Nano-Clear® NCI for Marine Applications

Extend Newly Painted or Existing Paint by 10+ Years

Achieve Unmatched Topcoat Durability

http://www.nanocoatings.com
Industrial Marine

Marine asset owners commonly apply protective topcoatings over steel surfaces to mitigate the effects of environmental exposure to the sun including oxidation, chemical attack damage, corrosion and desire for better appearance. Conventional industrial coatings “alone” are currently very susceptible to;

- UV degradation
- weathering
- acid rain
- water damage
- corrosion
- normal use

What is needed?

An improved surface coating that protects industrial assets more thoroughly than any existing technology. A permanent surface coating that will extend the surface life of newly painted or in-service painted assets by 10+ years.

Nano-Clear NCI Coating

Nano-Clear NCI Industrial Coating is designed to dramatically improve the surface life of painted assets by significantly improving corrosion resistance, chemical attack, abrasion, UV damage and weathering. Nano-Clear NCI improves the surface protection of paint and improves brand image while significantly reducing surface maintenance costs.

- Extreme Corrosion Resistance
  No Rust After 5000 Hour Salt Spray Testing

- Extreme Abrasion Resistance
  Only 8.4mg loss after 1000 cycles, 1kg

- Weatherproof Gloss
  99% Gloss Retention after 4000 Hours. Xenon WOM

- 1K Coating, Ambient Cure
  Dry-To-Handle in 4 hours; Return to Service in 24 hours

- Reduce Re-Paint Cycle by 2X - 3X
  As Documented in Production Case Studies

- Improve Brand Appearance
  Achieve Deeper Colors & Dramatically Higher Gloss

- Achieve Lower Operating Costs
  By Extending Your Recoat Cycle By 10 Years... Guaranteed!
Nano-Clear® NCI is manufactured using proprietary 3D nanostructured polymers - producing extreme crosslink density.

NCI provides extreme corrosion resistance, abrasion, chemical & UV resistance and reduced surface maintenance. NCI penetrates deep into the pores of freshly painted or in-service paint to enhance color, improve gloss, dramatically increase surface hardness, improve chemical and long-term UV resistance.

Nano-Clear is a one-component humidity cured / highly cross-linked polyurethane/polyurea hybrid nanocoating.

With this exceptionally high crosslink density, we have the test data to prove that NCI is the world’s best all-around clearcoat for resistance to scratches, chips, abrasion, chemicals, weathering, and more. Please see the back cover for test results or http://www.nanocoatings.com.

BMW validated Nano-Clear coating to have the highest gloss levels and DOI of any clear coating system they had ever tested.

BMW

Before

Even with its remarkably high surface hardness (4H), NCI stays flexible. This iron-phosphated steel panel, painted with Macropoxy® 646 Epoxy and then coated with NCI, bends in-half without cracking or any other failure to the coat. Call 810-227-0077 for technical questions.
Coatings contain “building blocks” with functional groups. The chemical reaction of these groups during curing forms a network. In most traditional polymers, the network is a linear chain of molecules with low crosslink density.

Conversely, we “nano-structured” our clearcoat to have a 3D molecular architecture. The 3D polymer network has an exponentially higher number of crosslinked sites. The result is a tightly knit mesh with unprecedented DMA density.

High crosslink density provides highly functional surface properties, including unmatched corrosion resistance, scratch resistance, chemical resistance and UV durability. It also means low surface energy, repelling water (hydrophobic) and aiding in the release of ice, dirt, brake dust, and even concrete dust.

Why is Crosslink Density So Important?

Even sticky concrete dust releases easily from Nano-Clear NCI
Unrivaled Performance Enhancement for Newly Painted or In-Service Coatings

For the last 30+ years, coating chemistries have been variations on the same (linear chain) polymer themes. As a result, industrial customers are on an endless treadmill: Painting, then watching the subsequent oxidization, loss of gloss, corrosion, and paint failure… requiring, in turn, labor-intensive surface prep and repainting with the same conventional coating technology.

Put simply: NCI enhances the color, gloss, surface hardness and extends the surface life of conventional coatings by 10+ years.

Nano-Clear NCI is designed to be applied directly directly over freshly coated or in-service painted assets including 2K epoxies, gelcoatings, 2K polyurethanes and powder coating.
How Does NCI Enhance Color & Physical Properties?

NCI has a low (200 cps) viscosity, so it penetrates deeply into the smallest pores of freshly painted or in-service painted assets, allowing the original underlying color to show through while fortifying/hardening the surface.

