

# Frequently Asked Questions

## About Copper Pitting Corrosion

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### What is corrosion?

“Corrosion” refers to the degradation of a material, such as those used in home plumbing, by chemical reactions.

### Why are metals used for pipe materials if they corrode?

Metals used in home plumbing possess a unique combination of strength, durability, corrosion resistance and low cost. In most cases, these characteristics are backed up by decades of trial and error experience, and the materials that failed in practice are no longer used. Some metals such as gold do not corrode significantly, but they are invariably too expensive for common use.

### Is corrosion of plumbing, including the copper pipes in my house, to be expected?

When immersed in water, all commercially available metal pipe materials will corrode. In the vast majority of cases, however, corrosion proceeds very slowly, and it is not a significant concern.

### What are the consequences of corrosion?

The two main consequences of corrosion that might concern homeowners include:

- 1) loss of pipe material, with resulting loss of strength, possibly leading to burst or leaking pipes
- 2) release of metal to drinking water in low concentrations as a result of corrosion.

### Why isn't plastic pipe used to avoid these problems?

Use of plastic pipe may eliminate certain corrosion problems; however, other problems have been associated with plastic. For example, under some circumstances bacteria can grow better on plastic pipe surfaces than on copper pipe. While not all these bacteria are harmful, production of safe drinking water requires elimination and control of bacterial growth at every reasonable opportunity. Certain chemicals can also migrate into drinking water through plastic pipe. In addition, because plastic is non-conductive to heat and

electricity, plastic pipes might be more prone to bursting in very cold weather and cannot be used to ground electrical appliances.

This list is not meant to discourage use of plastic plumbing, which obviously has its own merits, but it is merely provided to show that there is no perfect plumbing material that could be economically used in all situations.

### Explain the difference between pitting corrosion and normal corrosion?

Tire wear on a car is a good analogy. Normally, the tire tread will wear down uniformly over the years and the tire will last as expected. However, if a nail were to puncture the tire, in effect causing excessive tire wear at one point, even a new tire can fail long before it should.

On a copper pipe, corrosion usually eats away at the surface slowly and uniformly -- in the case of copper pipe it will normally last hundreds if not thousands of years. "Pitting" is said to occur when excessive corrosion occurs at a small area on the pipe surface, causing the pipe to fail in as little as a few months under some very rare instances.

### What causes copper pitting corrosion to start?

There are many ideas on this subject. The list includes factors arising from improper installation, bacteria, electrical grounding, pipe manufacture, water quality, or a combination of these and other factors. While some individuals may strongly believe that one or more of these factors is involved, to date scientists have been unable to identify a cause. In fact, over the years, most of the promising ideas have been directly tested in my university laboratory, and none have ever caused a pit to form. Obviously, *there is a cause*, because pitting does occur—the problem is that the very unusual circumstances that cause this have not yet been scientifically identified.

### What can I do if I have a pitting corrosion failure?

Unfortunately, other than replacing the pipe section when it fails, not much can be done. In some outbreaks of pitting corrosion elsewhere in the country, the problem was so serious that leaks occurred about once a week, and homeowners began to turn off their water whenever they left home. Thankfully, this frequency of pitting corrosion is not observed in the WSSC system.

### If I have had a pitting corrosion failure, does that mean I will have more?

No. There are many cases where only one leak from pitting corrosion has occurred, the affected pipe section has been replaced, and that is the end of the problem. On the other hand, if you have had one pitting failure, you are statistically more likely to have another.

**If my neighbor has experienced copper pitting corrosion, does that mean I will too?**

No. One of the most perplexing aspects of this problem is that two houses can be built next to each other at about the same time, the pipes can be installed by the same plumber and purchased from the same manufacturer, and the pipe is obviously filled with the same water--yet one home might develop a serious pitting problem while the other does not.

**If I replace all my copper pipe with new pipe, will that guarantee I will not have problems in the future?**

Replacing all your pipes will buy you a few months to a year during which new pinhole failures will not occur. It might even solve the problem for a much greater time period; however, in my experience with other "outbreaks" of pinhole leaks (outside of WSSC service area), it has not provided a long-term solution. Your own decision to replace plumbing should weigh the costs for your particular situation versus these possible benefits.

**Who is responsible for this problem?**

Since scientists studying this problem have never identified a cause, it is not possible to say who or what is to blame.

**Is the situation hopeless?**

No. While scientists have never identified what starts pitting, it is currently believed that in some cases, adjustments to water chemistry are possible that can "kill" existing pits. Again, to use a tire analogy, some unusual types of tires can be purchased that are self-healing. Not much is known about how to kill pits, and as a result, these factors have to be investigated on a case by case basis before a "cure" can be identified.