RECENT CHANGES TO NFPA 13 REGARDING CORROSION AND CORROSION REDUCTION IN WET METALLIC PIPE FIRE SPRINKLER SYSTEMS

The NFPA 13 Technical Committee has spent the last two revision cycles doing significant reviews of corrosion and corrosion reduction prior to adding additional specific system requirements, designed to reduce corrosion in wet system, to the 2016 edition of NFPA 13.

From all the studies and report that have been undertaken to study corrosion there is one basic conclusion: the coming together of steel pipe, water, and oxygen will result in corrosion. Additionally we have learned that:

- Corrosion tends to be localized
- Dry pipe system will typically corrode faster than wet pipe systems
- Hot dipped galvanized pipe will typically fail faster than black pipe
- The design of the system, the specific components used, the level of activity the system sees, the temperatures of the environment in which the pipe exists and the quality of the installation will all impact the rate at which the system will corrode
- The process of repairing leaks, which cannot be avoided, actually works to create more leaks

The NFPA 13 Technical Committee found there was a direct linear relationship between the removal of air in a system and the reduction of corrosion. Based on the results of these studies the committee concluded that adding venting requirements to wet pipe sprinkler systems will reduce corrosion activity. NFPA 13, 2016 Edition added:

- **7.1.5 Air Venting**; A single air vent with a connection conforming to 8.16.6 **shall** be provided on each wet pipe system utilizing metallic pipe.
- **8.16.6 Air Venting**; The vent required by 7.1.5 **shall** be located near a high point in the system to allow air to be removed from that portion of the system by one of the following methods: (1) Manual valve, minimum 1/2 in. (15mm) size; (2) Automatic air vent; (3) Other (AHJ) approved means.

These new requirements relate to the definition of a "system" as it is described in **3.3.23 Sprinkler System**, "A system that consists of an integrated network of piping designed in accordance with fire protection engineering standards that include a water supply source, a water control valve, a

waterflow alarm, and a drain." For clarity, any portion of a system downstream of a control valve, such as the individual floor of a multi-story building supplied by a common riser, is considered a separate system and therefore requires its own air vents.

The objective of venting is to reduce the amount of oxygen trapped in the system that will feed corrosion and microbial activities. There is no calculation requirement and no requirement that all of the air be exhausted; and while every system is required to have an air vent there are no specific instructions as to where the air vent needs to be located. There are recommendations that, "The air venting valve **should** be located where it will be most effective." But it is left to the system designer's discretion to determine the type, location and even if multiple air vents be utilized on a single system. There are also no requirements that either manual or automatic air venting valves be piped to a discharge.

Summary:

Metal pipe sprinkler systems start to corrode from the time they are installed and the corrosion process continues until the system fails. While there is amble evidence of sprinkler systems being in service in excess of 50 years without issue there is also ample evidence of sprinkler systems being in service for less than 10 years and experiencing corrosion failure related issues.

The sprinkler system installed in a building or structure is a valuable asset providing both life safety protection for the occupants and property protection for the building's owners. Like any piece of infrastructure within a building it needs to be monitored and managed in order for it to continue to operate effectively. An extensive review of corrosion and method for the reduction of corrosion by the NFPA 13 Technical Committee has determined that the inclusion of air venting into wet sprinkler system using metallic pipe is a reasonably inexpensive way to reduce pipe failures and increase system life expectancy. As of the writing of this paper the air venting requirements added to the 2016 Edition of NFPA 13 have been upheld and will continue into the next scheduled edition of NFPA 13.