

Problems Diagnosing Zinc Needles in High-Tech Environments

By Jason Roth

The issue of Zinc Needles (or Zinc Whiskers) has been plaguing data centers worldwide for almost 50 years, causing catastrophic downtime in high-tech environments. For the past decade, disaster recovery companies have been stepping forward to remediate this contamination from high-tech computer centers; thus the term *Zinc Remediation* was born – and there are many companies around the world who have paid large amounts of money to have this service performed. The problem is that many of these remediation companies are not properly testing the problem; and this may be costing their clients tens of thousands of dollars or more of unnecessary expense due to misdiagnosis.

ZINC'S THREAT TO THE DATA CENTER OR CLEANROOM

Zinc needles ("ZN") are conductive contaminants that grow in a hair or fiber like formation – they come from cold-dipped galvanized tiles that are stimulated to grow from the constant temperature, humidity, oxygen levels and energy levels within the data center environment. If the back of an access tile was manufactured using the cold-dip electroplated process with a "flat pan" type of backing on the tile, ZN growth will most likely appear eventually. The ZN will appear on the backs of any access floor tiles in an icicle type formation.

ZN grow in microscopic proportions - as the crystals grow, like hair, they can eventually break off and spread throughout the facility by the continuous forced airflow within the airflow plenum (the area below the floor tiles) and the forced airflow above it. ZN can then settle inside air-cooled equipment and on any other surface – which has the potential to cause catastrophic downtime, production failures and can actually cause short circuits inside power units and equipment. High quantities of zinc may also contribute to bad indoor air quality and "sick building syndrome". Since ZN can be such a threat, companies are willing to pay high dollar amounts to have this contamination removed (zinc remediation) and chemically retarded to ensure zinc growth has been stopped.

MISDIAGNOSIS MAY COME FROM THE INITIAL REVIEW

There are three strong indicators that are commonly used to show a potential of ZN growing on the access tiles within the facility.

Indicators:

1. **Manufactured Type/Date:** Cold zinc galvanized tiles have the greatest potential of zinc growth. Typically, the cold zinc galvanized tiles were manufactured before the early 1990's, so it would be good to find a date stamp or manufacturer's model # on the tile (if there is one) and research the manufactured date of the access tile. This would give an indication of whether the tile has a higher potential of zinc needle growth.
2. **Type of Backing on the Access Floor Tile:** Look for a "flat pan" type of backing on the access floor tile. Typically, the flat pan will not have a high shine if it is a candidate for ZN growth. Also, if there are "dimples" throughout the metal on the back of the access floor tile – it may be less likely that the tile will facilitate the growing of ZN.



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3. **Shiny Particles:** Place the tile in an area with low light, use a high powered halogen flashlight and shine it on the back of the tile at a slight angle. Although zinc grows at microscopic levels, Zinc has a high shine – so there is a good chance that speckles of shiny particles will be more visible to the naked eye using this procedure. Some even use a low powered microscope to try and see the shiny particles a little closer.

These methods are only *indicators* of *potential* zinc growth; however it is impossible to *confirm* zinc growth from these simple tests. Many remediation companies are using these factors as the final confirmation, possibly costing their customers thousands of unnecessary dollars and headaches.

All of the above indicators cannot confirm zinc needle growth. Why? There are too many variables that could mislead even a trained eye. For example, there were many different ways that access floor tiles have been manufactured over the years, so there is no guarantee that the access tile was manufactured using the cold zinc galvanization process. A Flat pan bottom on an access floor tile may look like a good candidate, however it may have really been hot-zinc galvanized and not be a threat. Also, even if you use the flashlight test and a travel microscope, there are other types of contamination that will have a high shine (such as ferrous metals). It would be hard to determine that the tile in the picture above is actually ferrous metals – not zinc needle growth. This is not a way to confirm zinc in a facility – it is simply a good indicator that there is a *possibility*.

So how can zinc needle growth be confirmed?

ZINC CONFIRMATION ONLY COMES FROM LAB TESTING

The way to **confirm** zinc needle growth is proper scientific lab testing. Qualified labs will do chemical analysis and utilize high-powered microscopes for confirmation. A lab confirmation test for Zinc usually starts at around \$400 (and up). The steps to get a confirmation of zinc needles from a lab test are:

1. Confirm Testing Appointment in Advance: Zinc can dissipate when taken out of its original environment for long periods of time. So in order to get a good read on the Zinc, a planned test time should be set in advance.
2. Packaging: The tile must be packaged with special edge corner spacers and carefully wrapped in plastic. The wrapped access floor tile must be then placed in a cardboard box strong enough to handle constant movement without breaking during the shipping process. The spacers will help prevent too much abrasion from shaving off the zinc on the back of the tile.
3. Shipping: When taken out of its growing environment, Zinc can dissipate over time. That is why overnight shipping is important for a proper diagnosis of Zinc Needles. Once packed, the tile must be shipped the same day for overnight delivery.
4. Lab Test Performed: There are multiple ways to test for confirmation of zinc needles. There are different prices for different services – chemical analysis is generally a lower price than having microscope photos taken of the access tile.
5. Report of Confirmation: After the tiles have been tested the lab will generate a report stating the outcome. This confirmation is imperative to get before committing to a remediation service.

Some companies have been extremely pleased to get a proper test and find out they did not actually have zinc issues – saving them time, headache and a great deal of money. If you have indicators that you may have zinc needles, it would be in your facility's best interests to contact a professional zinc remediation company to get your tile tested in a lab.

A few things to look for in a reputable remediation company are:

1. They know how to properly get your access floor tile tested from an independent lab.



2. Their Scope of Work must include protective cleanroom suits, masks, hoods, boots for employees (see World Health Organization's article regarding Zinc), and barriers for non-affected areas of the facility.

3. The scope of work should include a three step process including encapsulation and removing oxygen from the zinc growth process on the back of the access floor tiles.

4. No fake remediation processes - they must not just wipe the backs of the tiles down with cleaner (this may look like a clean solution, however this janitorial approach is dangerous, as it will send the zinc crystals airborne and cause potential downtime and potential health risks).

The most important thing is to check the remediation company's contacts that will provide a recommendation for zinc needle remediation. Properly testing a tile for zinc may sound a little costly; however, it is a lot less expensive to properly test for zinc and be sure it is the right move than to undergo a zinc remediation process unnecessarily.

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