Anti-Corrosion Packaging Solutions for Metalcasters

MODERN CASTING

A Resource From Modern Casting in Conjunction with Green Packaging Inc.

12 Essential Procedures

to Prevent Corrosion on Metal Castings

Anti-Corrosion Packaging Solutions.
Protect Every Casting.

1 Production, Inspection, and Packaging Personnel should always wear gloves while handling metal castings because contaminants and acids present on human hands can cause and promote corrosion and rust on metal castings.

2 Be sure that metal castings do not come in direct contact with wooden pallets, corrugated boxes, or untreated paper at any time during production, storage or shipment.

3 Keep metal castings away from industrial air contaminants such as exhaust from lift trucks, manufacturing and heat treat areas because they are corrosive to metal castings.

4 Metal castings must remain covered with VCI Paper or VCI Poly throughout the entire manufacturing process.

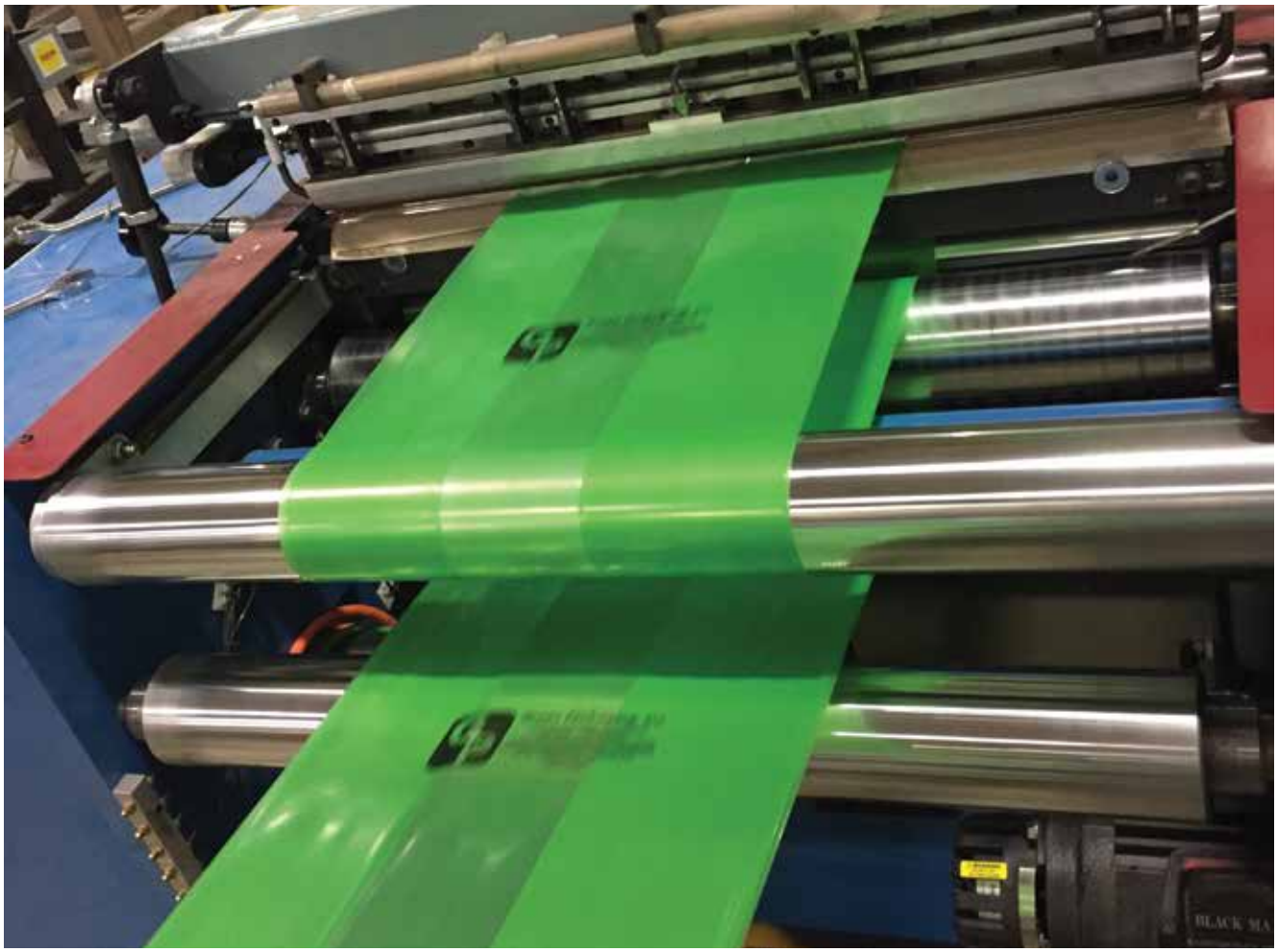
5 Keep temperature in manufacturing and shipping areas constant and as low as possible. High temperatures and temperature fluctuations will promote and accelerate rust and corrosion on metal castings.

6 If you have a machining operation, and if you are using water-based metalworking fluids, be sure to use deionized or distilled water-not city water.

