

Some Thoughts to Consider about PVC Pipe

The piping industry was revolutionized by the introduction, in the 1940s of polyvinyl chloride (PVC) pipe and fittings.

Piping system components manufactured from PVC exhibit excellent corrosion resistance, are light weight, have high strength-to-weight ratio, are exceptionally durable and have good resiliency.

The use of PVC has grown steadily since the introduction, to the point where about 100,000 miles of PVC pipe is installed each year in North America. The growth of the industry has been due, in part, to the availability of a wider range of PVC pipe sizes and compatible fittings that are inexpensive and easy to install.

No portion of the piping industry has been affected by PVC pipe and fittings more than the irrigation industry. The large quantity of pipe and the numerous fittings required made PVC a natural choice. The relatively low cost of the materials, the ease of installation and the corrosion resistance nature of PVC have made PVC irrigation systems the choice for golf course installations, home and commercial systems.

The changes in piping materials have been followed closely in irrigation systems, especially golf course systems, by substantial changes in sprinklers and control equipment. The advent of valve-in-head sprinklers and computerized control systems in the last 20 years has provided nearly

unlimited flexibility in system operation.

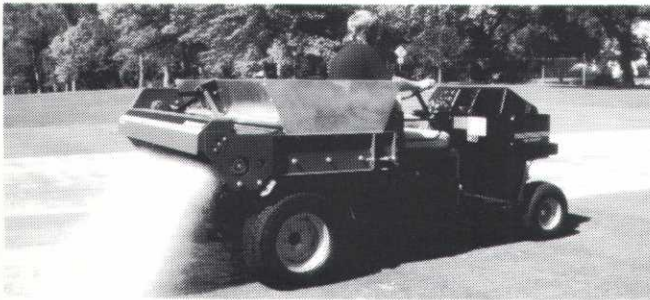
In early golf course systems, the design consisted of the main line system and lateral system, with a control valve separating the two. The pipe, fittings and sprinklers down stream of the control valve were pressurized only when the block valve was operating. Operating four to six sprinklers, covering a large area off a single block valve considerably reduced the systems flexibility. Also, low head drainage through the sprinklers allowed air into the pipe, causing potentially damaging surge pressures the next time the block valve turned on.

Surge pressure or water hammer is created any time the flow rate changes in piping systems. Typical causes include rapidly closing valves, pumps starting or stopping, line breaks or entrapped air rapidly escaping. As water moves through pipe, kinetic energy is created in relation to the mass of water moving and the velocity in which it is moving. When the flow is stopped rapidly, this kinetic energy exerts itself in the form of a momentary increase in pressure above the normal static pressure, resulting in a surge. This surge can be damaging to PVC pipe and fittings.

Early irrigation systems were constructed mainly of steel pipe, especially in the smaller diameters. Sprinkler swing joint assemblies were nearly always constructed with steel

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PVC Pipe —

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components. From a pressure capacity standpoint, the components had strength well beyond the stresses put on them. With PVC, although the strength-to-weight ratio is fairly high, a given fitting or pipe used in an irrigation system is not nearly as strong as the steel counterpart it replaced. Because of equipment changes which resulted in added flexibility, we are placing extra stresses on systems while we are using components with less strength. This combination can lead to component failure unless careful consideration is given to system design and operation.

PVC pipe is produced in pressure ratings from 100 PSI through 315 PSI and in sizes from ½" through 12". 100 PSI and 125 PSI rated pipe is not recommended for irrigation application. Usually 160 PSI and 200 PSI rated pipe is used or irrigation systems.

PVC pipe is produced to standards such as ASTM (American Society for Testing Material). These standards insure products that have uniform characteristics and, in most cases, allow each manufacturer's material to be used with another manufacturer's product. This feature insures product availability and competitive pricing to the end user.

PVC pipe is manufactured in standard 20 ft. lengths with some manufacturers making 40 ft. lengths on special order. The pipe is made with one end belled for solvent welding or for gasket joint connection. For golf course systems sizes 2½" or 3" and larger is usually gasket joint. Gasket

joint connections are easy to assemble and the rubber gasket provides for expansion and contraction that takes place in the pipe with temperature changes.

Thrust blocking is required on all gasket joint pipe installations. Because the gasket allows the pipe to move at each joint, it could also be pulled apart by thrust forces. Water under pressure exerts thrust forces in piping systems at changes in pipe size or direction, dead ends and valves. The size, shape and type of thrust blocking required depends on the maximum system pressure, pipe size, type of fittings and soil type. Refer to the manufacturer or system designer's recommendations for thrust blocking.

If solvent welded pipe is chosen, care must be taken when making the solvent connection. Improper application of the cement or primer can result in failure of the joint. Refer to the pipe and solvent manufacturers for their recommendations on proper solvent welding techniques.

PVC piping offers many advantages over other types of piping to the irrigation industry. If the systems are carefully designed, installed and maintained, the piping will give years of satisfactory service. However, inadequate consideration of potential hydraulic situations, faulty installation or improper operation can lead to significant problems, if not immediately, then at some time in the future.

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