

Galvanized Pipe and Dry Systems

Over the years, one of the most common questions that have come into the NFSA EOD program is, "Are all dry-pipe systems required to use galvanized pipe?"

The answer is "no." The portion of NFPA 13 that limits the type of pipe that is required in sprinkler systems (wet, dry, preaction or deluge) is section 6.3.1.1, which gives the user the option of using one of the types of pipe referenced in Table 6.3.1.1 or one of the specially listed types of pipe. Table 6.3.1.1 contains a number of options of different types of pipe both galvanized and non-galvanized. There is no section in NFPA 13 that requires any specific choice within these options for dry-pipe systems (with the exception of the section discussed in the next paragraph).

Typically during this conversation, someone usually brings up section 8.4.7.2.1, which says, "Where steel pipe is used in preaction and dry pipe systems, piping materials shall be limited to internally galvanized steel." On the surface, this appears to require galvanized pipe for dry-pipe systems, but it does not. NFPA 13 is set up with specific sections dealing with specific subjects. Subsections of the main section only apply to the subject of the main section. In this case, the main section is 8.4.7, which is, "Control Mode Specific Application (CMSA) Sprinklers". Therefore, section 8.4.7.2.1 only applies to situations where CMSA sprinklers are used at the ceiling, which is a very small subset of the dry-pipe systems being designed or installed.

During the testing that led to the development of the original CMSA sprinkler (the Large Drop Sprinkler), there were some tests conducted with the sprinkler right over the fire missing (simulating what might happen if pipe scale got stuck in the sprinkler orifice). The tests did not go as well as planned, but rather than increase the number of sprinklers in the design area, the sprinkler committee decided to try and decrease the probability that pipe scale would build up in the pipes and they required galvanized pipe just in this very specific situation. Later, when other types of CMSA sprinklers were developed, the rule was expanded to apply to them when they were used in dry-pipe systems out of an abundance of caution. There is actually no evidence that galvanized pipe is necessary for these larger orifice CMSA sprinklers when used in dry-pipe systems, but the rule continues in NFPA 13.

This one rule (section 8.4.7.2.1) only applies to CMSA sprinklers. For dry-pipe systems with other types of sprinklers, there is no restriction on the use of any specific type of piping as long as the piping complies with 6.3.1.1.

Is Galvanized Pipe Better for Dry-Pipe Systems from a Corrosion Perspective?

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Years ago, the conventional wisdom was that the galvanic coating on the pipe helped to prevent corrosion of the pipe. Over time, that seems to have changed, although the observations are anecdotal and the reasons are debatable.

Recently, sprinkler contractors have commented that during the internal inspections that are being conducted in accordance with NFPA 25, they are seeing internal corrosion in galvanized pipe just as much as they see in black steel (non-galvanized) pipe. In some cases, the contractors are reporting that the corrosion in the galvanized pipe appears to be worse than the black steel pipe. In most cases, the corrosion that they are reporting is localized as opposed to uniform throughout the pipe, but non-the-less, the galvanized pipe appears to be corroding significantly.

At least one manufacturer has provided an explanation of what they think is happening. This manufacturer believes that the problem can be explained by the dipping process that each manufacturer uses to dip the steel pipe. If the manufacturer uses the same tank to dip the pipe that they dip other material in, it is possible for other chips and flakes of steel (called dross) to be in the tank. This dross can get caught up in the coating and then cause the coating to flake off later, which provides a bare spot in the pipe that allows local corrosion. This particular manufacturer believes that a "dross free" dipping process would prevent the corrosion problem.

During the last few revision cycles of NFPA 13, the committee has been asked to deal with the galvanized pipe issue. Some people are in favor of prohibiting galvanized pipe. Others are in favor of mandating the use of nitrogen in dry-pipe systems (instead of air), which would negate any concerns about the type of pipe. For the last two cycles of NFPA 13, the committee has decided not to take any drastic action. Rather than prohibit the use of galvanized pipe, the committee has decided to eliminate the hydraulic advantage. Since the internal corrosion can cause localized bumps and indentations that affect the Hazen-Williams C-Factor of the pipe, the committee has reduced the C-Factor from 120 to 100 for galvanized pipe in dry and preaction systems. So now, the C-Factor for galvanized pipe in dry-pipe systems is the same as the C-Factor for wet pipe systems.

Ultimately, whether the one manufacturer discussed above is correct or not, the fact is that whenever you put water, steel and air together, you will get corrosion. Dry-pipe systems have a great deal of air. We introduce water into the piping during trip tests and it is difficult to get the water out. So, the steel pipe, whether it is galvanized or not, has a potential for corrosion. If you are really concerned with corrosion, there are a whole host of other variables that you might want to address including looking at how you join your pipe (roll groove versus cut groove), how you pitch your pipe, your draining procedures, and what gas you put in the pipe (air or nitrogen).

Mixing Galvanized Pipe with Black Steel

Another frequent question that we get to the EOD system is whether black steel pipe can be mixed in a system with galvanized pipe. The answer is that we are not aware of any prohibitions on the mixing of such pipe. NFPA



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13 does not prohibit the practice of mixing different types of pipe and we are not aware of any material compatibility issues that would prohibit the practice.

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