Foam Emitters

FEATURES AND BENEFITS
Armor Protective Packaging® offers rust prevention and rust removal products that are clean, safe, easy, and that protect metals while in-process, in transport, or in storage. ARMOR combines its VCI (vapor corrosion inhibitor) Nanotechnology® with packaging materials such as paper and poly film to create products that displace moisture on metal and guard against rust. ARMOR also offers desiccants, emitters, foam pads and its Metal Rescue® Rust Remover Bath and Dry Coat™ Rust Preventative. For more than 35 years, ARMOR has worked with customers from around the globe to provide rust prevention and rust removal solutions and to Take the Work Out of Your Workday!

WHY ARMOR?

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Easy-to-Use: VCI-impregnated and malleable to any location
Continuous Protection: up to 3 years protection
Safe: non-toxic, no messy oils/greases
Clean: no fiber or dusting
Ranges of Sizes: Standard sizes and customized perforated sheets
Complements: other ARMOR VCI products
Dual Protection: corrosion protection and cushion for sensitive parts

The proprietary ARMOR VCI Nanotechnology® comes with more than 35 years of industry experience. With service on four continents and in more than 25 countries, ARMOR is positioned to provide corrosion management solutions wherever and whenever you need them.

Approved By/Conforms:
- FDA for use in equipment packaging
- Global OEM companies
- RoHS – REACH Compliant
- NACE Std TM0208-2008
ARMOR SHIELD® Foam Emitters

Product Overview
All Armor Protective Packaging® products utilize our proprietary and time-proven ARMOR vapor corrosion inhibitor (VCI) Nanotechnology®. Oxidation occurs when an electrolyte (water, oxygen, etc.) is present on the surface of a metal. The corrosion process begins when electrons flow through the electrolyte from high energy areas (anode) to low energy areas (cathode) of the metal. ARMOR VCI blocks this reaction by passivating the surface and inhibiting the electrochemical current flow from anode to cathode. ARMOR VCI’s protective vapors adhere to a metal surface to form an invisible film only a few molecules thick to protect metal from attack.

ARMOR SHIELD® Foam Emitters are an open-cell, blue polyurethane foam with a density of 0.023 g/cc contains 20% by weight ARMOR Global Multi-Purpose VCI formulation. Foam Emitters are designed for the long-term storage of ferrous and non-ferrous metals and is both non-toxic and nitrite-free.

Compatibility of ARMOR SHIELD Foam Emitters with Metals

<table>
<thead>
<tr>
<th>Metal to be Protected</th>
<th>ARMOR SHIELD® Foam Emitters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>★ ★</td>
</tr>
<tr>
<td>Aluminum Bronze</td>
<td>★ ★</td>
</tr>
<tr>
<td>Aluminum Magnesium alloy</td>
<td>○</td>
</tr>
<tr>
<td>Brass</td>
<td>★ ★ ★</td>
</tr>
<tr>
<td>Bronze</td>
<td>★ ★ ★</td>
</tr>
<tr>
<td>Cadmium</td>
<td>★ ★ ★</td>
</tr>
<tr>
<td>Cast Iron</td>
<td>★</td>
</tr>
<tr>
<td>Chromium</td>
<td>★ ★</td>
</tr>
<tr>
<td>Constantan</td>
<td>★ ★ ★</td>
</tr>
<tr>
<td>Copper</td>
<td>★ ★ ★</td>
</tr>
<tr>
<td>Galvanized</td>
<td>★ ★ ★</td>
</tr>
<tr>
<td>Lead</td>
<td>○</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>○ ○</td>
</tr>
<tr>
<td>Nickel</td>
<td>★ ★ ★</td>
</tr>
<tr>
<td>Nickel Silver (Cu, Ni, Zn)</td>
<td>★ ★ ★</td>
</tr>
<tr>
<td>Silver</td>
<td>○ ○</td>
</tr>
<tr>
<td>Solder (Pb, Sn)</td>
<td>○</td>
</tr>
<tr>
<td>Steel</td>
<td>★ ★</td>
</tr>
<tr>
<td>Tin (Pure)</td>
<td>★ ★ ★</td>
</tr>
<tr>
<td>Tinned Steel</td>
<td>★ ★ ★</td>
</tr>
<tr>
<td>Zinc</td>
<td>★ ★ ★</td>
</tr>
</tbody>
</table>

Compatibility Key

★ ★ ★ Complete Protection
★ ★ Good Protection
★ This product will protect this metal from corrosion; however a more suitable formula may be available.
○ Testing is recommended
○ ○ Not Compatible
Standard Foam Emitter Sizes

- 10” x 10” x ¼” protects up to 8 cubic feet per pad
- 2” x 10” x ¼” protects up to 2 cubic feet per pad
- 2” x 5” x ¼” protects up to 1 cubic foot per pad
- 1” x 1” x ¼” protects up to .25 cubic feet per pad

Shelf Life & Storage of ARMOR VCI Products

When ARMOR SHIELD® Foam is stored properly (nested together and wrapped or in some sort of closed container), the shelf life is two years from the date of manufacture.

