



How water pressure can affect irrigation system efficiency and performance

Editor's note: This article was written by Lynette Von Minden from Swanson Russell, an agency that represents Rain Bird.

IT'S CERTAINLY NO SECRET that sports turf managers and groundskeepers are trying to do more with less. From fertilizers and fungicides to equipment and pest management, tight budgets and environmental concerns have made it necessary for these professionals to think outside the box to keep fields in attractive, playable condition.

When it comes to sports field irrigation, rising water prices and an increased emphasis on water conservation mean that sports turf managers must do all they can to use water as efficiently as possible. Over the years, irrigation system manufacturers have introduced many new technologies intended to improve water efficiency without sacrificing a field's health and overall appearance. These technologies range from the extremely sophisticated, like central control systems that enable users to schedule and program irrigation for multiple sites remotely to the seemingly simple, like high-efficiency nozzles for rotors and sprays. However, no matter what type of control system or nozzles an irrigation system uses, it can't operate at top efficiency if the field's water pressure fluctu-

ates or is consistently high. That's where the need for pressure regulation comes in.

The concept of "pressure regulation" certainly isn't new. Most homes have a few appliances or fixtures that regulate water pressure, like low-flow toilets, shower heads and washing machines. But why does water pressure have such an impact on irrigation system efficiency? Water pressure that's higher than the recommended level for any rotor or spray will increase its flow rate, forcing more water through the sprinkler than it needs.

"Every sprinkler head has an optimum pressure operating range," said Chris Dimmick, Rain Bird Corporation's area specifications manager for the Great Lakes region. "During testing, the manufacturer determines this optimum range as it relates to nozzle performance. For every additional 5 psi over and above a sprinkler head's recommended operating pressure, it will use 6-8% more water than it should. While that amount may not sound like much, it adds up to a very significant amount of money and water when an irrigation system runs multiple times per week, 8 or 9 months out of the year."

As if wasting water and money wasn't bad enough, high or fluctuating water pressure also has a negative impact on turf. When water is under excessive pressure, it tends to emerge from the head as mist or fog, which can easily drift away in the wind instead of landing on its intended target. As a result, some areas of the turf may be too dry, others, too wet. To compensate for the dry areas, many turf managers tend to water more often, creating boggy conditions in some areas of the field and unnecessarily wasting even more water. Not only do they end up with muddy turf and large water bills, the high water pressure and more frequent operation cause greater wear and tear on irrigation system components. This situation leads to systems that may break down more frequently, requiring a higher level of maintenance and possibly decreasing the system's overall life span. The bottom line? More time and money leaking away from already-stretched budgets.

For those sports turf managers who aren't sure whether their irrigation systems are suffering from the effects of high or fluctuating water pressure, it's never too late to find out and take steps to alleviate the problem. While it's possible to observe the system in action and see whether water is emitting from sprays and rotors as visible droplets (good) or mist/fog (bad), it's better to actually measure the water pressure to know exactly what you're up against. "Measuring your water pressure is as simple as attaching a pressure gauge to a hose bib," Dimmick said. "If you don't have a gauge handy or aren't sure how to measure correctly, an irrigation industry professional in your area should be available to help. It's important to

never assume you have adequate pressure—it's a critical design element that cannot be taken for granted."

So what exactly constitutes "high water pressure?" That depends on the sprays and rotors in use on a particular field. The vast majority of sports field playing surfaces are irrigated with larger rotors that have an accordingly larger distance of throw. "Most of my sports field customers irrigate their playing surfaces with rotors having a throw radius of 39 to 81 feet, or a throw radius of 39 to 64 feet," Dimmick said. "Due to their greater throw radius, the appropriate operating pressure for those rotors will be higher than, say, a rotor used in tighter areas, such as the areas between first and third bases and the fence line, or behind home plate and the backstop on a baseball field. The rotors used on the field itself may have a specified operating pressure range of anywhere from 30 to 100 psi; the smaller rotors or sprays used elsewhere will typically operate at a pressure range of 25 to 65 psi. However—just because your water pressure falls into the product's specified range doesn't mean that the rotor or spray is operating at maximum efficiency. It's important to check product specs or ask your local irrigation professional to determine the optimal pressure for your particular brand and model."

According to Dimmick, sprays typically have an optimum inlet pressure of 35 psi and smaller rotors operate their best at 45 psi. To help customers with high or fluctuating water pressure, Rain Bird has developed spray and rotor models with what the company refers to as "Flow Optimizer Technology." Inlet pressures up to 100 psi are effectively managed by integrated pressure-regulating stems (PRS) and ensure that these products always operate at optimum pressure levels.

These particular products are very useful when irrigating areas off the field. But what about those larger rotors that water football, baseball or soccer fields? There are other ways to alleviate the problems associated with high or fluctuating water pressure. Pressure-regulating swing joints, for example, can also control and maintain a preset rotor inlet pressure. Like a pressure-regulating stem built into smaller rotors and sprays, these swing joints ensure optimal droplet size and eliminate misting, resulting in improved uniformity and reduced water consumption. They can also be used to provide the same pressure to each rotor on a zone in applications where high flow rates result in significant friction losses or where there are elevation changes.

It's also possible to regulate water pressure at the valve using a pressure-regulating module like Rain Bird's PRS Dial. This type of product

is specifically designed for use with commercial valves like those used in sports field irrigation systems. The module threads underneath the solenoid and adapter, effectively optimizing inlet pressure for all the rotors or sprays in an entire zone. However, while it's certainly better than not regulating pressure at all, regulating pressure at the valve may not be as accurate as using a pressure regulating swing joint or a sprinkler with in-stem pressure regulation. This is because the dynamic pressure—pressure while water is in motion—is constantly chang-

ing. When regulating pressure at the head rather than at the valve, the discharge pressure will be identical at each head, causing the heads to discharge the same amount of water.

"High or fluctuating water pressure can obviously have a tremendous impact on any irrigation system's efficiency and effectiveness," Dimmick said. "Given the higher prevalence of watering restrictions and rising water prices throughout the country, pressure regulation is a topic that deserves attention both on and off the field." ■



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