Swing Joints—Vital Components of Valve-in-Head Irrigation Systems

Unless you work in Florida, you know this past winter was tough on irrigation systems. The Alaska Blaster wreaked havoc on unprotected pumps, backflow devices, valves, pipes and sprinkler heads deep into the South. Days of freezing temperatures, unusual for the Sunbelt, damaged typically undrained systems.

While many of these problems are simple to spot, it's the ones you don't see that will drive you crazy during another expected year of drought. Manufacturers of irrigation components suggest that superintendents and sports turf managers across the country devote extra time this spring to inspect their systems for winter damage. And while you're troubleshooting, you may want to take a fresh look at sprinkler head heights and the condition of fittings from the laterals to the surface.

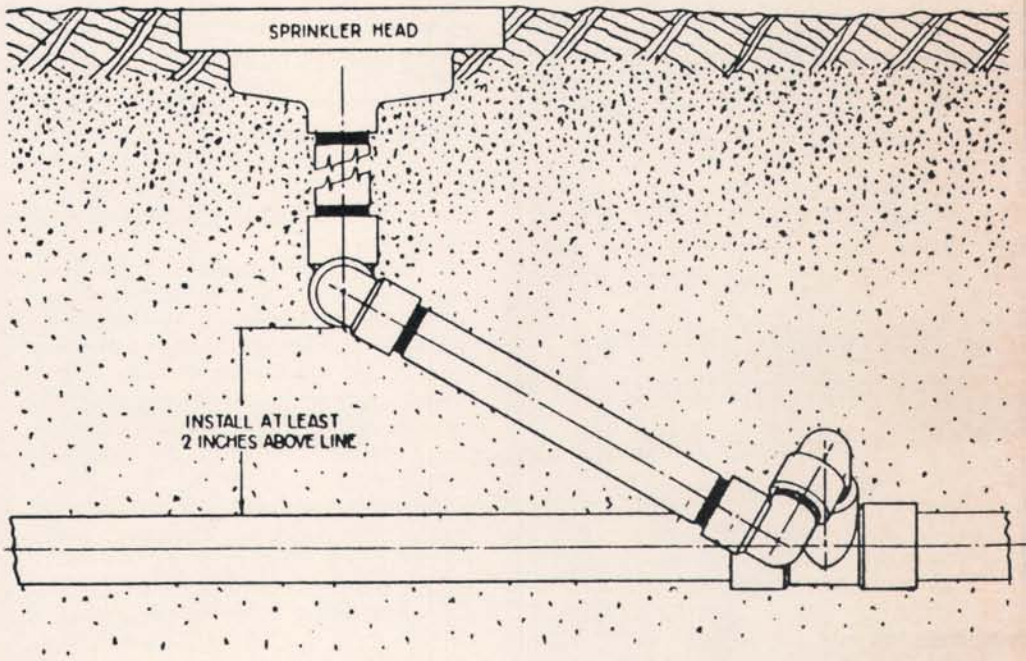
Fine-tuning an irrigation system is critical in maintaining uniform coverage at the greatest efficiency. Water and energy are two of the largest items in a turf manager's budget. Small leaks by themselves may seem minor, but when added together they represent a significant water loss and sizable energy loss, especially for pressurized systems with valve-in-head sprinklers.

"Irrigation designers and contractors have experimented for years with the way heads are connected to laterals," explains Larry Workman of Lasco. Starting with old galvanized pipe, they devised a combination of nipples, street elbows and risers to join the laterals 18 inches to two feet below the surface with sprinkler heads. The intent was to provide a way to adjust heads after installation of the turf and to protect the laterals and heads from damage by surface traffic.

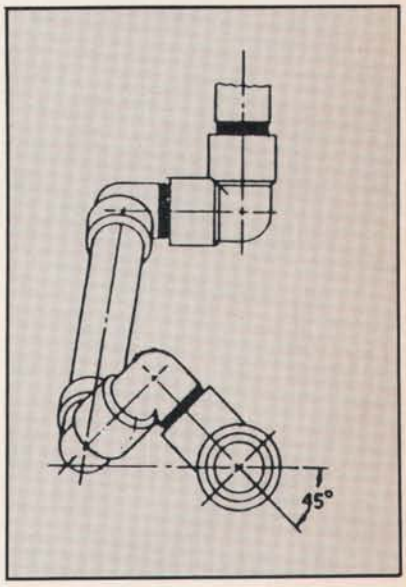
Those were the days of block or battery systems. Heads were placed into zones controlled by individual valves. The laterals between the valves and the heads were pressurized only when the valves opened. If the fittings between the laterals and the heads leaked, it was only for the short time that zone was operating. Fittings that were slightly loose so they could move were expected to leak to a degree.

