Plate Self Decay of Charged-Plate Monitors

Introduction

Charged-Plate Monitors (CPM's) evaluate the ability of air ionizers to neutralize static charge. A CPM charges an isolated, conductive plate that is charged to a known level. Then the air ions produced by the ionizer neutralize the charge on the isolated plate, and the time required to discharge the isolated plate is measured.

In an ideal, traditional CPM, the plate is perfectly isolated from ground and represents a perfect capacitor. Once the plate is charged to a known level, it would hold that charge indefinitely. The only cause for the isolated plate to discharge would be by impingement of air ions.

In practice, other factors may exist that cause the isolated plate to discharge. In the absence of air ions, any discharge of the isolated plate is known as plate self decay or plate isolation.

The Problem

As the isolated plate in a traditional CPM is supported from ground by one or more insulating supports, a common cause of self decay is leakage through these insulative supports.

The two major contributors to leakage across these supports are:

- High humidity, and,
- Lack of cleanliness.

Any substance (contamination) that is deposited on the surface of the insulative supports, such as salts and oils from fingers, and dust, may increase the conductivity of the support and increase the leakage from the isolated plate to ground. Moisture in the air can be absorbed into the surface layers of the support and further increase the surface conductivity of the material. Moisture may also activate ionic impurities within the insulating supports.

The ESD Association Standard Test Method STM3.1 recognizes that a small amount of self decay may be unavoidable. This test method allows a maximum self-decay rate of 10% in five minutes. Self decay shortens decay time measurements. A small amount of self decay doesn't impact a CPM decay measurement enough to matter. Higher self-decay rates present an error in decay time measurements that may be significant to your evaluations of ionizers.

Minimizing Plate Self Decay

Relative humidity becomes a problem when it rises above 60%. Keeping your CPM clean and storing it in a warm, dry area are the most effective ways to manage plate self decay. The warm air lowers the relative humidity.

When the CPM is stored in areas with higher humidity, use a heat gun to warm the insulative supports and drive out any moisture that has been absorbed by those supports. This will offer a temporary solution if the relative humidity and plate self-decay rate are too high.

When this method seems to ineffective, clean the supports with a solution of de-ionized water and isopropyl alcohol and allow the plate to dry for 24 hours.

Another Solution

Advanced Energy's newer CPM, Monroe 288, uses a high-voltage follower (electrometer) technology that is much more resistant to the effects of high humidity. We recommend this model for high-humidity areas where CPM measurements are made.

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