



## NUPI Americas Pressure Testing For Liquid Systems

NUPI Americas Warranty requires the installed NUPI Americas piping systems pass common testing methods, including the NUPI Americas Pressure Test which is detailed in this document or a Pressure Testing which specifically required by the authority having local jurisdiction. NUPI Americas Testing requires the passing of three tests, 1) Preliminary Pressure Test, 2) Principal Pressure Test, and 3) Final Pressure Test. Pressure testing is to occur immediately after the product's installation and before the product is put into service. Warranty coverage begins directly after a properly performed, and successfully completed pressure test has been submitted to NUPI Americas. Therefore, it is highly recommended to installers and owners to submit pressure tests results to NUPI Americas directly after successful completing pressure testing of their systems. As part of the pressure testing program NUPI Americas makes available "Pressure Test Submittal Sheets", and "Bldg. Pressure Test Log" as a means of recording and presenting pressure testing results. In additions to submitting these sheets it may also be necessary to submit electronic pdf drawing showing pressure test sections which were tested. Please contact NUPI Americas for questions and concerns regarding pressure testing NUPI Americas piping systems. Any exceptions to the NUPI Americas pressure testing procedures, pressure testing policy, and warranty must be provided in writing by NUPI Americas.

During pressure testing the pressurized pipe zones will be evacuated, and only staff involved with the pressure testing the system will be allowed to be present in those areas. Pressure testing shall be conducted with the use of the appropriate PPE gear including, and not limiting safety glasses, gloves, hardhat, and steel toe boots. Under no circumstance shall the pump, or compressors be left operating and unmonitored during the pressure test. Pressures shall be monitored regularly during pressure testing NUPI Americas piping systems.

### **Compressed air pressure testing is not allowed for pressure testing liquid systems.**

Compressed air systems shall be pressure tested utilizing "Leak Testing of Niron RR-RCT Piping Systems Using Compressed Air or Compressed Nitrogen", a separate pressure testing document. **Liquid system shall be tested with water or air over water (water-filled piping, with air as a pressure source and air separated from water).** Air over water pressure testing is limited by the test pressure of the system and by the SDR of the pipe used on the compressed air side of the system. **Air over water testing will not be permitted if testing pressures exceeds 150 psi. The pipe SDR on the compressed air side of the air over water system must be SDR 11 or lower, SDR 17 pipe is not allowed in compressed air piping.**

## DETERMINING TEST PRESSURE AND MAXIMUM TEST PRESSURES

The “Test Pressure” used in pressure testing a system is dependent on Pipe SDR and the Operating Pressure of the system. **Table 1** provides Test Pressure requirements for NUPI Americas pressure testing. The “Maximum Test Pressure” is the maximum allowable test pressure which a system can be tested to. Maximum Test Pressures are also shown in **Table 1**. Each pipe SDR has its own Maximum Test Pressure. Pressure testing pressures shall not exceed the Maximum Test Pressure. Low Pressure Compressed Air Leak Test pressure can be conducted in these systems, however the maximum test pressure is 15 psi for all pipe SDRs.

**Table 1**

Highest Pipe SDR Installed In the System	Operating Pressure	Test Pressure (For Liquid)	Maximum Test Pressure <sup>1</sup> (Liquid)	Low Pressure Leak Test Maximum Test Pressure <sup>2</sup> (Gas)
SDR 17	65 psi or lower	100 psi	170 psi	15 psi
	Greater than 65 psi	150% of Operating Pressure		
SDR 11	100 psi or lower	150 psi	270 psi	15 psi
	Greater than 100 psi	150% of Operating Pressure		
SDR 9	100 psi or lower	150 psi	340 psi	15 psi
	Greater than 100 psi	150% of Operating Pressure		
SDR 7.3	100 psi or lower	150 psi	430 psi	15 psi
	Greater than 100 psi	150% of Operating Pressure		

1) Maximum testing pressures allowed at lowest pipe in test section. Utilizing the lowest pipe in the testing zone is extremely important for testing high rises.

2) Low pressure compressed air may be used to detect leaks so that leak areas can be repaired before filling system with water for the required three step pressure test.



