

VCI EMITTERS F.A.Q.

VCI Emitting Device - Frequently Asked Questions:

1. What is an "Emitter"?

Emitters are devices (cups, foams, films, bags, etc.) which contain special compounds called **VCI 's** (Vapor Corrosion Inhibitors). VCI's release (emit) safe compounds that prevent rust & corrosion into the surrounding enclosure or package. The physical change of the solids in the emitters to a vapor is similar to the way a mothball works.

VCI is released into the package at a controlled rate so that the corrosion protection provided to the metal(s) is continuous over a period of time ranging from months to several years, depending on the number of emitters deployed, cubic feet rating of the emitting device(s) and the atmospheric conditions.

In the industry of corrosion control, when referring to VCI emitters it is generally accepted that the meaning is a device such as an individually packaged adhesive backed cup or a VCI foam device, small pieces of foam or VCI treated chip of paper, pouches or packs that are used in single applications.

VCI Emitters can be purchased at our VCI store or click here for VCI emitting device information and to purchase online. Mil Spec VCI Emitters are also available.

It is important to note that our VCI foams, films (plastic poly), vci formulations, vci powder and VCI paper are often used in industrial packaging solutions or "packs" of parts and other metals for prolonged corrosion control. In general, most of our corrosion control products contain VCIs and emit (release) vapor corrosion inhibitors although these are not normally referred to as 'emitters'.

2. How are Emitters Used?

Emitters are used to protect enclosed metal components (parts or systems made of various metals) from corrosion by placing one or more of the devices in a container, package or other enclosure. This includes electronics, cabinets, closed bins, re-useable packaging and enclosures of all types. Computers and other electronic devices, electrical control boxes used for plant equipment, control boxes containing relays, switches, electronic gear aboard ships & airlines, tool boxes, spare parts boxes and storage units, fuse boxes, telecommunications devices, analytical equipment, gun cabinets and any other enclosure that contains metals that will corrode. They are also used extensively in shipping containers and packaging.

3. What Will Emitters Do For Me? Why Do I Use Emitters?

Emitters will save money (and time) for almost any company using electronics or **companies that are** processing or manufacturing items made from metals. Emitters reduce the incidence of corrosion that would otherwise negatively affect production and product quality in several ways:

- Emitters reduce the occurrence of electrical/electronic failures in relays, switches and connectors by preventing corrosion which is the **Number 1** cause for failure of electronic and electrical devices.
- VCI emitters reduce maintenance by reducing failures, OEM equipment warranty claims and

part replacements.

- VCI emitters extend the useful life of equipment and parts.
- Improve reliability by reducing noise levels, relay chatter and switch reliability and continuity.
- VCI protected parts are always immediately ready for use
- Reduce accumulation of contaminants. The quality and performance of electronic devices will also improve in that they will look cleaner, function more reliably and have lower electronic noise.

4. How Does an Emitter or VCI Device Work?

The chemicals (VCIs) which vaporize into a package or enclosure are a blend of special compounds that form a very thin layer, only a few molecules thick, on the surface as they interact with all metals present. These chemicals are NON-hazardous and unique in that they prevent the interaction of: air, water, moisture or contaminants with the metal, thus preventing corrosion. The VCI is pro-active in that it actively seeks out and protects all metal surfaces.

5. How Long Does it Take for an Emitter to Become Effective?

This will vary somewhat depending on the size, shape and temperature of the enclosure. At room temperature, emitters begin working immediately for metals in close proximity to the VCI emitter but it may require as much as 24 to 36 hours for metals at the farthest ends and internal spaces to be protected with VCI vapors. In some cases a 'boost' treatment of VCI spray or fogging is recommended prior to closing the enclosure.

6. How Can Emitters be Made Effective Sooner?

This can be done in several ways:

- By using more than one emitter and locating them evenly distributed throughout the package or enclosure.
- By fogging the entire package initially with one of our VCI powders, VCI spray, fog or direct application to the metal parts.
- By treating some of the internal components with a VCI rinse or cleaner, such as a VCI degreaser , VCI temporary coating , ElectroSpray or VCI enhanced rinse before placing them in the container or enclosure.
- By increasing the temperature of the parts or atmosphere.

7. Are Emitter Vapors Hazardous?

Our VCI emitters contain natural organic compounds which are not hazardous, toxic or flammable. Some of the chemicals are very similar to compounds that are been used in foods and beverages.

8. Are Emitters Environmentally Safe?

Our VCI emitters, like most of our products, are environmentally and workplace friendly and do NOT CONTAIN any known environmentally restricted or harmful compounds.

9. How Do You Remove Emitter Films?

The films left by vci emitters are only a few molecule thick (~1/25,000 of 1 m or 1/500,000 th of 1 mil). They are much thinner than most contamination layers which form on virtually any surface. It is not necessary to remove them and they have little effect on adhesion, subsequent coatings or use.

10. What happens to VCI Emitter Vapors When the Box is Opened and Closed?

Some of the *vapors* will escape when a container is opened, but the VCI's already adsorbed on the metals will not be disturbed immediately. They will continue protecting the metal. As soon as the container is closed, the VCI emitter will again replenish the container with Vapor Corrosion Protection.

