

Plainview Water District

Pinhole Leaks in Copper Piping

Contrary to popular belief, and in most cases wishful thinking, copper water piping does not last forever. In fact, original design criteria for copper piping projected that it should last for 20 to 25 years. As we have seen, however, this piping can last for both shorter and longer time spans.

The most widely used material for domestic water supply systems is copper. Since 1963 over 5.3 million miles of copper plumbing pipe have been installed in about 80% of all buildings in the United States. Copper exhibits excellent resistance to corrosion. Nevertheless, copper is vulnerable to pitting corrosion which can eventually lead to pinhole leaks. A pinhole leak is the breakthrough (puncture) of the copper pipe due to the progressive attack of the pitting corrosion process. A copper water plumbing system can experience significant damage from pitting corrosion but not result in pinhole leaks for many years. Pinhole leaks are not unique to the Plainview Water District but have been documented wherever copper water piping is used throughout the United States.

Pinhole leaks can occur in any copper pipe within a consumer's home or business. The Plainview Water District (District) has noted that most pinhole leaks are being reported in the hot water piping after the hot water heater. The fact that these pinhole leaks have been occurring on the hot water piping after the hot water heater presents a number of additional variables to be considered.

First, as we learned in our high school chemistry class, chemical reactions occur at a faster rate in hot water than in the cold water. This increased rate of chemical reactions will also accelerate the rate of corrosion within your copper piping system.

The second variable associated with hot water pinhole leaks occurring after the hot water heater concerns the "sacrificial anode" located inside the hot water heater. The "anode" provides what is commonly called cathodic protection. Because the metal anode is more reactive to the corrosive environment than the system as a whole, it dissolves more easily than the internal copper piping and/or hot water heater. As corrosion is concentrated on the anode first, it provides protection to the metal of the system (copper pipe) it is connected to. If this anode is allowed to corrode or dissolve totally, the corrosive tendencies of the water turn to the next available metal of your copper piping. Thus anodes should be replaced during routine maintenance (flushing, etc.) of your hot water heater.

Other factors can also cause pinhole leaks. One is a condition called "electrolysis". This process occurs when you have a mixture of metals in your plumbing system such as the combination of galvanized iron and copper. Even when a system is comprised of all copper piping, electrolysis can be caused by just one galvanized nipple or connection. An electrical ground wire in contact with a galvanized connection on your hot water heater is also enough to cause electrolysis.

Stray currents can also have an effect on pinhole corrosion due to improper electrical grounding. The practice of using the water distribution piping as part of the grounding system for homes and buildings has been common place for more than 80 years. It is well known that direct electrical

current discharge from a metallic object can cause rapid and extensive corrosion. There are numerous cases of stray current corrosion having been associated with direct electrical currents. Acidic water can also cause pinhole leaks in your copper pipe. Acidic water slowly eats away the copper at its weakest point until a pinhole develops. The green stain you may notice on your copper piping is the result of oxidized copper. Again, remembering our high school chemistry lessons, the pH of water ranges from 0 to 14 with 7 being neutral. The pH of acidic water ranges from 0 to less than 7. On the other end of the scale, alkaline water ranges from above 7 to 14. To maintain its target pH of 8.0, the Plainview Water District treats its raw water supply with calcium hydroxide, commonly referred to as lime. This not only sweetens the taste of our water but also minimizes its corrosive effects. The addition of lime also produces a secondary positive effect. It leaves a calcium carbonate coating on the interior of copper plumbing pipes which protects the pipes by creating a barrier between the pipe and the water which greatly reduces the corrosive process.

Chlorination is an essential element of water supply disinfection to prevent the growth of harmful microorganisms. Excessive chlorination, however, can be damaging to copper piping, especially in relatively new systems where protective films have not yet been established. The Plainview Water District is mandated by the New York State and Nassau County Departments of Health regulations to chlorinate its water system as a safeguard against bacteriological outbreaks as well as waterborne disease. In order to meet these requirements, the District utilizes calcium hypochlorite in tablet form to disinfect its public water supply system with a target chlorine residual of 0.8 mg/l in its distribution system.

With respect to those consumers who have experienced pinhole leaks in their internal plumbing, specifically internal copper water pipes, the best course of action is to contact a licensed plumber to make the necessary repairs. While the District appreciates and sympathizes with those who have experienced this situation, it cannot take any responsibility for the copper piping within the consumer's home or business. Under New York State Law, the District can only assume responsibility for repair of service line leaks in the street up to the curb or pavement line of the consumer's property. From that point on, the law requires that each consumer must maintain its own internal plumbing system.

The Plainview Water District continually monitors the quality of the water supplied to its consumers to ensure that it meets and/or exceeds all regulatory requirements. In addition to meeting and/or exceeding the mandated regulations, the District continues to explore new and emerging technologies so as to continue to utilize the best available technology to supply and treat the existing potable water supply system to its consumers.

Bibliography

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