

Data Centers

Types of Failures

Failures due to particulate and contaminant dust are generally classified as:

- Mechanical effects, including obstruction of cooling airflow, interference of moving or optical parts, and deformation of surfaces
- Chemical effects, including corrosion of electrical components, due to dust comprised of sulfur and chlorine bearing salts
- Electrical effects, including impedance changes and electronic circuit conductor bridging



Critical Importance of Indoor Air Quality (IAQ)

Air quality within data centers is more important today than ever. Data centers have unique requirements and strict regulations, compared to a typical commercial site. Particulate and corrosive gaseous contaminants have become a serious problem for data centers and server rooms. In some cases, corrosion of electronic components has resulted in catastrophic failures of equipment, due to environmental conditions such as low concentrations of corrosive gases. These contaminants enter data centers in a variety of ways, including outdoor ventilation systems, adjacent interior areas, and with individuals entering and exiting the facility or critical areas.

While the connection between contamination and hardware failures is often overlooked, the need to maintain a high level of equipment dependability in data centers is not. AAF Flanders is experienced in the prevention and control of particulate and gaseous contamination, as well as air quality testing and analysis in mission critical applications.

Gaseous Contamination Risk

Sulfur-bearing gases, such as sulfur dioxide (SO₂) and hydrogen sulfide (H₂S), are the most common gases causing corrosion of electronic equipment. Once introduced in a data center or server room environment, these gaseous contaminants lead to deterioration of copper surfaces and silver solder used on computer circuit boards, leading to intermittent and hard failures. These forms of corrosion can cause failure by either impeding the flow of electricity or forming unintended circuit paths. Elimination of corrosive contaminants is therefore essential in maintaining data center equipment reliability.

Corrosion of Electronics

Corrosion of electronics due to ambient air pollution has been documented for many years. Historically, the problem occurred only at industrial sites, such as pulp and paper mills and petrochemical refineries. These industrial facilities produce relatively high levels of sulfur content—hydrogen sulfide, sulfur dioxide, mercaptans, or sulfur laden particulates. Therefore, electronic components in these plants are subject to corrosion, due to reactions with environmental sulfur and humidity.



Data Centers

There are various types of electronic circuitry corrosion, including whisker growth and creep corrosion. Stricter environmental guidelines have forced many manufacturers to replace lead-based solders with lead-free solutions, which are more susceptible to corrosion from airborne gaseous and particulate contaminants. These forms of corrosion can cause failure by either impeding the flow of electricity or forming unintended circuit paths. Silver whisker growth will cause failures by forming unintended circuit paths on a circuit board. The growth of silver whiskers is the notable indicator to server manufacturers that sulfur contamination exists in their equipment.



Optimize Your Environment

In data centers with air-side economizers, supplemental real-time monitoring, such as AAF Flanders' SAAFShield® Technology, is recommended to enable quick reaction to outdoor events that may introduce corrosive gases into data centers. Real-time monitoring is also recommended in data centers with gas-phase filtration air cleaning systems, in order to track the efficiency of the filters.

For data centers with or without air-side economizers that do not fall within the ISA-71.04 severity level G1 for copper and silver corrosion, remediation through gas-phase filtration is recommended. Blowers at air inlets, fitted with particulate and gas-phase filters, can be used to fill the data center with clean air and pressurize it to prevent contaminated outdoor air from leaking into the data center. The air in the data center can be recirculated through gas-phase filters to remove contaminants that are generated within the data center.

Filtration Solutions

Pleated Filters

The AAF Flanders pleated filters line provides the industry's broadest selection of high performance, high capacity filters, including specialty and standard capacity options. Pleated filters can be used as prefilters to protect and extend the life of higher efficiency, more expensive final filters. In many applications, they are the only filter used in an HVAC system.



MEGApleat® M8
(see page 118)

Box Filters

These rigid, extended surface filters are ideal for use in all high efficiency applications. The supported pleat filters provide strength and integrity in high flow, turbulent, and variable airflow conditions. These filters are designed to remove airborne biological contaminants in critical areas.



VariCel® VXL
(see page 132)

Gas-Phase Products

AAF Flanders has assumed an industry leading position with the development of its innovative SAAF product line designed to reduce or eliminate harmful gaseous contaminants. In combination with our expertise in airborne particulate filtration, SAAF products and solutions allow us to develop unique and effective total filtration solutions to protect people, processes, and equipment.



Gas-Phase Filtration
(see page 211)