The problem with galvanized fittings in some soils is they corrode and the joints freeze and become locked in position, explains Workman. Once this occurs, you are back to a rigid connection between the head and the lateral.

To overcome many of the problems with galvanized pipe and fittings, the irrigation industry started replacing them with PVC or polyethylene components. These plastic fittings did not corrode and remained flexible. But, like galvanized fittings, they would often leak slightly after being backed off.



Recommended installation of swing joint for sprinkler head application. Photo courtesy: Lasco Industries.



The irrigation specialist or contractor had to learn the difference between installing galvanized and plastic fittings. Most fittings and pipe have tapered threads. As they are tightened together, the male thread exerts an increasing amount of force against the female thread. If the same amount of torque is applied to plastic fittings as to galvanized, the plastic will crack and the joint will either be weak or leak. Furthermore, galvanized male fittings screwed into plastic female fittings will often be overtightened. When water hammer hits the weakened joint, it can't handle the load and bursts.

To complicate matters more, teflon tape and some joint compounds actually have a lubricating effect on plastic pipe, making it too easy to overtighten plastic joints. When the joint is loose, these compounds do not always seal the threads adequately. Compared to the ease and integrity of glued plastic fittings, seating threaded plastic fittings properly is difficult.

One company's research showed that standard fittings backed off one-quarter turn had a 50 percent chance of leaking. Backed off one-half turn, the percentage jumped to 80. The margin for error was simply too great for installation in the field on pressurized systems.

The world of irrigation was changing, especially on golf courses and parks. Automatic controllers opened up a whole new realm of possibilities and eliminated much

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of the labor and attention given to irrigation systems during operation.

To give the golf course superintendent control over individual heads around greens, irrigation manufacturers created valve-in-head and valve-under-head sprinklers. Advanced controllers and field satellites also provided the superintendent with a much larger number of stations so he could program many heads individually.

The significant point about valve-in-head or valve-under-head sprinklers is that the connection between the lateral and the head is pressurized. Instead of leaking for 10 or 20 minutes, loose fittings will leak constantly if not completely sealed. A steady, small leak can keep jocky pumps working overtime, waste water, and result in damage to the area around the head.

"95 percent of all new golf courses are utilizing valve-in-head sprinklers."

One way to overcome this problem is placing valve-in-head sprinklers in zones as before. The controller must be instructed to open two valves to operate a single head, the one in the head and another supplying water to the zone. This permits the lateral and the fittings to be unpressurized except when operating any of the heads in that particular zone. It is common in older irrigation systems that were retrofitted for valve-in-head sprinklers. Irrigation designers also include main valves in strategic areas for this and other reasons. But no golf course or park wants to pay for unnecessary valves.

"When valve-in-head systems became popular, those of us in the fittings business had to come up with a solution to leakage," Workman recalls. It was Lasco engineers who pioneered the development of the first prefabricated swing joints. By preassembling elbows with O-rings at the factory, Lasco was able to provide leak-proof joints that allowed movement for adjustment and traffic impact.

Tapered threads were replaced in the swing joint with stronger acme threads. The O-ring allowed more than a full turn of swivel without leaking. During installation, the swing joint is tightened all the way and then backed off one full turn before alignment. An assortment of accessories has been designed to adapt the swing joints to various sizes of pipe and heads. The preassembled joints not only eliminate the problem of leakage, they reduce installation time considerably.

Because valve-in-head sprinklers produce a shock when closing, the components are rated to withstand 200 psi of pressure, adds Workman.

"The first swing joints were single swing elbows," recalls Bob King, president of King Brothers, Inc. Then more elbows were added to make the joints adjustable in all directions.

KBI makes fittings for the plumbing industry as well. "The liability situation for both the institutional irrigation market and the plumbing industry is changing today," King adds. "You have to make sure your product works without fail. A fitting behind the wall of an apartment building must be reliable, just as a swing joint on a golf course."