## SYSTEM INSPECTION PRIOR TO PRESSURE TESTING

Perform a visual inspection of all fusions to inspect for proper fusions. Proper socket fusion beads shall have 1) a double bead, with beads being uniform, and in contact with one another, or 2) a flat single bead which is pressed tight against the fitting when cold rings have been used. Pipe shall align with the socket fusion and electrofusion fitting. Spray out will not be present on the electrofusion fitting. Butt weld beads will be round, and bead heights consistent when compared pipe to pipe having the same size and SDR. During visual inspection verify all mechanical connections have been installed properly. Check and verify low pressure rated plumbing fixtures are isolated from the pressure test. Remove all fusion equipment from the system before starting the test.

## PRESSURE TESTING SETUP FOR WATER AND AIR OVER WATER TESTING

Install a pressure gauge at the lowest pipe in the test section and conduct the pressure testing with this gauge. The test gauge shall be calibrated to accuracy of 0.5 psi. Pressure relief valves shall be located at the lowest pipe as well. Pressure relief settings set to a relief pressure equal to or less than **Table 1's** "Maximum Test Pressure", and at least 5 psi above "Test Pressure". Open the highest point in the system to allow air to pass up through the pipe as the pipe fills with water. Drain valves shall be provided at the lowest pipe in the system to drain the system as necessary. Fill out the "Pressure Test Submittal Sheet", clearly indicating piping which is being pressure tested. In some cases, it may be necessary to provide electronic pdf drawing to clearly display the pipe which is pressure tested. Provide a test number for the pressure test in the "Pressure Test Submittal Sheet" if more than one pressure test is to be completed at a facility. When more than one pressure test is conducted at facility fill out the "Bldg. Pressure Test Log" directly after performing pressure tests on the varies pipe sections.

## PRESSURE TESTING

NUPI Americas pressure test method a is three-step pressure test where each test section receives three tests. Step One - Preliminary Pressure Test shown in **Figure 1**, Step Two - Principal Pressure Test shown in **Figure 2**, and Step Three -Final Pressure Test shown in **Figure 3**. All three tests use the test pressure determined in **Table 1**. The Low Pressure Compressed Air Leak Test shown below is optional test method, it is not required, but is recommended.

### **Low Pressure Compressed Air Leak Test**

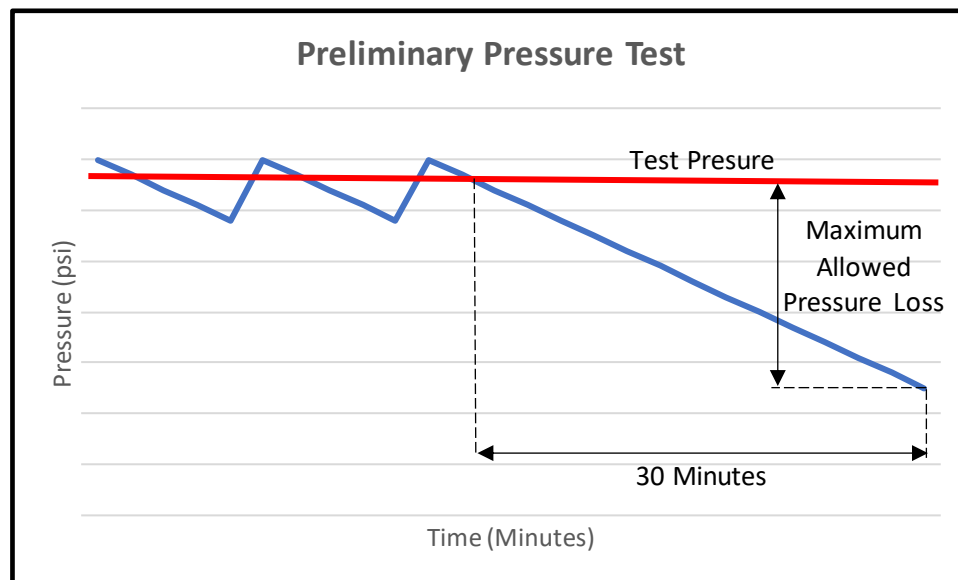
A non-required leak test called the “Low Pressure Compressed Air Leak Test”, can be used to find leaks within the system prior to utilizing the required three-step pressure test. In this test method low pressure compressed air is used to pressurize the pipe to a pressure no higher than 15 psig while a leak finder solution is applied to areas of the piping system. The compressed air will cause the leak finder solution to bubble when a leak is present. This is an optional method which can be used to save time in the pressure testing process as leaks can be addressed before the system is filled with water, thus possibly saving on system drain time if repairs are required.

