

A New World of VpCl[®] Protection Corrosion Inhibiting Additives for Coatings, Fluids, Adhesives and Plastics



CORTEC
CORPORATION

Environmentally Safe VpCl[®]/MCI[®] Technologies

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Cortec® VpCI® additives can add significant value and marketability to your coatings, fluids, adhesives, and plastics.

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Cortec's custom Vapor phase Corrosion Inhibitor (VpCI®) additives offer a new world of production and marketing possibilities. That's because our proven VpCI® technology offers effective, low cost protection as a simple and economical addition to your

production process. Our researchers and engineers work together with your technical staff to give you an additive that is tailored to your production requirements — and your customers' specific needs.

These additives can open new markets for you—with both current and new customers.

Cortec® VpCI® additives are a sound business investment. Because they increase the protective capability of your products, VpCIs add significant value to what you can offer current clients. The benefits of VpCIs will add the essential credibility you need to reach new markets.

Cortec® additives can be customized to enhance your product line.

Our manufacturing process allows us to economically implement VpCI® corrosion inhibiting technology in most coatings, fluids, elastomers and polymers. The Cortec® team of sales representatives, researchers and engineers have the training and comprehensive lab support to properly analyze your products and also design an effective, economical additive for your needs.



Here's how our corrosion inhibiting additives take the performance of your products to a higher level.

Cortec® VpCIs protect continuously — Unlike conventional methods, Cortec® VpCIs can be formulated into any part of your product or system. Once in place, the VpCIs go to work immediately. More importantly, they are self-replenishing for uninterrupted protection both in direct contact and in the vapor phase.

Cortec® VpCIs are safe for your staff, your customers and the environment — Unlike corrosion inhibiting systems of the past, Cortec® VpCIs do not contain chromates, other heavy metals, or chlorinated hydrocarbons. All of our additives have minimal toxicity and polluting effects.

Cortec® VpCIs add value to your products — Now you can improve the competitive advantage of your products by adding VpCI® capability. It's just one more way our corrosion inhibiting technology can open new markets for you.



Cortec® VpCI®
technology
provides
constant, safe
and complete
protection.



Cortec®
VpCIs are a
proven revolution in
concept and
design.

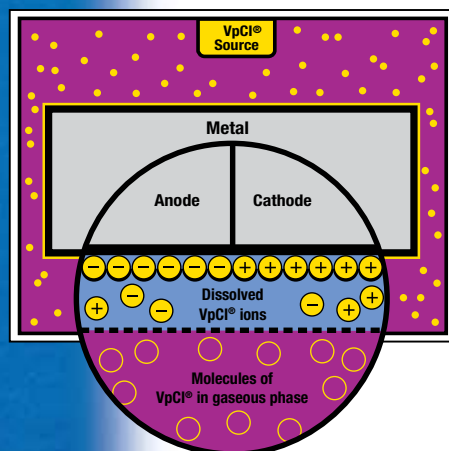
Ionic Action of VpCI® Creates a Molecular, Inhibiting Layer.

VpCI®:

- ▶ Vaporizes.
- ▶ Conditions enclosed atmosphere and porous substrates with a protective vapor.
- ▶ Vapor migrates to all recessed areas and cavities.
- ▶ Vapor phase inhibitors condense and absorb on all metal surfaces.
- ▶ Ions dissolve in moisture layer (water electrolyte).
- ▶ Protective ions are attracted to metal surfaces.
- ▶ Ions form a thin, monomolecular protective layer at the metal surface.
- ▶ Galvanic corrosion prevention.

Protective layer re-heals and self-replenishes through further condensation of the vapor. VpCI® combines with other functional properties:

- ▶ Antistatic
- ▶ Cleaning
- ▶ Desiccant
- ▶ Coatings
- ▶ Fire Retarding
- ▶ Lubricating
- ▶ Paint Removing
- ▶ Polymeric
- ▶ Rust Removing



Our VpCI® technology is changing the way companies protect their materials and products. With Cortec® VpCIs, you can eliminate the need for expensive alloys or stainless steel and other corrosion resistant metals and materials.