7 Metal castings must be clean, dry, and free of fingerprints before packaging. Do not stack castings on top of each other unless they are completely dry.

8 Package metal castings immediately in a Rust Guard Premium™ VCI Poly Bag or Rust Guard Premium™ VCI Paper to prevent rust and corrosion.

9 Use a combination of VCI Paper and a VCI Bag for complete corrosion and rust protection.



10 Keep the VCI Bag open until the castings inside reach ambient air temperature.

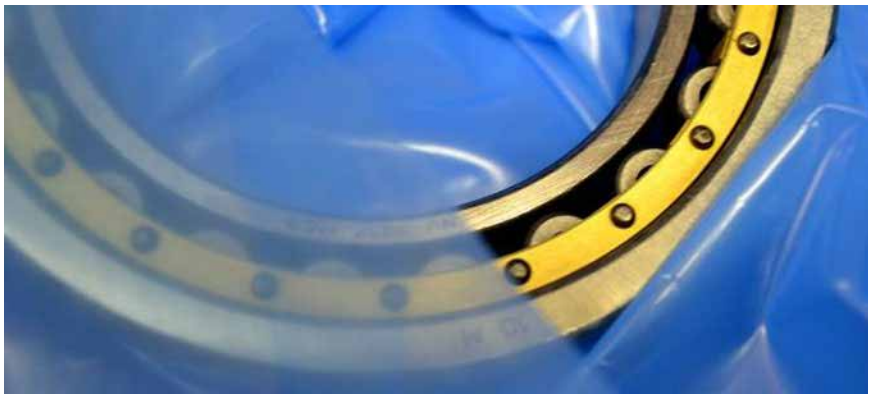
11 When your castings arrive at your customer's facility, instruct your customer to keep the VCI Bag closed until the castings reach ambient air temperature.

12 Consult with a Corrosion Specialist such as Green Packaging, Inc. to insure that you are using a VCI product that is designed to protect metal castings. Rust Guard Premium™ VCI products are formulated specifically for cast metals. Also, be sure that these products are being used and applied properly for your exact application. Green Packaging, Inc. provides FREE corrosion consultations for its foundry customers and offers a Rust Prevention Guarantee.

VCI Performance in Warm-Humid Environments

Harleysville, PA – It is a fact of nature-metals rust and corrode. This process of corrosion is happening around us all the time. It happens even more quickly when the weather is warmer. For every 10 degree C rise in temperature, corrosion rates can double. This means that the warmer your metal part (or the air surrounding it) is, the quicker it is going to rust. In addition, relative humidity greater than 60% is sufficient to create an electrolyte on the surface of metal. The electrolyte, along with oxygen, is all that is necessary for corrosion to form on metal surfaces. Corrosion is the natural reaction of metals with oxygen. This reaction is immediate and ongoing unless the corrosion cell is halted, or passivated. It is important to remember that the more manipulation metal endures during its processing, the more quickly it is likely to corrode. This manipulation includes cold working, stamping, forming, deep drawing, coiling, coining, and heat treatment.

A corrosion inhibitor is any chemical or mechanism that can stop corrosion. There are hundreds of chemicals that can be used as corrosion inhibitors. In addition, any type of material that can create a barrier between the metal surface and the atmosphere will likely



inhibit corrosion. This is how oils and greases came into use as corrosion inhibitors. The goal is to prevent moisture and oxygen from reaching the surface of the metal. VCI (Vapor Corrosion Inhibitor) Technology is an effective method of corrosion prevention for all types of fabricated metal parts. VCI works on a molecular, Nanotechnology level to inhibit corrosion on metal.

VCI's are a unique class of corrosion-inhibiting chemical compounds that contain sufficient vapor pressure to release molecules from the substrate into the air. Proper VCI formulations contain inhibitors that easily vaporize from a solid form into a gaseous form. This outgassing is an important factor in the way that VCI's prevent corrosion. VCI works in several important ways. First, the VCI vapors or gasses fill the enclosed space with corrosion-inhibiting compounds. Once this space is full of the VCI, or VCI-rich, the vaporization ceases. The vapors effectively stop the corrosion cell (electron movement on the surface of the metal) so that corrosion is halted. If the package is opened for inspection of parts, or for any other reason, some of the VCI vapors will escape. At that point, the VCI again begins to outgas from the substrate until the air is once again VCI-rich. In addition, the VCI molecules are attracted to the surface of the metal due to their polarity. This enables the molecules to form a strong bond with

the metal surface. This molecular layer is only 1-3 molecules thick, but it is sufficiently strong to prevent moisture and oxygen from reaching the surface of the metal, so it will remain corrosion-free.

Higher temperatures and higher levels of humidity in the air actually increase the effectiveness of VCI. High temperatures act as a catalyst, making the VCI molecules vaporize more quickly. Likewise, higher humidity enables the ions to disassociate more quickly, and reassociate as they form a bond on the surface of the metal.

