

# Prevention of Corrosion in Electronic Devices

## Use Vapor Corrosion Inhibitor Enhanced Protective Covers

**Practical Solution:** There is an easy to implement, **preventative** solution for corrosion of electronic devices that employs chemistry: advanced protective covers made from vapor corrosion inhibitor enhanced materials.

A vapor corrosion inhibitor (VCI) is a chemical substance, or combination thereof, which prevents or significantly reduces the onset of corrosion without reacting with the environment [1]. A corrosion inhibitor may provide protection via three fundamental mechanisms [2]. They either form an ionic bond on the surface, as shown in Figure 1, form a film by oxide protection of the surface, or change the corrosiveness of an aqueous media. Sharman et al. [3] provide a detailed description of VCIs and examples of their military use.

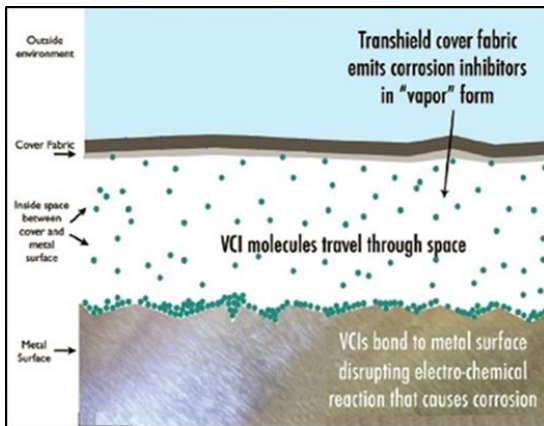


Figure 1. VCI in vapor form migrating and bonding to the metal.

Hienonen et al. note that VCIs neither cause a short circuit in the conductor spacing on the isolator surfaces nor form an electrically isolating film on the connector contacts and thus can be used safely in electronics [4].

The VCIs protect the asset (including connectors) from the environment [5]. The VCIs are blended to protect multiple metals and must be in sufficient quantity to last for an extended period. The blend also contains low and high vapor pressure VCIs to provide short and long-term protection. Advanced protective covers with VCI meet these needs and are tested in some of the harshest environments.

In 2013, at the request of the Florida National Guard, a Satellite Transportable Terminal (STT) was protected by a Transshield XT advanced protective cover with VCI at a Florida National Guard base in Jacksonville, FL. Paired coupons were employed inside and outside the cover to assess the level of protection provided to the asset.

At the end of the 45-day evaluation, National Guard personnel witnessed the removal of the Transshield XT advanced protective cover. Photographs of the coupons were taken immediately. Typical paired coupon post trial results highlight the dramatic corrosion prevention and are shown in Figure 2. Transshield XT advanced protective cover provided in excess of 99% protection for all coupons. A logical conclusion is that similar protection is provided to electronics of the STT.



Transshield XT 99.9% Protection Outside Cover 12.3% Protection  
Figure 2. STT Coupons After Testing

Electronic devices protected by a Transshield XT advanced protective cover with VCI technology require less maintenance and fewer repair parts. The return on investment (ROI) is significant when the cover cost is considered. Life cycle costs are also driven down.

**Independent Approval:** In 2013, NAVSEA approved the next generation advanced protective cover with VCI technology developed by Transshield. Made from ArmorDillo®, these second-generation covers provided a lighter, more form-fitting cover.

**Bottom Line:** Three fundamental components are required to protect assets:

1. Covers must be made from VCI enhanced fabric.
2. Cover design matters; covers must be formfitting.
3. Covers need to be installed correctly and secured properly to protect equipment.

### References

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- [3] Sharman, D. J., Washburn, M., Ozol, S., The Wide Ranging Benefits of Corrosion Inhibitors, The Department of Defense Allied Nations Technical Corrosion Conference, August 2017
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