The Cortec® corrosion inhibiting additive process.

Our ability to match Cortec® VpCI® additives with your formulations makes our system complete and flexible. Here's how we ensure you get the protection you need.

1 *Step one: Assess your needs thoroughly.*

Working closely with your scientific and technical staff, we utilize the latest technology and research equipment to determine the correct additive for your needs.

2 *Step two: Complete analysis of your materials.*

After a complete examination of your product or prototype, the correct VpCI® additive package to ensure protection is determined. Production of your additive sample begins.

3 *Step three: Thorough testing.*

To ensure your production specifications are met, we rigorously test your product or prototype using ASTM or other DIN, JIS or MIL-SPEC test standards.

4 *Step four: Producing the product you need.*

With our ISO 9001-2000 and 14001 certifications, we provide complete production and quality control programs and specifications.



Cortec[®] Corrosion Inhibiting Additives for Coatings

Cortec VpCI[®] additives offer unprecedented protection in almost every aspect of outdoor, indoor, short-term and long-term corrosion protection. They are excellent for the maintenance and storage of products and equipment.

Cortec[®] Corporation's complete line of waterborne and solvent-based additives offers corrosion protection for ferrous and non-ferrous metals. In addition, Cortec[®] VpCI[®] additives provide excellent performance, low viscosity and can be easily blended into your product at any stage of manufacture.

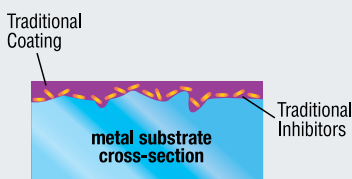
Whether it's a permanent or temporary coating, waterborne or solvent-based formulation, or even a flash-rust additive that's needed — Cortec[®] additives will improve the performance and add to the value of your products.

Advantages of CORTEC[®] Coating Additives

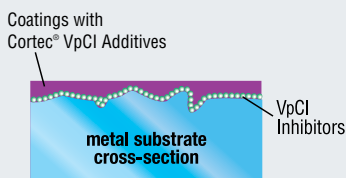
- ▶ Vapor phase Corrosion Inhibitor (VpCI[®])
- ▶ Organic & inorganic inhibitors
- ▶ Environmentally friendly
- ▶ Liquid phase wetting (preferable compared to pigment inhibitors)
- ▶ Added in let-down stage vs. grind for pigments stage
- ▶ Clear base
- ▶ Use less inhibitor (0.5 - 2%) vs. 5 - 20% for pigment inhibitors
- ▶ May improve gloss, coalescence and flow properties
- ▶ Can work synergistically with other components in the formulation
- ▶ Long term, flash rust, and in-can



TRADITIONAL COATINGS VS. COATINGS WITH CORTEC[®] VpCI[®] ADDITIVES

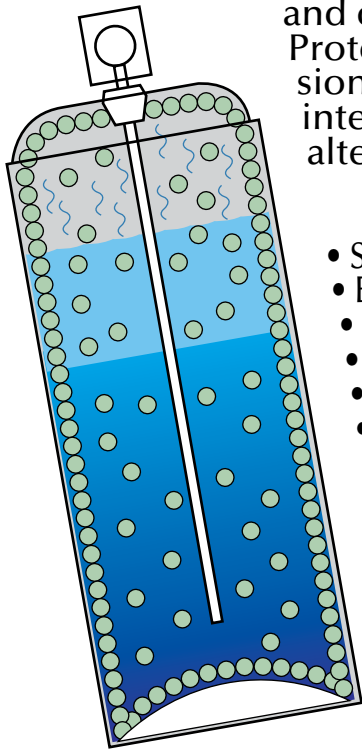


Traditional coatings rely on sacrificial metals (zinc, chromates, aluminum) for inhibition. Due to the large particle size of these inhibitors, gaps exist which allow corrosion to start and eventually expand, causing coating failure.



Coatings with Cortec[®] VpCI[®] additives use the patented VpCI[®] technology to protect the metal substrate with a tight bonding molecular structure. This system eliminates the gaps which occur with traditional inhibitors and prevent corrosion from starting.

