

## LOW TEMPERATURE / PHOSPHATE-FREE CONVERSION COATINGS

*A cost effective alternative to iron phosphate*

Energy costs are a major concern for metal finishing operations as well as issues of environmental compliance. Waste water treatment facilities in certain areas of the country are tightening phosphate and heavy metal discharge limits on metal finishers. To address these concerns, a line of inorganic conver-

sion coating products has been developed. They focus on temperature reduction and phosphate discharge elimination while improving corrosion resistance.

Formulated to replace traditional iron phosphate, these products require no or very little heat to deposit an inorganic conversion coating. Conventional iron

phosphate products, on the other hand, can require temperatures of 130-160F. Another benefit of this new technology is usage; a maximum of about 2% by volume is needed in the bath compared to approximately 2-4% by volume with conventional iron phosphates.

*Continued on page 4*

Paint system	Substrate	Inorganic conversion coating 2% conc., 80 °F bath, 30 seconds contact time	Conventional iron phosphate conversion coating 4% conc., 140 °F bath, 60 seconds contact time	Hours of neutral salt-spray exposure (ASTM B-117)
TGIC Polyester	Cold Rolled Steel	0.5 mm creepage from scribe	1.8 mm creepage from scribe	504
TGIC Polyester	Aluminum	0.2 mm creepage from scribe	1.0 mm creepage from scribe	1008
Hybrid	Cold Rolled Steel	2.0 mm creepage from scribe	4.3 mm creepage from scribe	504
Hybrid	Aluminum	0.4 mm creepage from scribe	2.2 mm creepage from scribe	1008

*Test panels were prepared and tested according to ASTM B-117 and evaluated according to ASTM D-1654 Method 2. Ratings were taken of the average creepage failure from the scribe mark after a predetermined number of hours of exposure.*

*As the table indicates, the inorganic conversion coatings outperformed conventional iron phosphate coatings in under film corrosion resistance.*

### INSIDE THIS ISSUE:

VOLUME 4, ISSUE 10

LOW TEMP PHOSPHATE FREE CONVERSION COATINGS	1
CALENDAR OF EVENTS	2
NEWS & NOTES	3
RACKING IT UP FOR POWDER	5
HULL CELL TEST METHODS	6
MAKE GOOGLE WORK FOR YOU	10
NASF BOARD ELECTIONS	11

**TECHNICAL &  
EDUCATIONAL  
INFORMATION FOR  
SURFACE FINISHING  
SHOPS IN AND  
AROUND  
THE SOUTH.**

## LOW TEMPERATURE / PHOSPHATE-FREE CONVERSION COATINGS

*A cost effective alternative to iron phosphate*

..... Continued from page 1

*In actual production on cold rolled steel panels, this new type of inorganic conversion coating with a DI water rinse has been proven to outperform Bonderite 1000 / P60 Chrome / DI rinse in corrosion resistance after 504 and 1008 hours of neutral salt-spray exposure (ASTM B-117) as the table below indicates:*

Substrate	Creepage from Scribe After 504 Hours of Neutral Salt-Spray Exposure (ASTM B-117)	Creepage from Scribe After 1008 Hours of Neutral Salt-Spray Exposure (ASTM B-117)
CRS treated with Inorganic Conversion Coating and DI Water Rinse	0.5 mm	1.8 mm
Pre-Treated Bonderite 1000 / P60 Chrome / DI rinse	1.5 mm	2.8 mm

*A TGIC Polyester paint, with an average thickness of 2.6 mils was used on all panels*

### PERFORMANCE

These conversion coatings provide a microcrystalline surface in the nanometer (10-9m) range and require a short contact time of 15 to 30 seconds. Conventional iron phosphate coatings are usually in the micrometer (10-6m) range and require at least 45 to 60 seconds contact time. The "nanocrystals" formed increase the surface area of the substrate thus enhancing paint adhesion, corrosion protection and consequently salt-spray results. These inorganic conversion coatings do not require a post treatment seal to achieve high performance adhesion, under film corrosion and salt-spray resistance.

The corrosion resistance

performance of these inorganic conversion coatings is compared below to conventional iron phosphate coatings (organic accelerator) with TGIC polyester and hybrid powder paint systems on cold-rolled steel and aluminum substrates.

### WASTE TREATMENT

These new technology coatings contain no regulated heavy metals and eliminate phosphate from the process bath. Sludge is also reduced to a minimum while waste treatment costs and other effluent issues are greatly diminished. Reduced sludge formation results in considerably lower maintenance costs since fewer bath dumps are needed and the incidence of plugged nozzles and other problems are reduced.

Rinse water consumption is also reduced because of the lower amount of total dissolved solids present in these new coating baths. Lower total dissolved solids means less rinse water overflow is needed to maintain proper rinse integrity.

### BENEFITS

The benefits of these new types of conversion coatings are real and tangible. Energy consumption is reduced, the process is consistent and easy to control while parts quality and performance are improved. The process produces much less sludge than conventional iron phosphates and when the tanks need to be pumped out, about once a year, there is no need for a tanker truck to haul away

the sludge as hazardous waste, all that is required is to neutralize the pH.

In summary, these new products offer a cost effective high performance and environmentally friendly alternative to traditional iron phosphates.

This article was provided by Chris Klingenberg and David Jones of EnviroServe Chemicals Inc. For more information on these new technology inorganic conversion coatings, please contact EnviroServe Chemicals Inc. by phone at 910-892-1791 or by e-mail [sales@enviroserveinc.com](mailto:sales@enviroserveinc.com)

