

VpCl[®] for Process Industries

VpCl[®] Water Treatment and Petroleum Additive Technology



CORTEC
CORPORATION

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

Cortec® VpCI® Technology

Corrosion-inhibiting products that are environmentally friendly and efficient.

Protect process systems.

Process systems have presented the greatest challenge to researchers in fighting the effects of corrosion — in economic loss and environmental safety. Cortec® produces technology that offers highly efficient and economical protection for process industries. Now you can protect your process and piping systems with technology that fights corrosion. These products have been developed using Cortec's proprietary VpCI® Technology. Cortec® VpCIs are a safe, cost-effective method for preventing and diminishing the severe damage caused by corrosive process streams.

Protect the environment.

Unlike corrosion inhibiting systems of the past, many Cortec® VpCIs do not contain chromates or other heavy metals, nitrites or chlorinated hydrocarbons. Our VpCIs offer you an environmentally safe method of treatment with low toxicity and low polluting effects.

With Cortec® VpCIs you can turn the tables on corrosion. With the support of our corrosion scientists, engineers, and testing facility, Cortec® can provide simple, cost-effective solutions to corrosion problems.

Protect continuously.

Unlike conventional methods, such as filming amine corrosion inhibitors, you can inject Cortec® VpCIs into any part of your 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.

VAPOR PHASE CORROSION INHIBITORS (VpCI®)

VpCI® technology is a revolutionary, environmentally safe and 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. Vapor phase Corrosion Inhibitors form a physical bond on the metal surface and form a barrier layer to aggressive ions. For use in pipelines, oil and gas wells, refinery units and fuels.

The diagram illustrates a cross-section of a pipeline containing a mixture of Gas, Oil, and Brine. A thin, mono-molecular protective barrier (VpCI®) is shown forming on the metal surface. The barrier is composed of VpCI® molecules that are dissolved in water and form a physical bond on the metal surface. The diagram also shows the formation of an emulsion and a partition barrier. A detailed view of the metal surface shows an absorbed VpCI® layer with VpCI® molecules dissolved in water.

Pipeline section shows active VpCI® protection at the liquid phase, the vapor phase and the interface, partition and emulsion barriers.

Cortec® Products Summary

Cortec® provides unique Vapor phase Corrosion Inhibition that:

- Protects the environment
- Offers complete package solutions
- Disperses in water, oils, solvents
- Formulate easily
- Protects multi-metals
- Remain compatible with biocides
- Can be used in all process industries
- Do not alter emulsion properties
- Protects against SCC (Stress Corrosion Cracking) and HE (Hydrogen Embrittlement)

Cortec® products can replace

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

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.

Put Cortec VpCIs to work anywhere along the line.



CONDENSATE LINES—
S-10

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® VpCIs you'll be able to extend life to your equipment.

HEATING—
VpCI®-617, S-7

COOLING—
VpCI®-646,
VpCI®-649

Brine

Salt Water

Steam

Condensation

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 with a high ratio of residual water, and systems exposed to halogens, sulfide and hydrogen. These products are especially effective in low areas in the system where water collects, causing 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®-641

OIL & GAS OPERATIONS—
S-10, S-11

**GASOLINE,
GASOHOL,
DIESEL—**
VpCI®-705

PIPELINES—
VpCI®-637
VpCI®-629



Applications

Upstream

- Oil and gas drilling and completion fluids
- Sub-sea pipelines, risers and separators
- Hydrate control
- Oxygen scavenger
- Crystalline modifiers
- Production chemicals
- Foam based under balanced drilling

Downstream

- Refinery crude storage
- Overheads, condensers, accumulators, 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
- Protect storage tanks and process equipment