In-Can Corrosion Three Phase Protection



NEW additive for water-based and other aerosol formulations. Protects against in-can corrosion without the use of special internal coatings or the risk of altering formulations.

- Solves in-can corrosion problems
- Environmentally safe
- No internal coatings necessary
- Stable and non-toxic
- Easy to formulate
- Neutral and clear

Selection of Cortec's additive for this type of application is formulation specific. We recommend contacting your Cortec® expert for proper product selection.



Flash Rust Inhibition



Water based acrylic paint without VpCI® additive.



Water based acrylic paint with VpCI® additive at 0.5% by weight.

VpCI® additives for water borne coatings, paints, adhesives and inks eliminate the problem of flash corrosion on cast iron, steel, zinc, brass, aluminum and copper surfaces.

Cortec® Corrosion Inhibiting Additives for Fluids

Cortec's contact and Vapor phase Corrosion Inhibitors (VpCI®) additives offer unique and effective corrosion protection when added to water, solvent or oil-based fluids, e.g. cutting fluids, cleaners, degreasers, hydraulic fluids, engine oils, gear oils, RP fluids, coolants, lubricants, etc. VpCIs offer the formulator the ability to pass ASTM-D-4627-86 cast iron chip test for metal-working fluids and MIL-B-46002 for gas turbine lubrication and corrosion inhibition.

VpCIs when added to hydraulic, cutting and coolant fluids, cleaners and oils, will enhance the performance of your products.

Productivity, investment protection and cost reduction.

The total economic loss from corrosion in a metal producing plant can exceed a staggering 5%. This huge loss comes from products that must be sold as a lower grade; or must be repickled, reprocessed or scrapped due to corrosive attack while in the plant, leading to lost production capacity. The high cost of corrosion also includes rust claims and freight costs for returned goods.





Cortec® Corrosion Inhibiting Additives for Plastics and Adhesives

When Cortec® additives are formulated with your plastics and adhesives, you can rely on constant corrosion protection for most types of molded or extruded products. Many companies already use masterbatch additives for the production of stretch and polyethylene films, antistatic bags, corrugated plastic containers, and injection molded parts. Formulation applications are almost endless.

Typical Materials Chart for Plastics and Adhesives

| Material | Cortec Additives |
|--|-------------------------------|
| Adhesives, Skin Package Additives (Pressure-sensitive, heat activated, hot melt) | M-138, M-435, M-5120 |
| Polyethylene, Polypropylene (LDPE, MDPE, HDPE, ULDP, LLDPE) | M-120, M-121, M-126, M-138 |
| Nylon | M-138, M-124 |
| Polyester | M-138, M-124 |
| Vinyl, ABS, PP, PE, Rubber | M-138, M-124 |
| Other Engineered Plastics | Consult Cortec |

Cortec® Corrosion Inhibiting Additives for Elastomers

Most elastomers are at best only inert in relation to metals, and often actually accelerate the corrosion of metals in contact. With Cortec's revolutionary VpCI® technology, standard elastomers are easily and economically transformed into emitting sources that protect any metal or alloy both in direct contact and through unique vapor phase inhibiting action. The area of the assembly adjacent to the VpCI® formulated elastomeric component is protected against corrosion for an extended time period, technically the same as the design life of the component.



