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**VpCI® Technology for
Chemical Processing Industry**



The Chemical Processing Industry

The Chemical Processing Industry encompasses a broad range of products, including petrochemical and inorganic chemicals, plastics, detergents, paints and pigments, and more. Process systems have presented one of the greatest challenges to researchers in fighting the effects of corrosion — in economic loss and environmental safety. Many corrosion protection methods have been developed and introduced for processing equipment. The aggressive corrosive attacks on processing systems present engineers with great difficulties to maintain efficiency while protecting the safety of workers and the environment.



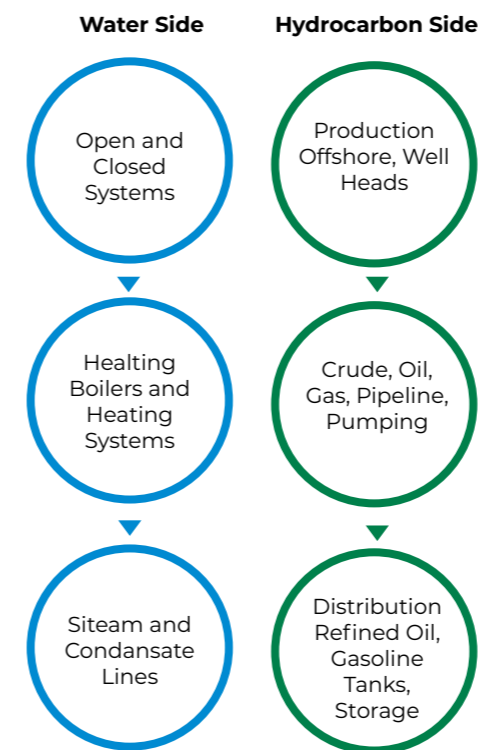
Major segments of our Chemical Processing Industry include:

- Petrochemicals, Industrial Organic Chemical Producers
- Industrial Inorganic Chemicals (Specialty Chemicals)
- Industrial Gases
- Agricultural Chemical Industry
- Plastics, Rubbers, and Resins Manufacture
- Pigments
- Fibers
- Producers of Other Chemicals
- Chlor-Alkali
- Surfactants

New Technologies from Cortec®

Thanks to the development of new technologies and the committed work of scientists and engineers from Cortec® Corporation, we are able to use the most advanced corrosion protection method available today - application of VpCI® inhibitors. This is a safe, cost-effective method for preventing and diminishing the severe damage caused by corrosive process streams. Cortec® products have been developed using our patented VpCI® Technology. Cortec® produces technology that offers highly efficient and economical protection for process industries, enabling our customers to protect their process and piping systems with technology that effectively fights corrosion while decreasing their costs.

