

## Irrigation System Freeze Protection

In areas where the frost level could extend below the depth of installed pipe, you must consider the need to drain the irrigation system to prevent freeze damage.

There is a bit of controversy as to whether this is necessary in systems consisting of polyethylene pipe: some feel polyethylene systems will survive the expansion of water during a freeze. (The manufacturers of polyethylene pipe agree it is not necessary to evacuate the water, but they do caution that the pipe must be buried. Otherwise, the pipe can be broken if struck or flexed while full of frozen water.)

Even so, enduring the stress of repeated water expansion over a number of years weakens the pipe and can lead to fractures. There is also a question of stress if the fittings and pipe do not expand and contract at the same rate during temperature changes.

With PVC pipe, there is no question — if PVC pipe more than half full of water is frozen, it will crack, and cracks caused by freezing are most often from fitting to fitting; that is, *along the length of the pipe*. In addition, closed-case heads installed above ground must be drained, regardless of their composition.

### Approaches to Irrigation System Drainage

In systems that do not utilize check valves to prevent low head drainage, either manual or automatic drain valves can be installed to quickly accomplish “winterization.” Systems that include check valves have to be “blown out,” as described shortly.

With manual drain valves, in a properly designed and installed system, gravity is used to remove the water from the system. With such a system, it is important that a good “as-built” drawing be available to help the responsible personnel locate the manual valves when draining the system. (Irrigation systems that use manual drain valves are not as common as they once were — the labor required to ensure there are no low, “water-trap” areas in the piping is costly.)

Automatic drain valves — spring-loaded devices that open when pressure is removed from that portion of the system — are now more common. However, some irrigation professionals feel automatic drain valves are too easily clogged, allowing water to remain in the pipes. It is also possible for water hammer to cause system damage if the pipes are drained after each irrigation cycle.

If you use automatic drain valves, be sure they are installed in a sump, and be sure they are installed pointing downward at a 45-degree angle; do not install them pointing straight down.

Both types of drain should be installed and used according to the manufacturer’s instructions.

### Blowing Out a Check-Valve Irrigation System

Systems utilizing check valves to prevent low head drainage cannot be winterized using manual or automatic drain valves. The most common method of draining these systems is the use of a portable air compressor to blow the water out of the system.

Systems consisting of pipe that is three inches or less in diameter can be blown out with a 125 CFM (cubic feet per minute) compressor. Larger systems (pipe that is four inches in diameter or larger) may require 250 CFM or more.

**Note:** The following is a general description of the use of an air compressor to blow out an irrigation system. The procedure can vary according to the type of equipment involved.

Connect the compressor to the system and activate the zone of sprinklers furthest from the compressor before opening the valve on the compressor. It is important to introduce air into the system gradually to avoid producing high-pressure surges. Depending on air pressure, pipe size, variation in elevation, and nozzle size, it is possible to subject the sprinkler system to surge pressures in excess of 600 PSI. (Placing a gate valve between the compressor and the irrigation system would be prudent; a ball valve could produce water hammer, and is not recommended.)

Gradually increase the air pressure in the system to 50 PSI, to reduce the chance of water ram damaging the components. If the sprinkler heads do not pop up and seal, adjust the pressure upward until they do, but **under no circumstances should the air pressure exceed 80 PSI.**

As stated, evacuate the zone furthest from the compressor first. In addition, be sure to start with the zones at the higher elevations and work down. Water will run down hill

into the main if you start at the bottom and work up.

Work in sequence through the other zones. We recommend evacuating the system in two short cycles rather than one long one. That is, blow out each zone for a short period of time, draining most of the water, and then repeat the process. This ensures removal of water that has drained from another zone into an evacuated zone. Cycling through the system twice also reduces the amount of time compressed air is moving through dry pipes, producing friction which could cause heat damage.

And finally, be aware that if the temperature has dropped low enough, there is the possibility that ice has formed in the sprinkler nozzles. If the nozzles are frozen shut, it is possible the water will not be evacuated from that section of pipe. Therefore, if the temperature is or has been low, you should inspect the nozzles before proceeding.

As you are blowing out the system, check the pipe closest to the compressor from time to time to ensure that it is not hot to the touch. If the pipe is hot, the air velocity through the pipe is too great and should be reduced. Excessive heat can damage the pipe and other components in the system.

The time required to evacuate a zone can be five or more minutes. When the spray from the sprinkler nozzles is reduced to a fine mist, an adequate amount of water has been blown from the system.

After cycling twice through the system, and you are satis-

fied the system has been drained, leave one zone on and shut down the compressor.

### Precautions

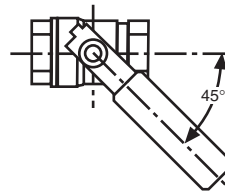
It is easier to drain and winterize the system properly than it is to replace components in the spring. When winterizing an irrigation system, be sure to take the following precautions:

- Don't allow the air pressure to exceed 80 PSI, particularly in systems designed to operate at less than 80 PSI water pressure.
- Don't stand over component parts while the system is under air pressure.
- Don't leave the air compressor unattended.
- Don't blow out the system through a pump. First blow out the system, then drain the pump.
- Don't leave manual drain valves open. Water could enter the system during winter thaws.

### The Finishing Touches

To protect backflow devices with resilient-seat (ball) valves, precautions must be taken to prevent damage caused by the freezing of water trapped in the valve body. After the water supply has been shut down for the winter and the system has been properly drained, return to the backflow device and use the lever handle to open and close it several times. This will remove any water that may be trapped in the body of the valve.

Leave the handle at a 45-degree angle, as shown in the diagram above, so the valve is partially open. If left fully open or fully closed, water can become



trapped within the valve, possibly resulting in freeze damage.

When preparing a hydraulic control system, close and disconnect the potable water supply line to the signal control tubing and drain the tubing. As discussed earlier, draining polyethylene control tubing may not be necessary, but if the control tubing is PVC, it must be blown out.

Electric or electronic controllers should be left with power on and the rain switch or station start switch in the off position. This will help prevent condensation inside the controller enclosure which could cause corrosion and component failure.

*These instructions are based on observation and practices proven over time in the field. However, extreme caution must be used when injecting compressed air into an irrigation system.*

*Note that some manufacturers of pipe and other components do not warrant their products when the components are subjected to compressed air, and they do not support this method of evacuating water.*

*Hunter Industries assumes no liability for use of this method of evacuating an irrigation system, and does not guarantee success by following these guidelines.*