11. How Many Times Can the Container Be Opened and Closed Before Depleting the Emitter?

This depends on the chemical contaminants in the atmosphere, relative humidity, temperature and a number of factors. For average conditions, if **all** of the vapor is lost from the container and **all** of the VCI escapes from **all** of the metal surfaces in the container, the container can be opened and closed approximately 4000 times or 10 times a day for one year! (1-3 times a day for two years.)

12. What About Enclosures/Cabinets/Boxes Which are Not Completely Sealed?

The lifetime of the device will be somewhat shortened, possibly to one year or less. Although emitters are specified for "enclosures" they will still provide protection for systems which have some air flow through them. The degree of protection will depend on the level of contaminants in the air and the rate of air exchange. The amount of VCI is already adsorbed on metal components will not be easily displaced. Once they have been coated with VCI, protection will continue for a considerable time that will vary due to local conditions.

13. What About Cabinets With Fans or Other Forced Air Throughput?

The lifetime of the devices will be shortened but they are still able to provide excellent corrosion protection. The emitter will need to be changed more frequently depending on the rate of air flow, the quality of the air flowing through the cabinet, temperature and contaminants. This protection is best achieved by allowing the VCI vapors to perform (coat the metals) with the forced air turned off, during downtime when the fan or forced air can be turned off, such as over the weekend or evenings.

14. How Do VCI's Affect Electrical Characteristics Such as Resistance, Dielectric Strength, etc.?

Available testing and use of VCI's used in emitters to date indicate that VCI's have no adverse effects on electrical parameters. In fact, Independent Testing Laboratories have shown that when VCI emitters are used, the contact resistance of relays and contacts remains much lower because they inhibit oxide and contaminant build-up on the contacts. Other tests have indicated no increase of leakage currents at any point on PC boards or electrical circuitry.

15. What About VCI's on High Frequency Equipment?

VCI emitters do not adversely affect the performance of RF equipment.

16. What About Using Emitters in High Voltage Equipment?

VCIs have been used in equipment which has operating voltages exceeding 5000 eV. We expect that if they are used at higher voltages there will also be no adverse interactions. In fact they will minimize formation of corrosive components, which extends equipment life and efficiency.

17. Do Emitters Provide Desiccant Activity?

VCI emitters do not provide much in the way of desiccant activity. VCI emitters function pro-actively to seek out metals and provide a corrosion protective "skin" or layer on all metal surfaces. This layer impedes the normal destructive reactions which otherwise occur with moisture and other contaminants. Although VCI emitters can be used effectively in conjunction with desiccants, in our experience we have found that desiccants are normally not required to achieve corrosion protection.

18. Are Emitters UL (Underwriter Laboratory) Approved?

UL approval is primarily a requirement for fire characteristics. Our VCI emitters presently do not have a UL approval, although there have been very few requirements for such.

19. What About Use of Emitters Under Harsh Conditions?

VCI emitters have been used very successfully under extremely adverse conditions, including remote control switch and relay boxes located near the sea, oil platforms, underground mining equipment, aviation equipment, aerospace, electric and public works utilities and atmospheres containing over 200 ppm of mixed acids such as SO₂, H₂S, HCL, etc., and in control boxes in harsh industrial atmospheres of +80 degrees F, RH of +80 %.

20. What About Protection of Silver, Gold, Tin and Other Metals?

VCI emitters use a unique blend of several different chemicals to provide a corrosion inhibitor with one of the widest ranges of protection possible. They are multi-metal inhibitors and will protect most metals under many conditions. We also carry lines of products such as special films and special papers for the protection of specific metals if required for the specific application.

21. What Are the Effects of Higher Temperature?

The higher the temperature, the faster the VCI will release its corrosion protective ions into the enclosed atmosphere. (emit a protective vapor) Corrosion Protection will be effective in faster and more pro-actively then a lower temperature. The enclosure will be saturated with VCI protection within less time but the VCI will also be depleted at a faster rate. At an operating temperature of 125° to 150°F, the useful lifetime and period of corrosion protection will be shorter. When emitters are used continuously at these higher temperatures we suggest that they be replaced more often say once per year or more. We have also found that certain constructions of VCI emitters withstand continuous high humidity and higher temperatures than others.

22. How Does One Know When the Emitter is "Used Up"?

There are several ways to determine if an emitter is still useful, but these methods are so costly that we recommend automatically replacing the emitter once every two years. The emitter should be replaced more frequently than this if the conditions are severe or there is significant leakage (air exchange), high temperatures or loss of the internal air through frequent opening and closing.

It is simple to determine if there is powder left in the emitter simply by shaking it. Or, if there are signs of corrosion beginning on the equipment, it is most likely that the powder in the emitter has depleted.

23. What About Using VCI Emitters in Older Equipment?

Although emitters will not reverse prior corrosion, when they are used in older equipment, they will extend the useful life of parts & equipment reduce failures and reduce further incidence of corrosion. For help to select the right VCI emitter click here.

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