Process Systems



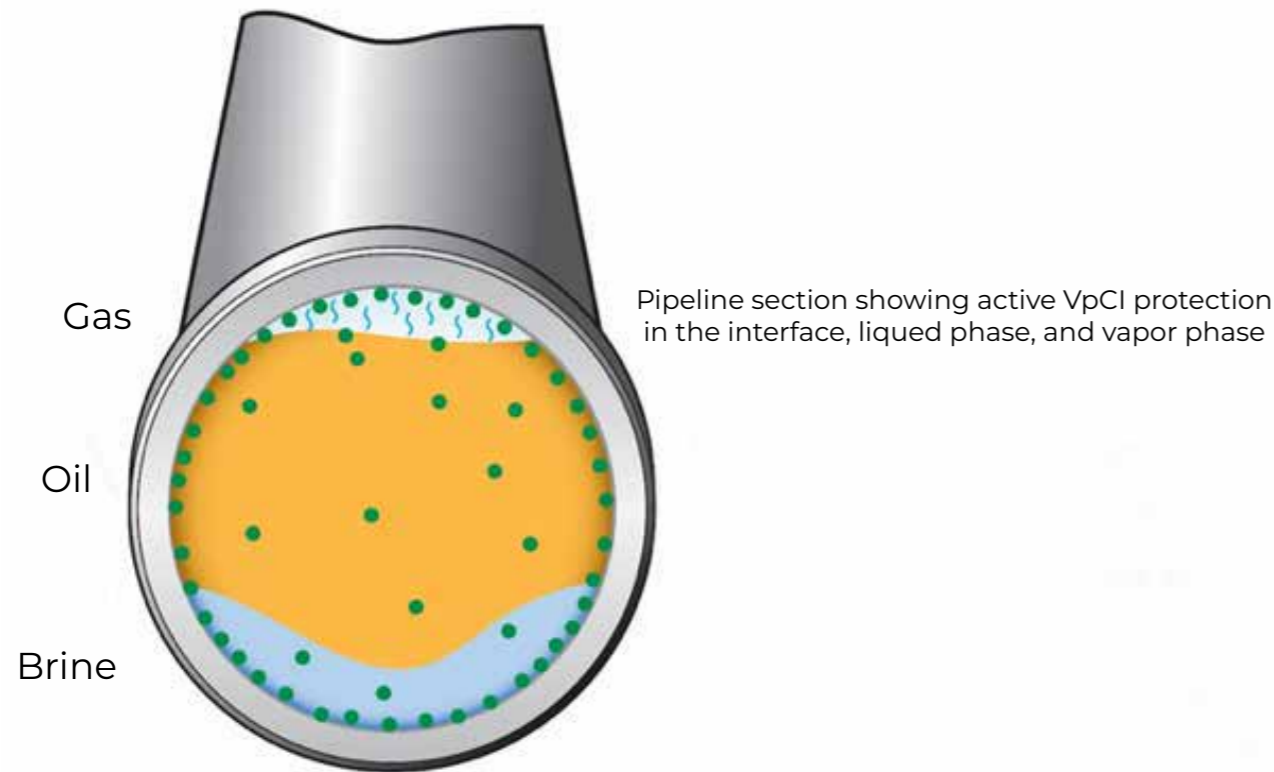
How Cortec® VpCIs can cut costs?

- Water-based VpCIs are more economical than conventional oil-based rust preventives.
- Efficient application results in labor savings.
- Improved health, safety, and pollution control.
- No need to remove VpCI® protection, eliminating extra processing steps.
- VpCI® treatments virtually eliminate economic loss due to rust, speckling, staining, and other forms of corrosion. You can eliminate claims and returns while improving the quality of your product. As a result, your processing will become more streamlined, allowing for more efficient operation.

Vapor phase Corrosion Inhibitors (VpCI®)

VpCI® technology is an innovative, environmentally safe, cost-effective option for corrosion protection. Cortec® products protect with a thin, mono-molecular protective barrier. The barrier re-heals and self-replenishes, and can be combined with other functional properties for added protective capabilities. VpCI® forms a physical bond on the metal surface creating a barrier layer against aggressive ions.

Cortec's VpCI® additives offer highly efficient, pro-environmental, and economical corrosion protection for process industries. While conventional corrosion inhibiting treatments provide protection at the liquid phase only, Cortec® VpCI® technology provides corrosion protection in interface, liquid phase, and vapor phase. Unlike conventional corrosion inhibition methods, Cortec® VpCIs are self-replenishing.



Add Cortec® VpCIs into any part of your system at single or multiple points. For example, inject VpCIs automatically into a system — without any operator attendance — and immediately start protecting hundreds of feet of piping in steam lines and liquid distribution systems. As the pro-environmental corrosion treatment of the 21st century, Cortec® VpCI® products are free of chromates, heavy metals, phosphates, or chlorinated hydrocarbons. Our organic formulations give an environmentally acceptable way to protect equipment. From aggressive brine solutions in deep and hot wells, to protecting miles of remote pipeline, Cortec's VpCI® products extend the life of your systems.



