

# Taking On Winter: The Basics of Irrigation System Blowouts

BY LUKE FRANK

**A**nybody in the turf industry north of 45 degrees latitude should have a firm grasp of proper irrigation system winterization. Otherwise, both acute and chronic forces can cause considerable system damage at spring recharge and nightmarish summer maintenance.

The power of water turned to ice is chilling: it can split mains and laterals, fracture fittings and heave sprinkler heads and valve boxes to new heights. There are three areas of opportunity for executing proper irrigation evacuation. The first two, sound irrigation design and installation, may be forgone conclusions. The third opportunity, actually purging your system, is a logical, methodical procedure of isolating and blowing out your system infrastructure.

## Start at the beginning

Those who contend with winter soil frost lines of 4 inches or more have a strong appreciation of nature and its power. Pipes, sprinklers, wires, valves, boxes, and other equipment are continually heaved, and hoed, all winter. Install something poorly in the fall and you'll have to rework it in the spring.

In many cases, there is little we can do to combat our weather conditions. However, there is much that can be done to make a system "give" with weather conditions.

Most systems are designed and installed somewhere within the top 12 to 24 inches of soil. Such systems are in the direct line of fire for winter abuse. Techniques such as pipe pitching, intended to direct water flow to the manual drains when opened in the fall for winter purging, are clever but shortsighted. If pipe truly is pitched at installation, it rarely remains that way due to frost heaving.

Consequently, each autumn, less and less water will be evacuated, so more of it will remain in the piping system. This remaining water then freezes and expands to continually weaken pipe and fittings through fatigue over time. Each year, system damage increases, whether visible or not, and spring recharge costs increase.

If pipes don't remain pitched from frost heaving, then water never really has the chance to get to any drains. Moreover, once winter frost completely surrounds the drain, it becomes ineffective, as it can no longer release the water from the system. For these same reasons, systems that rely exclusively on manual and automatic drains for winterization are at risk.

## Essential design features

Basic fundamentals tell us that if a device or technique is marginally effective, additional system service will be incurred. Adding pieces to the system that may fail or not work as specified, or will damage other components, should be avoided.

An irrigation consultant/designer should be aware of winterization techniques required for each specific project before finalizing the layout. For example, mainline

systems on all projects should be configured so that compressed air can be introduced into the system at key locations and provide for the easy removal of the majority of water from the entire mainline system promptly. At the water source(s), just downstream of the backflow preventer, an outlet should be provided as the point of connection for the compressor hose.

At the mainlines' ends, or at isolation points in looped system design, quick couplers should be specified to enable water release. Naturally, these also would be useful for manual watering during the season,

but placed in key locations so that during winterization, high volumes of water can be easily released from the system. All quick couplers should be accessible and protected by a valve box for easy location in the fall.

Irrigation consultants/designers must have practical knowledge and thorough experience in winterization procedures to truly design a reliable system. Examples are pumping systems designed to require minimal winterization; or the research of and experience with sprinklers, valves, and other components that perform better in colder climates and during winterization. Poor design will result in hard to winterize and maintain systems.

In northern climates choked with heavy frost, building in system flexibility is very important. All systems should be installed

with an appropriate flexible riser (preferably swing joints) at each sprinkler. Valves should be installed so that valve boxes don't rest on any incoming pipe or wire.

Mainlines should be installed outside of the electrical valve boxes to allow for wintertime movement, and adequately sized compressor connections should be installed near the water source and outlets, preferably quick couplers at the end of mainlines.

While these installation fundamentals are important, an accurate as-built plan will be your winterization reference tool every fall. As-builts should provide information for your crew about where to begin and end the process and warn of peculiar issues and how to deal with them. Be diligent in regularly updating any changes in product or location as the seasons pass.

## Getting down to business

On larger projects with multiple taps and looped mainlines, a game plan should be designed, documented, and followed. The overall goal is to replace the piping system's full water volume with equal or greater air volume by methodically pushing the water out.

Looped mains will have to be isolated to create single, independent flow direction. Multiple tap systems also will have to be isolated, one tap from another, to form independent flow directions.

Proper compressed air volumes and pressure are keys to successful winterization procedures. Generally, compressed air pressures of 70-80 psi combined with air vol-





umes of 160 cfm will service most properly laid out systems.

Larger sites or poorly designed systems might need multiple compressor units to provide the air volume needed to purge water from the system. Remember that full air volumes are the key to the best system purging. And be patient, while a simple residential system may take an afternoon, a baseball complex or golf course could take several days of isolating and purging zones.

To begin the winterization process, shut down the water source. If yours is a metered system (which it should be), it may be as simple as shutting a valve. On a pump station designed for non-winter removal, it may be the same—shutting a valve—plus shutting off power. Depending on the pumping system, effective winterization could require suction line removals, hydraulic valve pumping or microchip removal.

Once the water source is shut down, the compressor can be hooked into locations designed or retrofitted into the system. Fire up the compressor and let it build up the desired pressure. Once accomplished, go to the end(s) of the mainline and insert a quick-coupler key into the quick coupler (again, designed in or retrofitted).

When the key is completely inserted, water will begin to flow. Gradually you'll see a combination of air and water; next very moist air and water vapor; and finally just air. Mainline purging is now complete. Large volumes of water are released first through the mainline, making zone-by-zone procedures less time consuming.

Next, go to the irrigation controller and activate it zone by zone. Repeat the same process looking for the same results. Follow this by locating any manual zones, drip zones, fountain system supply taps, lake fill lines, etc., and perform the same process. If additional quick couplers are on site, the same procedure should be followed.

On larger sports facilities, with varied topography, an additional step is taken. After the initial winterization occurs, compressors are shut down. The remaining water is allowed to "pocket." Later, the compressors are reactivated and the remaining water will be purged.

With the system now purged of water for the winter, you can be assured that the minimum amount of water re-entering the system through sprinklers will not accumulate in volumes large enough to cause damage. Beware: systems that rely exclusively on manual or automatic drains will leave substantial water in the piping. Thus, when water enters through the same sprinklers, larger volumes of water accumulate in the piping and freeze damage will occur.

Most of us aren't lucky enough to have contributed to the original irrigation system design; we work with what

we have. But simple compressor hose hook-ups and quick coupler retrofitting in strategic locations will equip crews for good system purging, which in northern climates is a matter of system survival. **ST**

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