King has found from experience that the weak link with swing joints is the threaded nipple used to join them to laterals or heads. For this reason the company recommends solvent glue joints at these locations.

Dura Plastics introduced a triple swing joint specifically for valve-in-head sprinklers in 1987. The company's engineers designed this swing joint with two O-rings to prevent leaks as well as intrusion of sediment into the joint. To help its customers distinguish its fabricated swing joints from ordinary fittings, the company's swing joints are colored gray.

The firm has devised accessories for its product to eliminate any extra joints. "You are better off to eliminate things like reducing nipples when possible," Roberts adds. "Don't use two or three fittings when one will do."

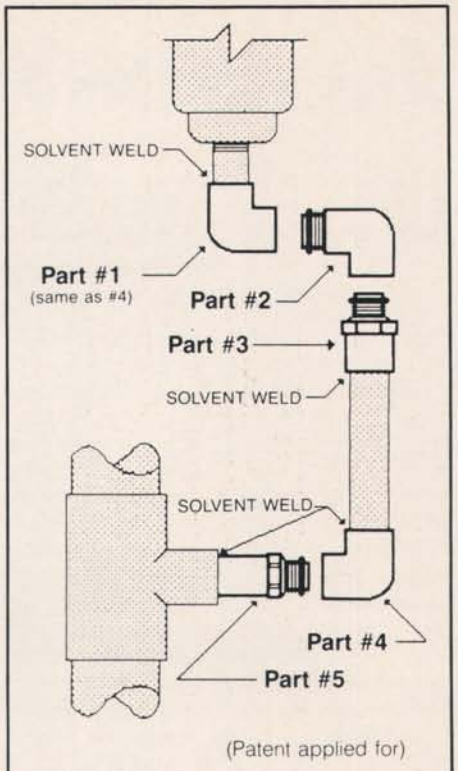
All the above manufacturers make swing joints in 1, 1¼ and 1½ inch sizes for golf course and institutional sprinkler heads.

Superintendents and sports turf managers should expect to pay a premium for swing joints. "They may add $4,000 to the cost of a half-million-dollar irrigation system," explains Lasco's Workman. But irrigation specialists are beginning to realize that the joints simplify installation, require little to no care, and will pay for themselves quickly in water and energy savings.

"Swing joints aren't for everyone," states Roberts. "They are designed specifically for valve-in-head systems in areas with heavy traffic, such as sports fields and golf courses. But then, 95 percent of all new golf courses are utilizing valve-in-head sprinklers," states Bob Roberts, sales manager for Dura. "Parks are also beginning to utilize valve-in-head sprinklers to a greater degree."

But the need for swing joints goes beyond the type of sprinkler head. All types of heads are subject to heaving in the colder regions of the country, remarks Don Cooper of Weather-matic. As subsurface water freezes it expands, pushing the soil and anything contained in it upwards. "If the head is attached to the lateral with a rigid joint, heaving can actually pull it off the lateral," Cooper warns. "It's important to place gravel sumps around heads to improve drainage in areas subject to heaving. Swing joints can definitely help."

Head adjustment is especially important in golf and sports turf. The majority of sprinkler heads are designed to be installed at grade. This provides clearance for maintenance equipment and prevents heads from interrupting play.



Lasco full circle swing joint kit.

However, there is a growing desire on the part of athletic field managers and superintendents to have heads set 1/4 to 1/2 inch below grade. Stadium turf managers frequently want heads on the playing surface set below grade so they can be covered with sand during games. Topdressing can also raise the turf around heads by as much as 1/4 inch per year.

Only a few types of sprinkler heads are designed to be set below grade or to be covered. All other heads must be adjusted periodically back to grade. This process is simplified by swing joints.

Smaller swing joints and flexible risers are available for more conventional sprinkler heads around golf courses, parks and schools—and standard fittings still dominate the irrigation market overall.

Regardless of their size, swing joints protect both heads and laterals from damage while saving water and energy in the process. They eliminate unstable wet soil around heads and simplify adjustment.

When you consider the investment your sports facility has in irrigation, swing joints make a lot of sense. They enable you to turn a potential liability into an asset. When replacing a green can cost $40,000 or a player's injury can result in damages of six or seven figures, any method of insuring the safety and integrity of an irrigation system is worth attention.