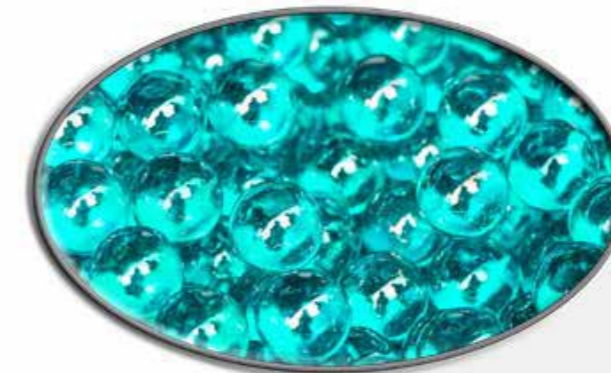
Environmental Safety

Cortec's VpCI® technology provides a new, pro-environmental set of answers. It offers environmentally friendly treatments with low toxicity and low polluting effects. As a chemical company, we believe in intelligent design and commitment to pro-environmental manufacturing and practices. Our commitment is reflected with Cortec's certification under the ISO 14001: 2008 Environmental Standard.

VpCIs offer the most environmentally safe method of corrosion prevention available today, with low toxicity and low polluting effects. Unlike corrosion inhibiting systems of the past, most of Cortec® VpCI's do not contain chromates or other heavy metals, nitrites, or chlorinated hydrocarbons. With the support of our corrosion scientists, engineers, and testing facility, Cortec® provides simple, environmentally friendly, cost-effective solutions to corrosion problems.



- Vertical Integration and ISO Total Quality to Reduce Risk
- ISO Accredited Laboratories for Validation Testing
- Trusted Global Manufacturing and Technical Service in 90+ Countries



Continuous VpCI® Protection

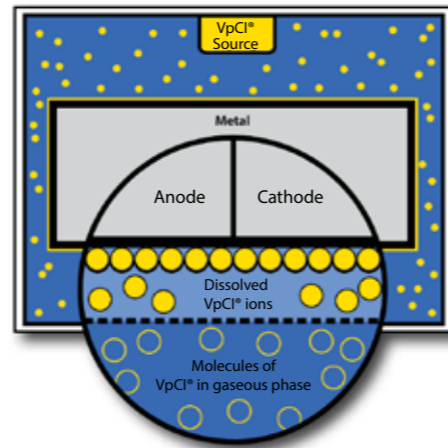
Unlike conventional methods, such as filming amine corrosion inhibitors, you can inject Cortec® VpCIs into any part of the system. Cortec® VpCIs go to work immediately and are self-replenishing. Continuous, uninterrupted protection in the liquid phase, interphase, and vapor phase can be added at multiple points. For example, the automatic injection of Cortec® VpCIs into a system — with no attendance operator — provides protection immediately, even on pre-rusted or scaled surfaces.



Cortec® Products Summary and Benefits

Cortec® provides unique patented Vapor phase Corrosion Inhibition that:

- Saves costly time and labor
- Protects the environment
- Offers complete package solutions
- Disperses in water, oils, solvents
- Formulates easily
- Protects multi-metals
- Remains compatible with biocides
- Can be used in all process industries
- Comes in multifunctional products
- Does not alter emulsion properties
- Protects against SCC (Stress Corrosion Cracking) and HE (Hydrogen Embrittlement)
- Requires little or no surface preparation
- Prevents further corrosion of ferrous surfaces
- VpCI® layer does not have to be removed prior to processing or use
- Does not interfere with operation of mechanical components



Total Corrosion Control Cortec® Corporation 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, water- and oil-based coatings and corrosion inhibitors, rust removers, paint strippers, powders, packaging foams, paper, films, and admixtures for concrete. Contact Cortec® for additional brochures and information.

Cortec® Products Safely Replace

- Nitrites
- Morpholine
- Molybdates
- Hydrazine
- Phosphonates
- Amines



Put Cortec® VpCIs to Work Anywhere Along the Line Process Systems – Water Side

Cortec® VpCI® Water Treatments provide continuous protection from corrosion. Boilers, heat exchangers, cooling towers, and steam condensate lines need Cortec® VpCI® Water Treatments to prevent the harmful effects caused by fresh and salt water, brine, and various dissolved halogens. Cortec® VpCI® Water Treatments keep your system free from pitting, aggressive scaling, and oxygen corrosion. They prevent costly damages and reduce maintenance time. With Cortec® VpCI's you'll be able to add extended life to your equipment.