For best results, do not leave ARMOR VCI packaging out in an open environment, either indoors or outdoors. Keeping it in its original packaging or enclosed inside a container ensures that the vapors remain in the packaging. As temperature and humidity levels increase, the rate of the volatilization of the chemicals contained in the packaging also increases, reducing the effectiveness and longevity of the product. Product should be stored in a dry environment with temperatures between 40° – 110° F (5° – 43°C).

Note: While Shelf Life and Length of Protection are two separate characteristics of VCI packaging materials, they are somewhat interrelated. Shelf Life refers to how long the unused VCI packaging material can be stored prior to being put in use. Length of Protection refers to how long the VCI packaging materials provide protection once in use. In both cases the duration depends on the product’s storage conditions.

Reusability

ARMOR SHIELD® Foam is not recommended for re-use for three primary reasons:
1. The rate at which VCI chemical volatilizes out of the product into the surrounding environment when in use
2. The inability to properly track and monitor the amount of time the materials have been exposed to the environment
3. Potential contaminants on the packaging that can be transferred
Length of Protection
ARMOR VCI products are used to cover or wrap metal parts and surfaces. The continuous vaporization of this chemically treated packaging creates a safe, protective environment that effectively blocks out rust, corrosion and oxidation. Typically, ARMOR VCI packaging will protect parts for approximately three years of corrosion-free storage when used properly in normal warehouse conditions.

ARMOR cannot control variable conditions such as temperature and humidity extremes, airflow, production and process methods, surface conditions of metal to be protected, customer employee training and other factors beyond our control, therefore it is impossible to guarantee a specific length of protection. Additionally, if warehouse conditions are expected to be severe (i.e. over 90° F and 75% RH) for any length of time, other methods of rust preventatives such as ARMOR WRAP®, ARMOR POLY®, Dry Coat™ RP or desiccants, may be needed, in conjunction with VCI packaging.

Discoloration of Urethane Foam
Urethane foams tend to naturally yellow over time. Oxidation, ultra violet light and temperature affect the color stability. The ultra violet wave length in light will interact with the urethane polymer causing it to oxidize. This chemical reaction produces a yellow color. ARMOR’s Shield Emitter is blue, therefore the yellowing process may produce a more greenish hue over time.

Another common means of oxidizing urethanes is through exposure to oxides of nitrogen. These gases are very common in many facilities as they may be produced by gas-fired furnaces and motor emissions. Most warehouses have furnaces and many have gas-powered lift trucks. Ozone gas will also affect the oxidation and consequential yellowing of urethane foams. Ozone is commonly associated with combustion engines.

Temperature is another way that yellowing may occur. The manufacturing process itself may produce a yellowed product as it is an exothermic reaction, meaning that it produces heat and releases it during the polymerization of the material.

Certain additives, such as fire retardants may increase the chance of discoloration as well.

The discoloration of urethane foams is a natural phenomenon as they will inevitably be exposed to oxidizing gases and light at some point. The change in color is purely cosmetic and will have no detrimental effect on the ability of the VCI (including those emitted from the Shield CF33 Emitter) to protect the metal surfaces from corrosion.

Wash hands thoroughly after handling this product and before eating.

All products manufactured Armor Protective Packaging® are warranted to be first class products and free from defects in material and workmanship. Liability under this warranty is limited to the net purchase price of any of such products proven defective or at our option to the repair or replacement of said products upon their return to us transportation prepaid. All claims on defective products must be made in writing 30 days after the receipt of such products in your plant and prior to further processing or combining with other materials and products. We make no warranty, express or implied, as to the suitability of any of our product for any particular use, and we shall not be subject to liability from any damages resulting from their use in operations not under our direct control. This warranty is exclusive of all other warranties, express or implied, and no representative of ours or any other person is authorized to assume for us any other liability in connection with the sale of our products.

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