As temperature increases, the vapor pressure of the VCI also increases, so the VCI chemistry is at a higher concentration in warmer temperatures, just when you need them the most. Thus, the higher the temperature, and the higher the humidity, the more quickly and effectively VCI products will perform in corrosion prevention.

VIDEO:
GREEN PACKAGING FOR CORROSION PREVENTION

To Seal or Not to Seal?

Harleysville, PA – The question often comes up regarding the necessity of sealing VCI bags. Many customers believe incorrectly that VCI bags must be completely sealed and airtight in order for them to be effective. This is not necessarily the case.

While absolute airtight packaging is obviously the most ideal situation for VCI rust protection, it is not required in order for our Rust Guard Premium™ VCI products to perform effectively. What is very important when using VCI products is that the VCI vapors must be enclosed or encapsulated in some manner – the more airtight the package the more effective the VCI protection will be. This is not to say that the VCI bag must be completely sealed-rather, the VCI bag can simply be folded over and kept closed with the box flaps, or the VCI bag can be folded over and taped or stapled to keep it closed. The only thing you will be missing is the water-tightness properties of a sealed bag; you are not losing anything on the VCI protection. So, unless your parts are going to be subject to a great deal of water spray, rain, etc. you will not be losing any VCI effectiveness by not completely sealing the VCI bag.

Packages may be opened and re-closed without negatively affecting the corrosion protection. VCI protection with our Rust Guard Premium™ VCI products is self-healing, meaning that the rust preventative compounds outgas from the VCI bag or VCI paper until it reaches equilibrium, then it stops. When the package is opened, the VCI will again outgas until equilibrium is achieved once again, allowing for optimum corrosion protection.

Rust and corrosion cost American metal parts manufacturers an estimated 30 billion dollars per year, and the average foundry loses $76,350 dollars a year in rust related costs. Every day, Green Packaging, Inc. strives to help foundries like yours protect their valuable castings from rust and corrosion. Preventing these issues helps you to preserve your company's goal of producing high quality castings. Don't let rust and corrosion on your castings ruin your company's well-earned quality reputation.

Is rust on your castings a never-ending problem? Are your customers complaining about rust? Are you spending money on expensive sand-blasting or other rust removal processes? The experts at Green Packaging, Inc. have solved corrosion problems for some of the largest foundries in the country. We specialize in solving complex corrosion problems in metal castings.

Whether you are producing castings of ductile iron, gray iron, or any other ferrous or non-ferrous alloys, one pound or 10,000 pounds, we have the correct VCI products to provide premium protection against rust on your valuable castings.

Unlike other companies' Multi-Metal VCI Formulas, our proprietary, nitrite-free, heavy-metal free VCI formulation is formulated specifically for cast metals and is extremely effective in preventing rust on your castings….Guaranteed!

We do much more than just sell VCI bags. We dive deep into your operation and determine exactly what procedures can be changed or improved in order to end your rust problems once and for all. We will then develop a powerful, specific corrosion inhibiting system for your unique application.

Green Packaging, Inc. is an active member and supporter of the Ductile Iron Society and The American Foundry Society.

Call today for your free corrosion consultation, samples, or a price quotation on all of your VCI packaging requirements.

Green Packaging, Inc.

Anti-Corrosion Packaging Solutions
Protect Every Part
www.green-vci.com

Rust Prevention for Foundries

Green Packaging, Inc. specializes in providing rust-inhibiting VCI (Vapor Corrosion Inhibitor) products, VCI Bags and VCI Paper for foundries and metalcasters across North America. Our VCI packaging products have helped foundries replace the hazardous oils and solvents of old with a non-toxic, environmentally friendly alternative. Our proprietary rust-prevention method is formulated specifically for cast metals and is extremely effective in preventing rust on your castings. It is our guarantee to your foundry.

Protection for Your Castings

Unlike other companies' Multi-Metal VCI Formulas, our proprietary, nitrite-free, heavy-metal free VCI formulation is formulated ***specifically*** for cast metals and is extremely effective in preventing rust on your castings....**Guaranteed!** Our products are **Safe-Easy-Effective!**

- More Products in stock with no lead time
- Best protection for Cast Metals
- Free Corrosion Consultation
- Free Samples
- Competitive Pricing
- Rust Prevention Guarantee
- Green Packaging, Inc. is a member and supporter of the Ductile Iron Society, American Foundry Society and the Conestoga Foundrymen's Association

Rust Prevention GUARANTEE

To help our customers stop rust and corrosion problems, we've provided 12 rust prevention tips to follow while using VCI products to package your metal parts. By following these 12 rust prevention tips and using all products as directed, Green Packaging , Inc. confidently provides our foundry customers with a rust prevention guarantee. If rust persists on parts after using VCI in combination with our tips, Green Packaging , Inc. will fully refund your money. That's right. We're so confident in the rust prevention benefits behind our products and expertise that we guarantee complete success or you get your money back. As the anti-rust experts, we put our name and our reputation on the line to help you ship better products and increase the satisfaction of your customers, because your business's success is a reflection on us. Stop rust once and for all.

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