CONDENSATE LINES- S-10



COOLING
VpCI®-646, VpCI®-649



HEATING
VpCI®-617, S-7

Process Systems – Hydrocarbon Side

Crude oil processing equipment, pipes and pipelines, refinery equipment and systems, tankers, and engines need protection against pitting, corrosive gases, and water intrusions. Cortec® VpCI® Treatments protect systems that have a high ratio of residual water, as well as systems exposed to halogens, sulfide, and hydrogen. These products are especially effective in low areas in the system where water can collect and cause extreme corrosive attack. Put Cortec® VpCIs to work and let the Cortec® VpCI® alternative solve your corrosion problems.

- PETROLEUM PROCESS – VpCI®-629, VpCI®-639
- HYDROTESTING- VpCI®-649
- OIL & GAS OPERATIONS- S-10, S-11
- GASOLINE, GASOHOL, DIESEL- VpCI®-705
- PIPELINES- VpCI®-637, VpCI®-629



Protective Storage of Processing Equipment – Applications

Cortec® formulations, using the newest chemical technology available, help alleviate your concerns in the areas of health, safety, flammability, and pollution control. There's a Cortec® solution whether you need temporary protection during in-plant processing, medium-term protection and, storage, or extended protection for lay-up, mothballing, and field service. With Cortec® products, you can effectively protect your metals and products against humidity and aggressive atmospheres as well as against corrosive industrial, marine, and tropical atmospheres.



Upstream

- Oil and gas drilling and completion fluids
- Sub-sea pipelines, risers, and separators
- Hydrate control
- Oxygen scavengers
- Crystalline modifiers
- Foam based underbalanced drilling



Downstream

- Refinery crude storage
- Overheads, condensers, accumulators, and morpholine replacement
- Organic sulfite replacement
- Lubes
- Amine systems



Petrochemicals

- Polymerization Processes
- Acid process control
- High alloy systems
- Quench water control



Fuels/Lubes

- Turbine transmission lubes
- Product storage
- Product transmission lines
- Fuel system lay up
- Storage tanks and process equipment

Case Histories

Hydrotesting and Mothballing Heat Exchange Tube Bundles

Ten heat recovery steam generation tube bundles were fabricated by STS in five different modular designs. During hydrotesting, VpCI®-649 was added at 0.25% by weight to provide corrosion protection of system internals.

VpCI®-649 combines contact and volatile corrosion inhibitors along with anti-scalants in a non-toxic formulation that does not contain nitrites, phosphates, chromates, or heavy metals. After draining the hydrotest water, VpCI®-309 SF was fogged into the coil bundles at a rate of 350gm/m³ compressed air. VpCI®-309 SF provides up to 24 months of continuous protection.

VpCI®-309 SF is a silica-free Vapor phase Corrosion Inhibitor powder for corrosion protection of ferrous metals in recessed areas, interior cavities, and voids. VpCI®-309 SF provides an extremely efficient dry method to protect metals within an enclosed space. The VpCI® vaporizes and adsorbs on all metal surfaces reaching all exposed areas including recessed sections and interior cavities.

The customer had procured and stored 19 spare subsea pipeline connectors for several years without protection. Upon inspecting the connectors, they were found to be rusted and required refurbishment. The customer required a long term preservation solution for the refurbished connectors that would withstand the harsh outdoor storage conditions and keep the spares ready for use at any time.

Loose rust and surface contaminants on the swivel flanges and bolts were removed using pressurized air. The parts were then put in a tank filled with VpCI®-422 Rust Remover, where they were left to soak until the rust completely disappeared. The rust removal process was followed by power washing with VpCI®-414 Cleaner/ Degreaser diluted 10% with water. The parts were allowed to completely air dry and then coated with VpCI®-369 Rust Preventive. The refurbished connectors were then protected with VpCI®-111 Emitters and shrink wrapped with VpCI®-126 HP UV Film. The customer was impressed by the efficiency of Cortec's rust removal and preservation technology and decided to implement Cortec's "Clean, Protect, & Preserve" concept and products to other equipment stored in the warehouse.