Product	Description	Applications	Dosage
VpCI®-329	Oil-based liquid concentrates that boost corrosion protection of oils.	Lubricating and hydraulic systems, tanks, gear boxes, differentials and surface treatment. Meets MIL-PRF-46002	10% to 20% by v/v depending on length of protection
VpCI®-609®	Powder to protect ferrous metals. Readably soluble in water. Nitrite and chromate free, non-polluting.	Very economical for protecting large enclosures, piping, and hydrotesting. It can be applied dry, by fogging, or added to water.	For dry, fogging, applications apply 0.4 oz. per cubic foot (11grams per 28 liters). For wet applications add 0.25% by weight to the water.
VpCI®-611	Water-based rust preventative concentrate. Leaves a very thin, transparent, tack-free film on the metal surface. Film is weldable and paintable. Non-toxic, and contains no nitrate or phosphate inhibitors.	For water-blasting or wet abrasive blasting. Also for wet lay-up and hydro-testing.	Diluted with water at a 1:10 to 1:20 ratio.
VpCI®-617	Water-based boiler water treatment prevents corrosive attack and harmful insulating deposits.	Boiler systems.	500 ppm.
VpCI®-619	A high temperature protective coating for metal surfaces for use under thermal installation. Product may be applied directly over a tight oxide film or scale.	VpCI®-619 is sprayed or brushed directly to the steel surface. Allow the material to dry up to 60 minutes.	The recommended film thickness is 2-3 mils (50-75 microns) dry with a corresponding coverage of 130-200 sq. ft. (12 - 18.6 m ² /l) per gallon.
VpCI®-629	Concentrated additive which forms a persistent barrier for continuous protection in crude oil and other liquid hydrocarbons.	Petroleum process streams (crude oil, products, fuel oils).	5-100 ppm.
VpCI®-637	Formulated for internal corrosion control in gas flow and gas transmission lines.	Gas transmission and gathering lines, pipes, pipelines, sub-sea pipelines, hydrate control additive.	300ml/1,000,000 ft ³ . 17 liters/million cubic meters.
VpCI®-639	High temperature version of VpCI®-629. Rated at 200°C and used up to 600 bar.	Protection for refinery overheads, high temperature oil and gas wells and other environments requiring long term water displacing film formation.	300ml/1,000,000 ft ³ . 17 liters/million cubic meters.
VpCI®-641	The key hydrotesting and water treatment product for industrial uses.	Protection of partially filled spaces in both vapor and contact inhibitors.	
VpCI®-645	Non-toxic, biodegradable corrosion inhibitor concentrate. Suitable for wet lay-up of boilers as a replacement for hydrazine.	Fresh water, salt water, brine and other highly corrosive solutions containing dissolved sulfides and halogens.	Cooling: 0.25% - 0.75%. Hydrotesting: 50 - 1000 ppm.
VpCI®-646	Ambiodic water treatment system effective against corrosion and scale.	Large industrial cooling systems (open and closed), power plants, refineries, process plants.	Less than 250 ppm.
VpCI®-649/649P	Concentrated additive protects multimetals from corrosive cooling systems.	Deep and hot wells, closed-loop cooling systems and casings.	.05% to 0.1% by v/v
VpCI®-658	Additive for injection into thermal insulation. Formulated for rapid transport of VpCI® throughout the insulating jacket to provide metal pipe protection.	VpCI®-658 is applied by injection into the insulating jacket through either a gravity fed system or a portable injection pump.	Injected at 3-6 month intervals at distances between injection points of 2-20 feet (.6 to 6m).
VpCI®-705	Fuel additive to provide corrosion protection for all common engineering metals used in automotive and industrial fuel systems. Approved by General Motors Corporation. #1065180 GMEMD Division.	Recommended for use in gasoline, diesel, gasohol mixtures and alcohol fuels as a corrosion inhibitor, fuel stabilizer and water emulsifier.	0.59 - 1.5% by v/v.
S-5	Wetting agent for aqueous and non-aqueous systems.	Easily added into aqueous and non-aqueous systems in conjunction with Cortec water-soluble and oil-soluble inhibitors.	Between 10 to 5000 ppm.
S-7	Oxygen scavenger designed to protect boiler systems against oxygen corrosion (hydrazine-free).	Applied into boiler systems to stop the corrosive effects of oxygen present in feedwaters.	10 ppm for every 1ppm O ₂ .
S-10/S-10F	Corrosion inhibitor for steam condensate lines in boiler systems.	Injection into steam condensate lines where dissolved carbon dioxide in water forms corrosive carbonic acid.	Less than 100 ppm.
S-11/S110rg/S-11p	Additive for acid systems such as industrial oil field acid cleaning solutions and hot pickling baths.	Added to low pH systems to prevent localized corrosion, especially pitting and hydrogen embrittlement.	0.5% to 1% by v/v.
S-14/S-14bio	General purpose water treatment antiscalant. Non-flammable and non-toxic.	Very effective against scale formation on surfaces in contact with water. S-14Bio is biodegradable version.	Less than 10 ppm.
S-16	Defoamer. Specially selected for use in combination with Cortec water-based and oil-based inhibiting systems. Stable under both acidic and basic conditions. Silicone free.	Defoamer for aqueous and non-aqueous systems.	A starting concentration of 0.3%-0.5% by v/v based on weight.
S-20	Thinner made of water/solvent blend. Used to quickly reduce viscosity of water-based coatings.	Recommend for adjusting the viscosity of VpCI®-374 and VpCI®-386 for spray and dip applications. It can be used for other water-based coatings.	For normal application 5-10% is recommended. Do not exceed 20%.
S-25	Thinner made of a solvent blend. Used to thin solvent-based coating systems.	It is recommended for VpCI®-368 and VpCI®-365 to reduce viscosity for spray and dip applications.	The recommended dosage is 5-10% by v/v.
S-39	Pour point depressant and flow improver.	Fuel additive is intended for use in distillate fuels.	.01% to .05% by v/v.
S-42	Additive to activate or accelerate a rust removing solution. Formulated to extend the life of a VpCI®-422 solution.	Designed for used or new solutions of VpCI®-422 to reactivate and accelerate their performance. For used solutions of VpCI®-422, S-42 is added when the pH of the VpCI®-422 solution has reached 5.0. It will bring the pH down to reactivate the rust remover.	2% for new solutions and 10% by v/v for used solutions.
S-49	Blend of solvents, dispersants, surfactants and emulsifiers for treatment of fuel oil grades #2, #4, #5 and #6.	Fuel oil dispersant/emulsifier that keeps insoluble particles dispersed thus reducing: carbon deposits, soot formations, smoke and particle emission.	1 qt. - 1 gal./1000 gal. 0.95 - 3,785 liters/3785 liters 1% to 10% by v/v.
S-69	All organic water treatment building block (liquid or powder form available).	Designed for low level concentrations which contain a unique combination of contact and vapor phase inhibitors.	1000 - 2000 ppm. for closed loop systems.

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