#### Method for the Low Pressure Compressed Air Leak Test

- 1) Pressurize the system to a pressure no higher than 15 psig.
- 2) Isolate system with shutoff valve.
- 3) Monitor pressure in the system. If system pressure drops to 0 psig there is leak or an open connection.
- 4) Check system for open connections.
- 5) Repressurize system to 15 psig and utilize a leak finder solution to inspect threaded and bolted mechanical connections, as well as valve stems. Bubbling should appear in leak areas with the leak finder solution. Tighten and repair observed mechanical connections where leaks are observed.
- 6) Repressurize the system to 15 psig
- 7) Isolate the system with a shutoff valve.
- 8) Monitor pressure in the system. If system pressure drops to 0 psig there is leak in the system.
- 9) Repressurize the system and utilize the leak finder solution to check for leaks at joints, or areas where pipe may have been damaged. Depressurize system and repair leak areas.
- 10) After completing this test proceed to the required three-step pressure testing method.

### Step One - Preliminary Pressure Test

- 1) Bring pressure just above test pressure, and isolate system. It is common for pressure to expand the pipe and cause pressure within the system to drop.
- 2) Bring pressure back up to just above the test pressure, and again isolate the system, allowing pipe expansion to drop the pressure.
- 3) Bring pressure up to a pressure just above test pressure, allow pressure to drop to test pressure, start stopwatch once pressure reaches test pressure. Allow 30 minutes to pass before reading the final pressure.
- 4) If pressure drop in Step 3 is greater than the Maximum Allowable in **Figure 1**, then the system fails test.
- 5) Throughout Steps 1 through 4, look for leaks. If a leak is observed, drain the system if necessary, repair leak area, and restart at Step 1 after repairing leaks.
- 6) If system had no pressure loss in Step 3, or a pressure loss less than Maximum Allowable in **Figure 1**, then the system passes the test, and is ready for testing with the Principal Pressure Test.



Maximum Allowed Pressure Loss

9 psi for SDR 7.3, SDR 9, & SDR11

6 psi for SDR17

**Figure 1 – Preliminary Pressure Test**

### Step Two - Principal Pressure Test

- 1) After passing the Preliminary Pressure Test, bring system back up to test pressure, and isolate system. Observe pressure after 120 minutes, and check system for leaks.
- 2) If pressure drop after 120 minutes is greater than 3 psi the system fails the pressure test and a leak is present. Repair leak and start over with the Preliminary Pressure Test.
- 3) If the system passes the Principal Pressure Test proceed to the Final Pressure Test.