Case Histories

Preservation of Kårstø Gas Treatment Plant in Norway

Kårstø is a gas treatment plant operated by Statoil. It handles rich gas being sent through pipelines from offshore installations. After treatment, lean gas is piped into continental Europe while natural gas liquids (NGLs) are shipped out in carriers. Kårstø also receives condensate (light oil) for stabilization and storage before export by ship. The facility ranks as Europe's largest processor and exporter of NGLs and condensate.

Statoil was expanding the Kårstø plant. During the expansion, Cortec's distributor was given the total responsibility for preservation. This included engineering the preservation program, supplying the products, as well as applying and maintaining the program



SOLUTION AND APPLICATION

1. Cortec® Emitters VpCI®-101, VpCI®-110, and VpCI®-150 were installed in electrical enclosures located in corrosive environments.
2. Cortec® VpCI®-323 was used as an oil additive in gearboxes and in pump transmissions.
3. Cortec® VpCI®-368 and VpCI®-369 were sprayed on painted and machined surfaces as additional protection.
4. Cortec® VpCI®-423 was sprayed on corroded stainless steel surfaces and washed off by Cortec® VpCI®-416 and water.
5. Cortec® VpCI®-609 was fogged in vessels and pipe systems at a typical dosage of 0.5 kg per cubic meter. VpCI®-609 was also added at a dosage of 2-3% to water used for hydrotesting of carbon steel pipe systems.

The preservation contractor described preservation methods and which products to use on the project. Cortec® was the only company able to provide environmentally sound products with a broad spectrum of applications. The one stop 'Total Corrosion Protection' solution concept made it simple for the customer to deal with only one vendor. Cortec's past success with similar applications and projects was continued.

Case Histories

Tank Hydrostatic Testing and Metal Clamp Protection

The customer required corrosion protection of boat tanks, metal clamps, and nuts during hydrostatic testing using salt water from the sea.

After filling up 1/3 of the volume of the boat tanks, 100 ml/m³ of VpCI®-645 was added. The tanks were then filled to the top with sea water. After draining, the tanks were rinsed with fresh water. Metal clamps were protected with a layer of VpCI®-369, which provides excellent protection in an aggressive environment.



Cortec's VpCI®-645 is a concentrate that is biodegradable and environmentally acceptable. After hydrostatic testing, it was safe to discharge treated salt water back into the sea. VpCI®-645 does not contain any nitrates or amines, so it did not need government permits for usage. The combination of Cortec's VpCI®-369 and VpCI®-645 offered the most economical and environmentally friendly products for efficient corrosion protection.



BUYERS GUIDE

PROCESS VESSELS AND TANKS	Stainless Steel	VpCI®-416 or VpCI®-417, VpCI®-368 or VpCI®-391 and Non-Ferrous Materials
	Carbon Steel	VpCI®-416 or VpCI®-419, VpCI®-309, VpCI®-369, VpCI®-368, VpCI®-391
DRIVES	Gear cases	VpCI®-329 or VpCI®-326, VpCI®-369, VpCI® CorrLube™ Grease
	V-belt Drives	VpCI® Grease, VpCI®-369 or VpCI® CorrLube™ Grease
	Bearings and Bushings	VpCI®-369 EcoLine® Bearing Chain, VpCI®-326 or VpCI®-329
	Couplings	VpCI® Dry Coating, VpCI®-368 or VpCI®-391, VpCI®-326 or VpCI®-329, VpCI®-416 or VpCI®-419
AGITATORS, CENTRIFUGES, MIXERS	Stainless Steel and Non-Ferrous Metals	VpCI® -417 Powder or VpCI®-419, VpCI®-368 or VpCI®-391
	Carbon Steel	VpCI®-416, VpCI®-369 or VpCI® CorrLube™ Grease, VpCI®-368 or VpCI®-391
	Gear cases	VpCI®-326 or VpCI®-329, VpCI®-369 or VpCI® CorrLube™ Grease
	V-belt Drives	VpCI®-369 or VpCI® CorrLube™ Grease
	Bearings and Bushings	VpCI®-369 or VpCI®-389, VpCI®-326 or VpCI®-329
	Couplings	VpCI®-368 or VpCI®-391, VpCI®-326 or VpCI®-329, VpCI®-369 or VpCI® CorrLube™ Grease
	Shafting and Machined Surfaces	VpCI®-416 or VpCI®-419, VpCI®-368 or VpCI®-391
	Mechanical Seals and Packing	VpCI®-416 or VpCI®-419, VpCI®-126, VpCI®-308, VpCI®-337, VpCI®-369 or VpCI®-369 Aerosol, VpCI®-416, VpCI®-369 or VpCI® CorrLube™ Grease

