Kalgard® 094-Line Corrosion Resistant Coating with Zinc Nickel Electroplated Substrate Neutral Salt Spray Test Results
Objective & Test Protocol

- **Purpose:** To test Kalcor corrosion resistant coatings over Zinc Nickel electroplated supplied sample steel panels to NSS (Neutral Salt Spray) per ASTM B-117.

- Zinc Nickel electroplated panels were prepared at the Dekalb Metal Finishing facility and provided to Kalcor.

- Two Zinc Nickel electroplated panels, (scribed and unscribed), were used as experimental controls.

- Each coating was applied at a target low and high mil thickness (0.8-1.0 mil, 1.2-1.7 mil respectively) and cured fully for 18 days at ambient temperature before being subjected to testing.

- Panels were evaluated weekly after initial salt spray exposure and incrementally thereafter until failure.
Test Variables

Panels were prepared in duplicate with the following Kalgard® 094-line corrosion resistant coating systems:

- 094-9218PF
- 094-9709
- 088-94091
- 821-98654/822-08765 2K Epoxy (mixed 4:1 by volume)
# Adhesion

<table>
<thead>
<tr>
<th>Coating System</th>
<th>ASTM Adhesion</th>
</tr>
</thead>
<tbody>
<tr>
<td>094-9218PF</td>
<td>0/100</td>
</tr>
<tr>
<td>094-97-09</td>
<td>0/100</td>
</tr>
<tr>
<td>088-94091</td>
<td>0/100</td>
</tr>
<tr>
<td>821-98654/822-08765 2K</td>
<td>0/100</td>
</tr>
</tbody>
</table>

Note: 0/100 is no removal with Permacel Tape.
Zinc Nickel Controls

Zinc Nickel Control A (Scribed)

Zinc Nickel Control B (Unscribed)
<table>
<thead>
<tr>
<th>Zinc Nickel Control A (Scribed)</th>
<th>Zinc Nickel Control B (Unscribed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,424 hours</td>
<td>1.1 mil</td>
</tr>
<tr>
<td>2,424 hours</td>
<td>1.6 mil</td>
</tr>
</tbody>
</table>
Kalgard 094-9218 PF + ZiNi
(after 2,424 hours Salt Spray)
# Kalgard 094-9709 + ZiNi

<table>
<thead>
<tr>
<th>Sample</th>
<th>Control A (Scribed)</th>
<th>Control B (Unscribed)</th>
<th>Duration 1</th>
<th>Duration 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc Nickel</td>
<td>0.9 mil</td>
<td>1.7 mil</td>
<td>2,424 hrs</td>
<td>4,992 hrs</td>
</tr>
</tbody>
</table>
Kalgard094-9709 + ZiNi
(after 4,992 hours Salt Spray)

0.8 mil 0.9 mil 1.2 mil 1.7 mil
Kalgard 088-94091 + ZiNi

Zinc Nickel Control A (Scribed)  Zinc Nickel Control B (Unscribed)  1.0 mil  1.7 mil

2,016 hours  2,016 hours
Kalgard 088-94091 + ZiNi (after 2,016 hours Salt Spray)
Kalgard 821/822 2K Epoxy + ZiNi

Zinc Nickel Control A (Scribed)  Zinc Nickel Control B (Unscribed)  1.2 mil  2.1 mil

1,348 hours  2,668 hours
Kalgard 821/822 2K Epoxy + ZiNi (after 2,668 hours Salt Spray)
## Summary Data

<table>
<thead>
<tr>
<th>Kalgard Coating</th>
<th>Salt Spray Hours</th>
<th>Visible Rust</th>
<th>Blistering</th>
<th>Creep</th>
</tr>
</thead>
<tbody>
<tr>
<td>094-9218PF</td>
<td>2,424</td>
<td>None</td>
<td>1mm, few</td>
<td>0 mm</td>
</tr>
<tr>
<td>094-9709</td>
<td>4992+</td>
<td>None</td>
<td>None</td>
<td>0 mm</td>
</tr>
<tr>
<td>088-94091</td>
<td>2,016</td>
<td>None</td>
<td>1mm, Medium density @2,016 hours</td>
<td>0 mm</td>
</tr>
<tr>
<td>821/822 2K</td>
<td>2,668</td>
<td>None</td>
<td>None</td>
<td>7 mm</td>
</tr>
<tr>
<td>Control A (Scribed)</td>
<td>4,992</td>
<td>None</td>
<td>N/A</td>
<td>0 mm</td>
</tr>
<tr>
<td>Control B (unscribed)</td>
<td>4,992</td>
<td>None</td>
<td>N/A</td>
<td>0 mm</td>
</tr>
</tbody>
</table>

**Note:** Control A and Control B both showed no red rust but exhibited heavy white visible corrosion.
Conclusions

- Zinc Nickel electroplated panels typically achieve 720 - 1,200 hours NSS having NO red rust, but do exhibit objectionable heavy white corrosion.

- All Kalgard coatings exceeded 2,000 hours Salt Spray resistance, with the following exceeding 2,400 hours:
  
  - 094-9709 (best performance at 4,992+ hours)
  - 094-9218PF
  - 821-98654/822-08765 2K Epoxy (mixed 4:1 by volume)

- At 2.1 mil DFT and at 2,668 hours salt spray, the Kalgard 2K Black Epoxy 4:1 mix had no evidence of degradation.

- Kalgard 094-9709 had no evidence of degradation at 4,992 hours salt spray and is the best option over zinc nickel plating for exceptional corrosion resistance.
For more information about Kalcor’s line of Kalgard® Corrosion resistant coatings:

Contact:
Tiffany Betzhold
Kalcor Coatings
(440) 478-3571
tbetzhold@kalcor.com
Or visit www.kalcor.com

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