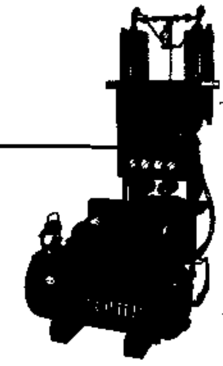

Dry and Pre-Action System Protection from Oxidative and MIC Corrosion

By Doug Chartier

Dry and pre-action fire sprinkler systems have seen an increase in corrosion rates and limited life spans. Potter Corrosion Solutions laboratories receive corroded samples from dry and pre-action systems at almost twice the rate of samples received from wet fire sprinkler systems. The majority of those samples are from galvanized systems. This data seems to suggest the antithesis of what is common knowledge about corrosion:

You need water for the corrosion process.

Galvanized tubing is used to delay the corrosion process.

Both of these statements are still true despite what seems an obvious conflict with collected data.

Water is present in dry and pre-action systems left over from testing and introduced as condensation from humid air. Galvanized tubing delays the process of corrosion of the steel below it by sacrificing itself to the corrosion process, thereby delaying the corrosion of the steel it protects.

Oxygen is introduced within the compressed air of said systems and the presence of small leaks within such systems requires more compressed air (rich in oxygen) to be introduced within the systems. All of these factors combine to make dry and pre-action systems the perfect chamber for MIC and Oxygen corrosion.

Two forms of the corrosive process are generally responsible for corrosion in dry and pre-action systems. Oxygen corrosion is evident to us all as the normal rusting process of metallic structures. Microbiologically influenced corrosion (MIC) is corrosion aided by microbial life form activity. Some of these MIC organisms accelerate the oxidation process and others use a reduction process to generate energy for their survival. The end result is corrosion of the metal, which is their host.

MIC bacteria are classified into two groups by their function. Aerobic — Those that need air (oxygen) to survive; Anaerobic — Those that do not need air (oxygen) to survive, and flourish without its presence.

Both groups are extremely damaging and sometimes work together to cause corrosion. They sometimes form what is known as a symbiotic relationship and depend upon one another to function.

Mitigation of Corrosion in Dry and Pre-action Systems

Several methods are employed to mitigate corrosion in dry and pre-action systems. Some are more effective than others. Three things must be controlled to mitigate corrosive forces:

1. Elimination of oxygen
2. Elimination of water
3. Elimination of MIC bacteria growth (both aerobic and anaerobic)

Corrosive forces are very persistent and methods to control corrosion must consider all three factors listed above. Some of these factors can be limited in the design stage of the system with choice of material, proper drainage, and environmental factors. Again, corrosion control is to be approached from all angles and all mitigation efforts combined into an effective corrosion control program. There is not a single solution, but a suite of ideas and methods to combat corrosion.

Recently, nitrogen usage has been introduced as a way to control corrosion. It is true that it eliminates most of the water and humidity within a system, plus restricting the amount of oxygen down to less than 5%. However, oxygen is known to cause corrosion even when it is only present in the parts / billion, and the lack of oxygen actually increases the growth rate of some anaerobic bacteria. Also, the systems are very expensive to buy and install ($35,000 to $50,000) and not within an economical range for many situations.

Potter Corrosion Solutions offers a two-part solution that addresses the three main corrosive forces in dry and pre-action systems:

• Coat the system with environmentally-friendly Potter Pipe-Shield™. Potter Pipe-Shield™ (Product number: 1119115) can be added to the hydro-test water and allowed to stand for one hour to allow the coating to occur. Then, the system can be restored to normal service. Potter Pipe-Shield™ protects against oxygen and MIC bacteria corrosion by providing a one molecule thick coating on the internal surface of the piping and all metallic parts of the system.

• Use the recently introduced Potter Corrosion Solutions CDP (Corrosion Dry Pak), part #1119726. The CDP provides dry air with a dew point of -40°F, thus eliminating corrosion-promoting humidity and water. The CDP is easy to maintain and occupies only a small footprint.

This two-point approach is an economical solution to corrosion in dry and pre-action systems.

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