ratings when choosing piping material for your golf course. One type is not necessarily better than the other. However, when doing a direct cost comparison, make sure you are looking at an even comparison that includes features, pressure ratings and expected velocities. Both PVC and HDPE will work as long as they are correctly designed and installed. **GCI**