

HYDRO-FORCE

TECHNICAL NOTE 01-03 WATER RESTRAINT SYSTEM (WRS) Winterizing and De-Winterizing Guidelines Dated March 24, 2003

Introduction

This information applies only to the WRS systems installed at very cold climates and that include a freeze protection system. The California installations that include a freeze protection system are: CSP Lancaster (1 system), California Correctional Institution (8 systems), and High Desert State Prison (3 systems).

The WRS systems have a “heat trace” anti-freezing system and are capable of being used during normal California winter conditions. However, some institutions may decide to not use the WRS in winter because of cold outdoor conditions that can cause exercise yard icing when water is sprayed. If this institution decides to not use the WRS during winter operations, this technical note provides information for preparing the WRS system for winter conditions in the fall before freezing conditions occur and for preparing the system for operational use in the spring.

Description

The WRS systems with the freeze protection (FP) equipment installed have a heat-trace warming system installed on the water tank, water valves (upper and lower), and interconnecting piping. This system must be electrically powered to be effective. WRS systems with FP also have the nozzle valve removed from the end of the WRS cannon. The nozzle valve is the yellow valve located on the end of the cannon and must be removed because these nozzle systems are mounted upside down and water retained in the barrel can freeze and crack the barrel assembly.

Winterizing Procedure

The winterizing procedure should be performed before a very hard freeze is anticipated. Light freezing can be tolerated by the system but freezing conditions with no anti-freezing system that last more than about 6 hours can affect WRS operation. However, the WRS can withstand freezing conditions of 12 hours or more if the anti-freezing system is properly maintained and plugged-in, and the WRS is operated on a daily basis. Regular system exercise moves the water and assures rotating components are operating correctly.

The following steps should be performed on all systems that are being winterized and not going to be used for any period during freezing conditions.

1. Verify that all portions of the WRS system containing heat-trace taping and insulation are connected to the proper AC power and properly activated. In most cases, feeling by hand the heat trace areas will indicate if the heat trace system is operating.
2. Verify that the heat trace taping is properly secured and the insulation is in place. This is particularly important where the WRS system components can sustain mechanical damage or weathering, such as, the upper valve and nozzle assembly. Close visual inspection should be performed on all components.

3. If the heat trace system includes a temperature control element, verify that the temperature setting is correct and operating properly.
4. Aim the nozzle assembly in a downward and out-of-the-way direction so any water can be drained out.
5. Shut off the main power breaker located near the Power Control Cabinet (PCC). This will remove power from most of the system and eliminate any accidental operation. **IMPORTANT:** Be sure that the power for the heat trace system is NOT connected through this breaker.
6. Shut off the water supply to the WRS water tank filling valve. If the water filling valve and interconnecting piping is not heat-traced and insulated, the water tank and water fill piping should be drained.
7. In the control room, shut off the video monitor, remove the tape from the VCR and shut off the VCR, and unplug power from the video unit installed near the VCR. If you wish, after removing the tape from the VCR, all control booth components can be powered down by unplugging the power strip located near the control booth equipment. This power strip is white and has four plugs for VCR, video monitor, video card and camera.
8. If possible, cover the WRS control panel so it cannot be damaged while not in use.
9. Inform operations that the WRS system has been winterized and is not available for use.

De-winterizing Procedure

The de-winterizing procedure must be performed on any WRS that has been winterized before the WRS can be placed into operation. De-winterizing consists of reversing the winterizing procedures, performing certain preventative maintenance procedures and testing the system for proper operation.

The following steps should be performed on all systems that have been winterized and have not been used for any period during freezing conditions. **DO NOT power the system until steps 1 through 9 below are performed.**

1. Perform a thorough visual inspection of all system components looking for any physical damage that could have occurred during the winter. Inspect the upper Bermad valve and nozzle system.
2. Check the heat-trace system to verify that it is still operating correctly. If this system is not working correctly, the piping system and tank must be inspected for frozen water before proceeding. Frozen components may have to be warmed to remove frozen water.
3. Drain any condensed water from air reserve tank. The drain plug is located on the bottom of the air reserve tank. Be sure the system is turned off and there is no pressure on the reserve or chemical tanks before attempting to drain the water.
4. Using a pair of open-end wrenches, tighten the bolts located at all water line joints and valves. The bolts may become loose and continued looseness can result in water leaks.
5. Check oil level in compressor. You can examine the oil level using the view glass at the end of the compressor body.

6. Check the water separator and the oiler located on the low-pressure regulator mounted on the air reserve tank. Remove water from the water separator unit. Add oil to the oiler unit if the oil level is less than 25 percent of the bowl height.
7. Remove and inspect the air filter located on the compressor.
8. Remove the water tank top cover, and inspect the water tank for freezing, corrosion, or defects.
9. Turn on the water supply line and check for water leaks.
10. Apply power to the system by activating the main circuit breaker located near the PCC. Using the proper voltmeter test for the 480VAC voltage on all phases and check for the presence of 24VDC at the terminals of the system low voltage power supply. In most systems, the power supply is located in the System Control Cabinet (SCC) located adjacent to the PCC. In a few systems, the power supply is located in the control room.
11. At the control room, plug-in and reactivate the VCR, video card and video monitor. If the control panel was covered, remove the cover.
12. Turn on the system using the control panel power switch. Verify that the control panel lights perform the initial test sequence, the audible device chirps at the end of the control panel test sequence and the compressor starts.
13. Return to the air compressor location and check the starting and stopping high air pressures (on chemical tank gauge) and the low air pressure (regulator on side of air reserve tank).
14. Check for air leaks on the hoses near the compressor. Soapy water solution in a spray bottle can speed checking for leaks.
15. Verify that the compressor pumps to the high pressure (about 16 bar), turns off and that the green lamp on the control panel illuminates indicating adequate air pressure.
16. **Verify that the control panel additive switch is in the OFF position before proceeding.**
17. Shoot a water stream through the nozzle and examine the water stream. The water stream should have the same narrow stream as when the system was installed. If in doubt, compare the water stream with the photograph of operation following initial installation, or call Hydro-Force Technical Service.
18. Shoot water streams in all water delivery modes, high pressure and low pressure, while using the different shooting modes; short pulse, long pulse, and continuous.
19. While shooting, move the nozzle in the horizontal and vertical directions, verifying that the movements are smooth. If “clicking” is heard from the rotary joints, the rotary joint clutches may have to be adjusted.
20. Optionally, the chemical switch can be turned to on and chemical can be dispensed using either the short pulse or the long pulse modes. Verify that chemical is delivered. Turn chemical switch to off before proceeding. Be sure to clean the yard of chemical residue using the continuous spray mode after chemical is dispensed.
21. Inform operations that the WRS system is available for use.

Should you have problems with the de-winterizing procedure, please contact Hydro-Force, Inc.

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