Humidity-cured at ambient temperatures, NCI quickly hardens and fortifies the painted surface, “locking-in” color and preventing future chalking with its long-term UV absorbers.

Please note: NCI must be applied over the existing coating system before the coating has deteriorated into a powdered, granular and/or eroding state. NCI is not a rust converter. Rust or peeling paints must be removed and repainted first with a coating such as a high solids, two-component epoxy, like Macropoxy® 646, prior to applying NCI.

Where Could You Use NCI?

On New or Highly Oxidized Coatings: e.g., 2K epoxies, 2K polyurethanes, powder coatings, polyesters, gel coats, e-coats, latexes, fiberglass, and anodized aluminum (to prevent filiform corrosion, etc.).

For Marine Equipment: e.g., ship hulls (above and below waterline), decks subject to abrasive traffic, cargo holds, pumps, valves, ballast tanks, tankers, lifeboats, oil platforms, pipelines, shipping containers, etc.

Problem: U.S. Army Landing Craft with conventional epoxy topcoats suffer deck surface corrosion after abrasive vehicle traffic (e.g., tracked vehicles) and UV degradation.

Solution: NCI provides superior abrasion and chip resistance, as well as 10+ years of UV protection.

Call Nanovere at 810-227-0077 to arrange a Nano-Clear NCI application demonstration

info@nanocoatings.com
# Nano-Clear® NCI Coating Specifications

**Recommended Uses:** On Highly Oxidized Paints or Freshly Painted Surfaces  
**Chemistry:** Nano-Structured Polyurethane / Polyurea Hybrid

## PROPERTY/TEST

<table>
<thead>
<tr>
<th>PROPERTY/TEST</th>
<th>TEST METHOD</th>
<th>RESULTS</th>
<th>TESTING SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crosslink Density</td>
<td>DMA (Dynamic Mechanical Analysis)</td>
<td>2.17 x 10^-3 mol/m³</td>
<td>Nanovere</td>
</tr>
<tr>
<td>VOC</td>
<td>ASTM D3360</td>
<td>1.25 lb/gal (150 g/l)</td>
<td>Nanovere</td>
</tr>
<tr>
<td>Recommended Dry Film Thickness</td>
<td>ASTM D5796</td>
<td>1 mil to 2 mils</td>
<td>Nanovere</td>
</tr>
<tr>
<td>Coverage</td>
<td>Nanovere</td>
<td>1122 sq ft/gal (at 1 mil)</td>
<td>Nanovere</td>
</tr>
<tr>
<td>Gloss 20° / 60°</td>
<td>ASTM D523</td>
<td>86.0 / 92.2</td>
<td>Stonebridge Technical Services</td>
</tr>
</tbody>
</table>

**ABUSE RESISTANCE**

- **Abrasion Resistance (CS-17, 1 kg, 1000 cycles):**  
  - ASTM D4060: 8.4 mg loss  
  - Testing Source: Nippon Paint

- **Scratch Hardness:**  
  - ASTM D3363: 9H  
  - Testing Source: Stonebridge

- **Pencil Hardness, Scratch:**  
  - ASTM D3363: 5H  
  - Testing Source: Stonebridge

- **Impact Resistance 18°C Direct in/lbs:**  
  - ASTM D2794: 50 Pass / 60 Fail  
  - Testing Source: Stonebridge

- **Scratch Hardness:**  
  - ASTM D2794: 10 Pass / 20 Fail  
  - Testing Source: Stonebridge

- **Pendulum Hardness (Persoz):**  
  - ASTM D2794: > 250 oscillations  
  - Testing Source: Nippon Paint

- **Chip Resistance: 25°C (2 mils):**  
  - ASTM D3170: 7A  
  - Testing Source: Stonebridge

- **Chip Resistance -29°C (2 mils):**  
  - ASTM D3170: 7B  
  - Testing Source: Stonebridge

- **Falling Sand Abrasion 100 liters:**  
  - ASTM D968: Pass  
  - Testing Source: Stonebridge

- **Mar Resistance:**  
  - ASTM D5178: 5.0 kg  
  - Testing Source: SASO

**ENVIRONMENTAL RESISTANCE**

- **Xenon WOM Resistance 4000 hrs:**  
  - SAE J1960: 100% Gloss Retention  
  - ASTM G155: 99% Gloss Retention  
  - Testing Source: Stonebridge

- **QUV 313, >1500 hrs:**  
  - ASTM D4587: 100% Gloss Retention  
  - Testing Source: Nippon Paint

- **Water Immersion Test 240 hrs @ 50°C:**  
  - ISO 2812-2: Pass  
  - Testing Source: Nippon Paint