ADDITIVE BUYERS GUIDE FOR PAINTS AND COATINGS

WATER-BASED ADDITIVES - FLASH RUST INHIBITORS

| PRODUCT | DESCRIPTION | RECOMMENDED USAGE | PACKAGING |
|---------|--|-------------------|---|
| M-111 | Vapor corrosion inhibiting waterborne additive for aqueous systems; good flash rust inhibition for ferrous metal, galvanized, and aluminum. | 2-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-240 | Vapor corrosion inhibiting waterborne additive for aqueous systems using a combination of several flash rust inhibitors that provide excellent protection. | 0.5-2% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-241 | Water-based anti-corrosion additive for coolants, metalworking fluids, in-can corrosion protection, etc. FDA approved as per 21 CFR Part 172. | 0.1-2% | 50lbs (22.68 kg), 100lbs (45.36 kg) 55 gallon (208 liter) totes (40% active) |
| M-380 | Corrosion inhibitor that provides both flash rust and long term corrosion protection. Very effective in combination with M-119 or M-119LV in a ratio of 3:1 (M-380/M-119). Maximum effect with carboxylated acrylic or styrene acrylic latices. Additives must be mixed into the coating separately. | 1-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-435 | Vapor corrosion inhibiting additive: offers rust protection for solvent-based and waterborne coatings. | 2-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |

WATER-BASED ADDITIVES - LONG TERM CORROSION PROTECTION

| PRODUCT | DESCRIPTION | RECOMMENDED USAGE | PACKAGING |
|---------|--|-------------------|---|
| M-118 | Contact and vapor corrosion inhibitor with a blend of additives to provide a synergistic corrosion protection for ferrous and aluminum substrates. | 2-4% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-119 | Contact and vapor corrosion inhibiting additive for aluminum and ferrous metals: offers good protection in a salt environment. Post add to coating with slow mixing. A 3:1 ratio of M-380/M-119 provides for a synergistic additive blend. These additives must be added separately to the coating. | 0.5-2% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-119LV | Contact and vapor corrosion inhibitor in a low viscosity blend for easy incorporation into a paint. Can be used with M-380 in the same 3:1 ratio (M-380/M-119LV) ratio. | 0.5-2% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-380 | Corrosion inhibitor that provides both flash rust and long term corrosion protection. Very effective in combination with M-119 or M-119LV in a ratio of 3:1 (M-380/M-119). Maximum effect with carboxylated acrylic or styrene acrylic latices. Additives must be mixed into the coating separately. | 1-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-381 | This Nano VpCl® additive is a long term and flash rust inhibitor. It combines the performance characteristics of Cortec® M-380 and M-119LV. M-381 is most effective in carboxylated acrylic or styrene acrylic latices on cold rolled steel, aluminum, and galvanized steel. | 2.5-4% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |

SOLVENT-BASED ADDITIVES

| PRODUCT | DESCRIPTION | RECOMMENDED USAGE | PACKAGING |
|---------|--|-------------------|---|
| M -109 | Solvent based corrosion inhibitor that is also effective in waterborne epoxy coatings. This VOC free additive should be added to the amine portion of a two part epoxy system. M-109 is effective on steel, aluminum, and copper type substrates. | 1-3% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-110 | Solvent-based corrosion inhibitor that is also very effective in some waterborne coatings. This non-toxic additive will not detract from the color of a coating due to its light tan shade. Used on cold rolled steel, aluminum, galvanized steel and cast iron. | 1-3% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-168 | Contact and vapor phase inhibitor; multimetal protection for solvent based coatings. Coatings become softer at high levels of this additive | 2-10% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-435 | Vapor corrosion inhibiting additive: offers rust protection for solvent-based and waterborne coatings. | 2-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-5365 | Solvent-based additive for solvent-based paints. | 1-2% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |

