PREPARING YOUR IRRIGATION SYSTEM FOR WINTER

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Winterization consists primarily of expelling all of the water from the irrigation system piping and equipment. This is necessary since any remaining water would freeze during the cold weather and could break pipes, fittings, valves, sprinklers, and pump equipment.

Although most substances contract as they get cold, when water cools it contracts only until it reaches a temperature of 39 degrees F. Upon further cooling to 32 degrees F, water actually EXPANDS. At 32 degrees F it further expands as it turns from water to ice. Water expands and increases in volume by about one-eleventh, so that 11 cubic feet of water will form approximately 12 cubic feet of ice. This expansion force is sufficient to cause pipes and fittings to burst, valves to crack, sprinkler cases to split open, and other damage to the irrigation system.

The only way to ensure expulsion of all water from the system is by using compressed air to blow it out. Therefore, it is highly recommended to rent a compressor and "blow out" the system for winterization. There are also many irrigation contractors that offer this service. In this article, I will detail all of the steps that should be taken to prepare your irrigation system for winter.

1. Developing a Winterization Plan

A crucial part of the winterizing process is to have a **written winterization procedure** for your fields or park. The "blow out" process cannot be performed efficiently unless there is a logical approach prepared ahead of time. You want to avoid the endless pushing of water around in the system without actually expelling it. A written plan can be followed step-by-step by any member of your staff or personnel actually doing the air blow out.

2. Preparing the System

Be sure that you have an accurate "as built" drawing of your system with critical "high" and "low" elevations indicated. This "as built" drawing should also indicate the location of all zone shut-off valves (or zone isolation valves), all drain valves, all remote control valves, sprinklers, quick coupling valves, controller locations and areas they control, etc.

3. Understanding Air Compression

It is important to remember that **air volume and not air pressure** is the most critical element in blowing out a system. A sufficient volume of air is required to move the water through the pipe's full diameter. If an insufficient volume of air is used after having forced out some water, the air will ride up over the top of the water. This will result in the remaining water draining back into low points of the system, which will then be subject to freezing and likely damage to the system piping, fittings, sprinklers, valves and other components of the system.

4. Calculating Air Volume

The volume of air required will depend on your irrigation system. In general it will require somewhere between 100 to 250 CFM (cubic feet per minute).

5. Determining Air Pressure

The amount of pressure to use is best established by analyzing the system and determining the weakest part from a pressure rating standpoint. This can be quite low, perhaps in the 60 PSI range. You should **not** exceed this pressure and it is best to keep it somewhere below this level. Air pressures should be in the range of 40 to 60 PSI.

6. Controlling the Process

Although many compressors have pressure gauges and some type of pressure regulating device, it is still strongly recommended to install your own pressure regulating valve and pressure gauge at the point of connection into the irrigation system. This ensures that your devices are operating correctly and are accurate, where those on the compressor may not be. It also provides a very important back up and close monitoring to ensure proper operation during the blow out process.

7. The Actual Blow Out Process

Identifying the Point of Air Introduction into the System

Compressed air should be introduced at the highest point on the system. A 1" size inlet, equipped with a gate or ball valve, is adequate for sports and park systems. This connection should be steel or brass – not plastic.

Step #1

Shut off the water supply to the system. This may be as simple as closing a valve on the source of supply to your system or it might entail disconnecting your pumping station from your system. It is recommended, and this is a good time to check, that the valve is tied closed and a sign

placed on it stating it's "not to be opened" to ensure no one opens it during the winter shut-down period.

Next, open all drain valves, hose connection spigots and/or quick coupling valves. Allow your main lines to drain to low spots in the system. Disassemble several sprinkler heads at high spots to allow air to enter and speed up the draining process. This is best done several days before actually connecting the compressor to your system.

Step #2
Connect the compressor to your system at the high point. If possible, you want to always push the water down hill to the low points of the system.

Step #3
Activate the compressor. It is important that the operator be knowledgeable and thoroughly trained on its proper operation. This is an expensive piece of equipment and must be operated properly to prevent damage to it. The compressor and irrigation system should be slowly brought up to the desired operating pressure in order to reduce the possibility of surges and potential damage to the system.

Be patient and do not rush this process – it may take in excess of 10 minutes to get the system up to proper pressure and volume. It is important that the compressor have a high-pressure relief valve that you know is in good working condition. Also be sure to monitor closely to ensure that only the proper volume of air is being forced into the system.

CAUTION! Water is relatively non-compressible, but air is quite compressible and can develop characteristics that are more explosive and dangerous. Caution must be exercised when turning equipment on or off while the system is under air pressure. It is also strongly recommended that no one work directly on or stand over equipment or sprinklers while the system is under pressure and **always** have at least one valve open to allow air to escape while the system is pressurized. The compressor should **never** be left unattended while in operation.

Step #4
Zones within your system that are farthest away from the point of introduction of air should be blown out first. By doing so you will be able to eliminate a large percentage of the water from the main lines first. This in turn should speed up the process of blowing out the remainder of the zones. In order to avert the possibility of water running back into zones that have already been winterized, piping that is at the higher elevations should be blown out at the beginning of the procedure, followed then by zones in lower elevations.