- **Salt Spray, 4000 hrs:**  
  - SASO ISO 11997: Excellent  
  - Testing Source: SASO

- **Humidity, 100% RH, 100°F, 240 hrs:**  
  - ASTM D 1735-02: No loss of adhesion. No change.  
  - Testing Source: American Racing Custom Wheels

- **CASS 240 hrs @ 50°C:**  
  - JIS H8502-7: Pass  
  - Testing Source: Nippon Paint

- **Thermal Shock (100°F 3 hrs, Freeze 3 hrs, Steam Blast 30 sec):**  
  - ASTM E84 / BS476: No loss of adhesion. No Change.  
  - Testing Source: American Racing Custom Wheels

- **Impact Resistance:**  
  - 1 kg - 160 cm  
  - 145 kg-cm  
  - Testing Source: Stonebridge

- **Impact Strength:**  
  - 7A  
  - 7B  
  - Testing Source: Stonebridge

- **Chip Resistance 23°C (2 mils):**  
  - ASTM D3170: Pass  
  - Testing Source: Stonebridge

- **Falling Sand Abrasion 100 liters:**  
  - ASTM D968: Pass  
  - Testing Source: Stonebridge

- **Mar Resistance:**  
  - ASTM D5178: 5.0 kg  
  - Testing Source: SASO

**CHEMICAL RESISTANCE**

- **10% Sulfuric Acid:**  
  - ASTM D 1308: No effect  
  - Testing Source: Stonebridge

- **10% Hydrochloric Acid:**  
  - ASTM D 1308: No effect  
  - Testing Source: Stonebridge

- **10% Sodium Hydroxide:**  
  - ASTM D 1308: No effect  
  - Testing Source: Stonebridge

- **10% Ammonium Hydroxide:**  
  - ASTM D 1308: No effect  
  - Testing Source: Stonebridge

- **Isopropyl Alcohol:**  
  - ASTM D 1308: No effect  
  - Testing Source: Stonebridge

- **Xylene:**  
  - ASTM D 1308: No effect  
  - Testing Source: Stonebridge

- **Skydrol® 500 Fluid:**  
  - ASTM D6943-A: No effect  
  - Testing Source: Stonebridge

- **MEK Resistance:**  
  - ASTM D 1308: 1500 double rubs  
  - Testing Source: Stonebridge

**ADHESION, FLEXIBILITY & CLEANING**

- **Adhesion, Direct to Metal:**  
  - ASTM D4541: 3 Mpa  
  - Testing Source: SASO

- **Adhesion, Cross Cut:**  
  - SASO ISO 2409: Rating 10  
  - Testing Source: SASO

- **Flexibility, 1mm Mandrel:**  
  - SASO 2833: Passed (Very Good)  
  - Testing Source: SASO

- **Flexibility, Cylindrical Mandrel:**  
  - SASO ISO 1519: 3 mm Passed (Excellent)  
  - Testing Source: SASO

- **Flammability, Surface Flame Spread:**  
  - ASTM E84 / BS476: Class 1 (Excellent)  
  - Testing Source: SASO

- **De-Icing Aid:**  
  - Coated equipment frozen in 20 ft freezer: It was possible to flake off ice bits and melting was faster.  
  - Testing Source: Schlumberger

- **Self-Cleaning Properties:**  
  - Oil & Dirt Release; Hydrophobic; Brake-Dust Release  
  - Testing Source: Stonebridge

**APPLICATION HIGHLIGHTS**

- **Pot Life:**  
  - 1 Component (1K):  
    - Relative Humidity: 20% to 80%  
    - Testing Source: Nippon Paint

- **Viscosity:**  
  - 200 cps  
  - Dry Time: Dust Free @ 68-72°F: 30 minutes  
  - Testing Source: Sasco

- **Spray Applicators:**  
  - HVLP Conventional or Airless  
  - Dry-To-Handle @ 68-72°F: 4 hours  
  - Testing Source: Sasco

- **Wipe-On Application:**  
  - ShurLine® Deck Pad  
  - Recommended for small areas: Yes  
  - Testing Source: Sasco

- **Application Temp:**  
  - 40°F to 90°F  
  - Testing Source: Sasco

- **Operating (Service) Temp:**  
  - -40°F to 250°F  
  - Testing Source: Sasco

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**Nanovere Technologies, LLC**  
4023 S. Old US 23, Suite 101  
Brighton, MI 48114 USA  
810-227-0077  
info@nanovere.com • http://www.nanocoatings.com  

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