Independent Guide

How could Zinc Whiskers affect My data centre or computer room?

Assurity Consulting

Independent workplace compliance

What are zinc whiskers?

Zinc whiskers originate from zinc-electroplated surfaces commonly used in a variety of building applications, including data centres and computer rooms. The zinc is used to coat metal fixtures to prevent rusting or oxidation occurring. Electrical pressures across the coating can cause the zinc to migrate and form thin spicules, that over time can grow out of the surface. These “whiskers” are typically only about 2 microns in diameter but can reach several millimeters in length over time.

Not all electroplated surfaces grow zinc whiskers and on those that do, it can range from a few isolated areas to the whole surface area being covered in them. Room contents including floor tiles, stringers, cable trays and ceiling tiles can all, and have been seen to, grow whiskers in our experience.

The whiskers themselves also tend to be very brittle and can be easily dislodged from the surface with contact. Because of their size though they can go unnoticed, with areas being inadvertently contaminated and re-contaminated on a regular basis.

Where are they found?

Any zinc-electroplated surface may experience whisker growth, however it is certain types of floor tiles used in computer room raised floor applications which are of most concern. These tiles tend to have large surface areas and are often disturbed and /or moved during normal activity, causing the whiskers to shed into the environment.

Once in the environment, they are easily picked up in air steams and disseminated throughout the room or area. Again, due to their size they are almost impossible to spot with the naked eye once they have become detached from the surface.

What are the implications?

Zinc is a metal and a good conductor of electricity. Because the subfloor voids in many data centres and computer rooms are used as air ducts, the susceptible surface of the tile is within the supply airflow. The whiskers, being brittle, can become dislodged easily and, if they come to rest on an exposed circuit card inside your computer equipment, they can cause short circuits, voltage variances and other signal disturbances, often intermittently. In most cases, the same short circuit caused by the whisker will either "vaporise" the offending contaminant or else the whisker will become dislodged when the board or card is removed, leaving definitive fault analysis difficult.

Zinc whiskers are a significant threat for failure-causing anomalies in electronic and computer equipment in data centres and computer rooms. They are not known to pose a threat to health, however. While there is no published research on exposure, overexposure is not thought to be a factor since indoor concentrations are relatively low.

Why have zinc whiskers appeared?

For some time both the electronics industry and the metal and plating industry have been aware of the phenomenon of zinc whiskers. More recently, two contributing factors have increased the recognition of zinc whiskers as a potential risk within data centres, computer rooms and other areas where electronic equipment is used:

1. Floor tiles and other prone surfaces are now old enough to have grown reasonably sized whiskers (several millimetres in length) which may have broken off and entrained in equipment.
2. Older electronic designs were less susceptible due to the size of the equipment. The continual shrinking of electronic assemblies has meant that the lead pitch (lead to lead spacing) on integrated circuits and other components is now so small that zinc whiskers have a much better chance of causing a short. Even a small whisker can now short two leads.

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How do I get my data centres and computer rooms checked properly for zinc whiskers?
While the process itself is relatively straight forward for the initial inspection of a room or area, the identification of zinc whiskers needs to be properly and carefully considered. All too often with the "untrained" eye, this can lead to unnecessary issues or time in solving or indeed resolving zinc whisker contamination. These include:

- As well as a physical inspection of all relevant room surfaces, laboratory analysis of samples must be carried out as artefacts, fibre glass and other contaminants can be wrongly mistaken for zinc whiskers:
- Not all surfaces are prone to zinc whisker growth, so considerable time and effort time can be wasted examining irrelevant areas of rooms and centres.
- If not very careful, even the initial examination process in contaminated rooms/centres can inadvertently lead to whiskers (sometimes in their millions) being dislodged and released.
- Computer rooms and data centres are complex environments, understanding how they operate in terms of air delivery/flow, protection and detection systems, lay out and equipment is essential if a realistic and accurate assessment is to be made.

If mis-diagnosed or not properly carried out therefore, your zinc whisker survey can often contribute to the problem, through cost, contamination and interruption, rather than help solve it.

When undertaken well and professionally, a pertinent zinc whisker survey can assist you in identifying whether your room/centre is susceptible to contamination, and if so to what extent and the options available to you in managing it.

This guide is of a general nature; specific advice can be obtained from Assurity Consulting. Assurity Consulting is the UK's leading independent compliance consultancy specialising in workplace health, safety and environmental solutions. We have over 30 years' experience of helping customers of all sizes, from across all sectors, manage their compliance responsibilities, making sure that their organisation is compliant, their employees are safe, their processes are cost effective and their management team is in control.

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