PIPING	Stainless Steel and Non-Ferrous Metals	Clean and flush
	Carbon Steel	VpCI®-649, VpCI®-368 or VpCI®-391, VpCI®-309, VpCI®-369, VpCI®-416 or VpCI®-419, VpCI®-368 or VpCI®-391
	Tracing	VpCI®-649 or 1% of M-640 L, VpCI®-649 or 1% of M-640 L
ELECTRICAL EQUIPMENT	General	VpCI®-105, VpCI®-111
	Motors	VpCI®-369 or CorrShield®-369, M-529, M-236, VpCI®-368 or VpCI®-391, VpCI®-105, VpCI®-111, or VpCI®-388
	Batteries	VpCI®-105, VpCI®-111
COMPRESSORS	General	VpCI®-368 or VpCI®-388
	Reciprocating	VpCI®-326 or VpCI®-329, VpCI®-126, VpCI®-369, VpCI®-389, VpCI®-307, VpCI®-309, S-5
	Centrifugal and Rotary	VpCI®-326 or VpCI®-329, VpCI®-369 or VpCI®-389
	Spare Compressor Rotors	VpCI®-416 or VpCI®-419, VpCI®-369 or VpCI®-322, VpCI®-126, MilCorr® VpCI® Shrink Film
DIESEL ENGINES		VpCI®-329 or VpCI®-326, VpCI®-705, VpCI®-649, M-640 L, VpCI®-368 or VpCI®-391, VpCI®-126, MilCorr® VpCI® Shrink Film
GASOLINE ENGINES		VpCI®-326 or VpCI®-329, VpCI®-649 or M-640 L, VpCI®-368 or VpCI®-388, VpCI®-126, VpCI®-309
AUTOMOTIVE ASSEMBLIES AND COMPONENTS	Clutch and Brake Mechan	VpCI®-307, VpCI®-126, VpCI®-368 or VpCI®-388
	Gearboxes	VpCI®-368 or VpCI®-388, M-530
	Axles and Differential Gears	VpCI®-368 or VpCI®-391, M-530
REFRIGERATION SYSTEMS		VpCI®-326 or VpCI®-329
COOLING TOWERS		VpCI®-368 or VpCI®-391, VpCI®-369, VpCI®-322, VpCI®-326 or VpCI®-329
FUEL SYSTEMS		VpCI®-705 Fuel Additive



DENİZ YAPI

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DEYAP ABOUT US

Deniz Yapi Sanayi ve Tic. A.S. in 1992 to carry out corrosion prevention and surface cleaning works, DEYAP is the Turkish distributor and licensor of Cortec Corporation and Mykal, the leading companies in the world.

Our company, which realized the supply (1992), production and project design (1995) of VpCI for the first time in Türkiye, provides the production of VpCI film and paper products specific to the demands of its customers in its 2500 m² production area located in Kocaeli Dilovasi and the supply of anti-corrosion chemicals, dehumidifiers, surface cleaning chemicals and auxiliary packaging materials. All of its production is carried out under ISO - 9001:2015 quality system.

“YOUR CORROSION
INHIBITOR PARTNER”

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