Step #5
During the blow out operation, be sure to flag and record any pipe or fitting breaks, valve damage or sprinkler problems so that proper repairs can be made in the fall or spring before the system is "re-charged" for irrigation operation. It is suggested that

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someone walk around the park and listen carefully as often you can hear the air escaping or see the air bubbling up from breaks in the piping or fittings, which you would not see under normal operation. This will be helpful in determining what materials you will need in the spring for proper repair. It will also eliminate the question as to whether this damage was done during the winter because of inadequate system blow out.

Step #6

If you have any backflow prevention valves on your system, they also need to have all water evacuated from them. Open and close drain valves and test cocks on the backflow preventers during the blow out process for the zone they are on. Also any rain shut-off devices that may be on the system should have their cup or collection sump emptied and either turned down or properly covered to keep any water out of them during the winter.

Step #7

After you have run a sufficient number of cycles so that only a mist is coming from the sprinklers on all zones, you are ready to shut down the operation. When shutting down, always leave several drain valves at the farthest end of the system open. Slowly close the flow control valve on the compressor until it is no longer pushing air. Then shut off the compressor.

Danger. Remember, do not disconnect while the connection may still be under pressure.

Step #8

Power down the controller (disconnect the transformer or main power) to prevent rodent infestation if located outdoors, or protect the unit by sealing all entry points. Anywhere where warmth is created by power being left on will attract rodents. Moth-balls are also a deterrent

8. Winterizing the Pump Station

A few simple steps can be taken each fall to ensure that the pumping station will be ready for operation in the spring. This includes making sure that all water is purged from the various sections and components of the pumping station. Whenever the temperature reaches 28 degrees F or lower for a longer period than 24 hours, you risk having freeze damage occur to the pumping station if water has not been purged properly from it.

Step #1

Refer to any manuals you may have on your pumping station for the manufacturer's recommendations on the proper way to winterize it.

Step #2

In addition to the pumping station manual, or in the event you do not have a manual, you should check and perform the following procedures. Open all drain valves and petcocks that are on the pumping station. If no drains are visible on the pumps themselves, or just for further assurance of getting the pumps drained properly, you can loosen the bolts on the flange and let the water drain from the pump. Also be sure to drain the pressure tank. Let the water drain by gravity from all areas of the pumping station. Be patient as this may take a considerable amount of time to ensure that all water has properly drained. Leave all drain valves open.

Step #3

With air, blow out all pilot tubing and all pilot valves on the main control valves. Leave the pilot tubing disconnected for the winter. Loosen the bolts of the main control valve bonnet to allow for draining. Tighten bolts and fill bonnet cavity with anti-freeze.

Step #4

Drain all the water from the various pressure switches. Blow out the tubing and leave all tubing disconnected for the winter.

Step #5

Check all piping connections and fittings for leaks or other repairs that may be required to put your pumping station back into good working order. This should include checking all mechanical connec-

tions for tightness. Check all seals, gaskets and hoses and replace any that appear to be failing or show aging or hardness and that may not be sealing properly or that look like they may soon fail. Preventive maintenance can be the least costly in the long run and can eliminate the possibility of down time right in the heat of the season when you can least afford it.

Step #6
Check all electrical connections. Inspect all electrical components in the controls for your pumping station. Replace any components that you know are bad and any that are suspect for failing in the near future. Again, preventive maintenance can be the most economical in the long run.

Step #7
Use steel wool or emery cloth to remove any rust deposits on the pumps, control valves, control panels, and piping of the pumping station. Use a high-quality, rust inhibitor type paint to cover all rusted and/or paint chipped areas.

Step #8
Grease all fittings on the pump station. If you have turbine pumps be sure to also change the oil in them. On centrifugal pumps, drain the water from them through the lowest drain plug on the volute of the pump.

Step #9
Aluminum intake lines should be removed for the winter to prevent electrolysis. Be sure to clean the interior and the exterior of the inlet or the foot valve. If you have a wet well, this is a good time to clean it of any debris and also to clean the inlet filters.

Step #10
If your pumping station is exposed, it is recommended that you cover it with a canvas to protect it from the elements and help prevent rusting. A plastic cover is not recommended as it causes condensation under it and will only aid the rusting process.

Other Pump Station Tips
If your pumping station is in a pump house, you may want to consider heating the pump house with a heater to maintain from 40 to 50 degrees F temperature all winter long. In some of the more moderate winter areas, thermostatically controlled heat tape can be used to provide this added protection and assurance.

Keep in mind that winterizing the pump station properly and making sure it will survive the winter successfully will ensure you that it will be ready and in good working order in the spring. It can reduce your replacement costs which can be quite high if you sustain a lot of damage to the pumping station due to winter freeze failure. In addition, you can eliminate the delay in getting your system back into operation in the spring due to needed pump station repairs In conclusion, your time and efforts dedicated to the winterization process are well spent for both the long-and short-term care of your irrigation system. ♦