ADDITIVE BUYERS GUIDE FOR CORROSION INHIBITING FLUIDS

| PRODUCT | DESCRIPTION | RECOMMENDED USAGE | PACKAGING |
|-----------------------|---|-------------------------|---|
| M-95 | Water-soluble additive for a variety of water systems. Biodegradable, non toxic, and excellent multimetal protection. | 0.25-1.0% (and up) | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-150 | Waterborne VpCI® additive for inks. Multimetal protection. | 0.5-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-151 | Solvent-based VpCI® additive for inks. Multimetal protection. | 0.5-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-235 | For water, solvent or oil-based systems, for protection of “yellow” metals, carbon, steel, and aluminum. | 0-1.5% | 50 lb. and 100 lb. fiber drums (23 kg and 45 kg) |
| M-236 | Anticorrosion additive for oils for protection of yellow metals. Conforms to specifications for transformer oil. | 200-500 ppm | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-238 | For solvent, oil-based systems, this product leaves a thin film, effective against humidity and salt environment. | 2-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-320 | Primarily for oil-based systems, this additive provides protection against salt and humidity, resistant to high temperatures. | 3-10% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-369 | Anticorrosion additive for oils, greases and waxes. Provides additional lubricity. | 1-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-370 | Use for water-based systems, (cleaners, metalworking, rinse water) offers multimetal protection. | 1-10% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-370A | This water-based additive focuses on aluminum protection, passes ASTM F-1110-90. | 1-10% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-370C | This version of M-370 focuses on cast iron protection and is also effective on aluminum. Good for “nodular” surfaces. | 0.5-10% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-370 NS | This version of M-370 is surfactant free. | 1-10% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-415 | FDA approved, VpCI-additive, provides excellent VpCI® protection for solvent and oil-based systems. | 1-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-435 | Vapor corrosion inhibiting additive: offers flash rust protection for solvent-based and waterborne coatings. | 2-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-529 | Multimetal anticorrosion additive to the lubricating oils including engine oils. | 1.5-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-530 | Multimetal corrosion inhibiting additive for lubricating oils used in operating engines. | 1.5-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-605L | Anticorrosion additive to magnesium chloride based deicer in liquid form. | 5-10% (per concentrate) | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-605P | Anticorrosion additive to sodium chloride based deicer in powder form. | 4-5% (per concentrate) | 50 pounds (23 kg) and 100 pounds (45kg) fiber drums |
| M-605PS | Anticorrosion additive to calcium chloride based deicer in powder form. | 4-5% (per concentrate) | 50 pounds (23 kg) and 100 pounds (45kg) fiber drums |
| M-640 / M-640L | Multimetal anticorrosion additive to glycol/water-based coolants used in radiators. | 2-3% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |

ADDITIVE BUYERS GUIDE FOR PLASTICS, ADHESIVES AND ELASTOMERS

| PRODUCT | DESCRIPTION | RECOMMENDED USAGE | PACKAGING |
|---------------|--|-------------------|---|
| M-121 | Masterbatch for extrusion of polypropylene. PP extrusion grade resin base multimetal and desiccant formulation. | 5-20% | Gaylord, 800 lbs. (364 kg) |
| M-124 | Masterbatch for molded plastics. Injection grade resin base multimetal and desiccant formulation. | 1-20% | Gaylord, 800 lbs. (364 kg) |
| M-126 | Masterbatch for extruded films including LDPE, LLDPE, and HDPE, patented. | 12% | Gaylord, 800 lbs. (364 kg) |
| M-138 | Powder form additive for synthetic elastomers and natural rubber. High heat tolerance. Also good in hot melt adhesives. | 1-10% | 50 lb. and 100 lb. fiber drums (23 kg and 45 kg) |
| M-435 | Liquid water-based VpCI® additive for skin film, adhesives, cohesives and latexes—specifically protects ferrous and yellow metals. | 1-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |
| M-5120 | Water-based VpCI® additive for adhesives and cohesives. Provides multimetal protection. | 1-5% | 5 gallon (19 liter) pails and 55 gallon (208 liter) drums |

Total Corrosion Control

Cortec® is dedicated to controlling corrosion at ALL STAGES of a product life cycle. Cortec® has developed a diverse range of corrosion protection products including cleaners, metalworking fluids, waterborne and oil-based systems, rust removers, paint strippers, powders, packaging foams, paper, films and additives for concrete. Contact Cortec® for additional brochures and information.

LIMITED WARRANTY

All statements, technical information and recommendations contained herein are based on tests Cortec Corporation believes to be reliable, but the accuracy or completeness thereof is not guaranteed.

Cortec Corporation warrants Cortec® products will be free from defects when shipped to customer. Cortec Corporation's obligation under this warranty shall be limited to replacement of product that proves to be defective. To obtain replacement product under this warranty, the customer must notify Cortec Corporation of the claimed defect within six months after shipment of product to customer. All freight charges for replacement product shall be paid by customer.

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