Sprinkler Pipe Corrosion

Frequently Asked Questions

The N_2-Blast® - Nitrogen Generation System produces Nitrogen on site to be used to maintain supervisory pressure within Dry and Pre-action Fire Protection Systems (FPS).

How exactly does Nitrogen inhibit corrosion?

View the questions below to find out!

Q: Will Nitrogen inhibit Microbiologically Influenced Corrosion (MIC)?
A: Since MIC is always associated with ongoing electrochemical corrosion, the short answer is yes. If we can effectively stop electrochemical corrosion, MIC also ceases to be a problem. Microbiologically INFLUENCED corrosion is exactly what the name says. It is electrochemical corrosion that is influenced by the activity of very specific bacterial strains. The presence of these specific bacteria creates conditions where the rate of electrochemical corrosion is accelerated. In most instances, this happens because bacteria produce byproducts, which then alter the chemical environment and thereby accelerate the rate of the corrosion reactions. For instance, acid-producing bacteria (APB) produce acid, which then locally reduces the pH (increases the local acidity), thereby enabling the cathodic hydrogen reaction. This, in turn, causes an increase in the rate at which the corrosion of the metal takes place. The bacteria themselves do not actively "eat away" at the metal, but rather create local conditions that will accelerate already ongoing electrochemical corrosion. If we can effectively stop the electrochemical reaction from occurring, the bacteria will not have an influence on the corrosion.

Q: What history or data is there that nitrogen in fact stops Corrosion?
A: It is a scientific fact that Nitrogen is an inert gas. The most prevalent cathodic reaction in a typical sprinkler system is the oxygen reduction reaction. By effectively displacing the oxygen with inert nitrogen, the thermodynamic driving force is removed and it slows down the corrosion reaction to a negligible rate.

Q: How does Nitrogen inhibit SRB and APB, which do not need oxygen or prefer Oxygen depletion?
A: The bacteria themselves do not "eat away" at the metal. The root cause for corrosion on Dry and Pre-action systems is the presence of residual water. That, along with the combination of an inexhaustible supply of oxygen in the form of compressed air, creates ideal conditions for corrosion to take place. If there are adequate nutrients (and the right type) available, certain types of bacteria can potentially establish colonies, having an influence on the corrosion rate as a result of the byproducts of their metabolic cycle. However, the electrochemical corrosion will occur whether bacteria are active or not.

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Q: Why does Corrosion also take place in Wet Systems?
A: We see as many wet systems with pinhole leaks as dry and pre-action systems. The exact same mechanism takes place in wet systems with trapped air. Under the law of simple physics, air migrates through wet sprinkler piping to the highest points of the system, where it accumulates in pockets under compression due to the water pressure in the system. The oxygen within the trapped air pockets drives the corrosion of the sprinkler pipe at the air-water interface. Another factor is the freshly oxygenated water that fills the system. Not only does the dissolved oxygen in the fill water react to form a layer of corrosive black magnetite along the interior pipe wall, but it outgases from the water into the trapped air pockets, contributing to the corrosion process at the air-water interface as well.

Q: How does Nitrogen stop MIC when SRB and APB do not NEED Oxygen and prefer an Oxygen Free environment? Nitrogen can only reduce Oxygen corrosion, not anaerobic bacteria, right?
A: It is a scientific fact that MIC-related bacteria need water to survive. The flaw in the argument about anaerobic bacteria is the suggestion that the bacteria themselves are the corrosive force. It is clear that the bacteria can influence already ongoing corrosion reactions by creating conditions that are conducive to higher rates of electrochemical corrosion. In addition, MIC takes place on substrates that are already predisposed to undergo electrochemical corrosion. In other words, you must have the right set of conditions for electrochemical corrosion already, before MIC even becomes an issue. For example, SRB produces sulfuric acid as a by-product of their metabolism. That lowers the local pH (makes it more acidic), which then accelerates the rate of corrosion by enabling an additional cathodic reaction (hydrogen reduction reaction), which cannot take place at neutral or alkaline conditions. As such, it is not the bacteria themselves that is corroding the metal; they merely contribute to the rate at which electrochemical corrosion is taking place by creating local conditions conducive to electrochemical corrosion.

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