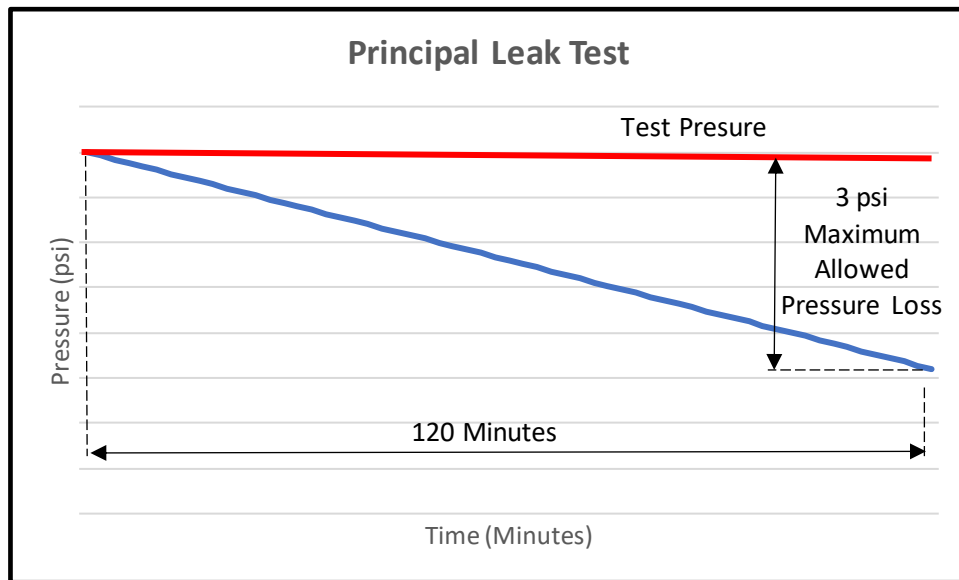


Figure 2 – Principal Leak Test

### Step Three - Final Pressure Test

- 1) Release the pressure from the system, but do not drain the system.
- 2) Bring system up to test pressure, for 2 minutes. Reduce the system pressure to 15 psi for 2 minutes.
- 3) Release pressure from the system, but do not drain the system.
- 4) Again, bring system up to test pressure, for 2 minutes. Reduce the system pressure to 15 psi for 2 minutes.
- 5) Release pressure from the system, but do not drain the system.
- 6) Again, bring system up to test pressure, for 2 minutes. Reduce the system pressure to 15 psi for 2 minutes.
- 7) Bring system up to test pressure, for 5 minutes. Reduce the system pressure to 15 psi for 5 minutes.
- 8) Inspect system for leaks during Steps 2 through 7. Test pressures should not deviate during the 2-minute and 5-minute intervals once the test pressure and the 15 psi low pressures are set. If leaks are observed repair leaks and start pressure test over starting with the Preliminary Pressure Test.
- 9) If no leaks are observed and the system test pressures, and 15 psi low pressures were sustained during the 2-minute and 5-minute intervals, the system passes the Final Pressure Test. Complete the pressure test submittal sheet and return them to NUPI Americas, along with pertinent electronic pdf drawings which show pipe sections tested.

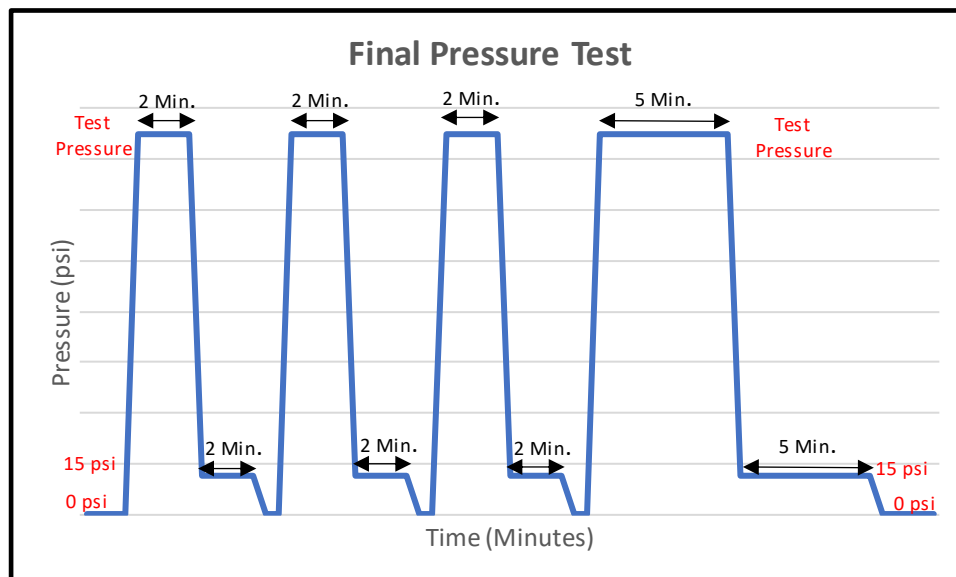


Figure 3 – Final Pressure Test