

Air Testing and CPVC Piping

In the sprinkler industry there are three instances where an air test may be performed on sprinkler system piping:

1. The contractor would like to double check the system before putting water into the piping. An air leak causes much less damage than a water leak.
2. If an acceptance test is scheduled during cold weather, water would freeze in the pipe and cause problems. Section 25.2.1.3 of NFPA 13 allows for a 40 psi air pressure test to be conducted in lieu of a hydrostatic pressure test at 200 psi. The hydrostatic test still needs to be performed, but the owner is allowed to occupy the building and the hydrostatic test can be done later when it is warmer.
3. In addition to the hydrostatic test, all dry-pipe and preaction systems need to have a 40 psi air pressure test in accordance with section 25.2.2.1 of NFPA 13.

These air pressure loss tests are problematic and may be dangerous when applied to piping systems. Air pressure testing is much different than hydrostatic tests and the results of a failure between these two testing methods are very different. Water is incompressible while air is very compressible. In a hydrostatic test with water, the reactionary force that occurs at a leakage point is dissipated throughout the system and the result is obviously a water leak but this does not result in extreme pressure releases.

An air test, however can result in a dangerous failure of the piping. Air is a compressible gas and can store far more energy than water when put under pressure and can release this energy very rapidly. This raises the possibility of an "explosion" which may break off small pieces of piping and/or fittings. The extreme pressure release could turn these small pieces into shrapnel and cause damage to personnel and property. This is why hydrostatic tests are generally performed at 200 psi but NFPA 13 restricts air testing to 40 psi.

The difference in the pressure release between water and air can be illustrated by an air balloon and a water balloon. If you stick a pin in an air balloon, there will be a loud pop as the air is violently released. When you pop a water balloon, by contrast, there will be a steady but sedate leak of water.

Air testing of CPVC piping, even at 40 psi, is a safety issue and is not considered a safe practice. Every manufacturer of CPVC piping cautions



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against air testing and requires hydrostatic testing only.

Pre-Testing

Contractors using an air test to make sure their systems have been joined properly must follow the installation instructions for the particular brand of CPVC. An informal survey of the manufactures of CPVC piping found slightly different air testing provisions, with one manufacturer allowing an air test at a maximum of 25 psi, some manufacturers allowing up to 15 psi and some manufacturers stating that air testing is not allowed at all. If allowed, these air test provisions are to allow contractors to quickly test the system for leaks but are not intended as a substitute for the required hydrostatic test. It should also be noted that if these air test are to be performed, all recommendations in regards to safety must be followed and the use of an oil-free air supply is required. None of the manufacturers recommend or allow air testing at the 40 psi stated by NFPA 13.

Since these pre-tests are not part of the installation standard, the acceptability of air tests, and the pressures to use, would be up to the manufacturers. Situations 2 and 3 from above are directly addressed by NFPA 13 and of a greater concern as these deal with requirements of the standard.

Acceptance Testing

Section 25.2.1.3 of NFPA 13 specifically allows the use of a 40 psi air test as a temporary measure for testing in cold weather. If the system passes this air test, occupancy of the facility is permitted but a full hydrostatic test is required as weather permits. Since air testing at 40 psi is not good to do with CPVC piping, this section should not be used by contractors. Even if air testing by the manufacturer is permitted at some lower pressure, such a test would not be acceptable as an interim air test by NFPA 13. Unless the standard is modified, the only option for a CPVC acceptance test even in cold weather would be a hydrostatic test.

Another issue when utilizing CPVC in dry pipe and preaction systems is that section 25.2.2.1 of NFPA 13 requires both a hydrostatic test and an air leakage test at 40 psi. Although there are CPVC systems that are listed for use with dry and preaction systems, it is not completely safe for these systems to test in accordance with section 25.2.2.1. This section does not currently include provisions for testing at a pressure lower than 40 psi.

The best advice is to follow the manufacturer's installation guidelines in lieu of the acceptance testing requirement of 25.2.2.1.

As a specially listed product, CPVC used in low pressure dry systems would be required by NFPA 13 to be used in accordance with its special listing and the listing states that these materials shall be used in accordance with the manufacturer's installation and design manual. Since the design manuals clearly state that testing shall be limited to hydrostatic testing only, it is acceptable to perform the required acceptance testing without the additional air test mentioned in 25.2.2.1.

Air testing of CPVC is a known safety concern, so installers must put the safety of personal foremost in their priorities. If the contractor deems an air test is advantageous prior to the required hydrostatic test and this practice is allowed by the manufacturer then the pressure limitations set by the specific manufactures of the CPVC must be followed and all safety procedures adhered with.

When dealing with the acceptance testing of CPVC dry and preaction

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systems, the provisions of the listing supersede the requirements found in Chapter 25 of NFPA 13. Do not perform an air test at 40 psi. The safety concerns outweigh any benefit of these tests.

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