Nano-Clear® NCI for Oil & Gas Market

Extend Newly Painted or Existing Paint by 10+ Years

Achieve Unmatched Topcoat Durability
Oil & Gas Market

Refinery 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
- chemical attack
- water damage
- corrosion
- abrasion

What is needed?

An improved surface coating that protects Oil & Gas assets more thoroughly than any existing technology. A permanent surface coating that will restore, enhance and extend the surface life of freshly painted or highly oxidized paint by 10+ years.

Nano-Clear NCI

Nano-Clear NCI dramatically improves surface protection and brand image while significantly reducing surface maintenance expenses.

- **Extreme Corrosion Resistance**
  No Rust After 4000 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 (Humidity) Cured**
  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
- **Extreme Chemical Resistance**
  To Solvents, Acids, Oils, and Greases
- **Achieve Lower Operating Costs**
  By Reducing Maintenance Time & Extending Your Paint Recoat Cycle By 10 Years...
  Guaranteed!
What Makes NCI Unique?

**Nano-Engineering (not nano-particles)**

Creates Exceptional Crosslink Density

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 highly oxidized paints to enhance color, improve gloss, dramatically increase surface hardness, improve chemical and long-term UV resistance.

Nano-Clear NCI 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](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.

**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?**

**Linear chain of molecules**

**3D molecular architecture**

**10 month field trial without Nano-Clear NCI**

**10 month field trial with Nano-Clear NCI**

Even sticky concrete dust releases easily from Nano-Clear NCI
Unrivaled Performance Enhancement
Newly Painted or Highly Oxidized Paints

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.

No matter how badly oxidized your existing coating is, Nano-Clear NCI for Industrial Applications will restore its color and provide unmatched surface protection.

Nano-Clear NCI is also designed to be applied directly over freshly coated surfaces including 2K epoxies, 2K polyurethanes and powder coatings.
How Does NCI Restore Color?

NCI has a low (200 cps) viscosity, so it penetrates deep into the smallest pores of freshly painted or oxidized coatings, turning the white, chalked layers transparent, 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” the restored 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, peeled 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.

For additional details please review the Nano-Clear NCI Technical Data Sheet http://www.nanocoatings.com/ncitds.pdf
Where Could You Use NCI?

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

For Oil & Gas Equipment:
e.g., exterior pipelines, oil platforms, fuel tanks, heavy duty equipment, earth moving equipment, ships, fleet vehicles, plant floors, painted building structures, light posts, transformer housings, pumps, valves, lifeboats, shipping containers, etc.

Call Nanoverere 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 | TEST METHOD | RESULTS | TESTING SOURCE
--- | --- | --- | ---
Crosslink Density | DMA (Dynamic Mechanical Analysis) | 2.17 \( \times 10^5 \) mol/m³ | Nippon Paint
VOC | ASTM D3360 | 1.25 lb/gal (150 g/l) | Nanovere
Recommended Dry Film Thickness | ASTM D5798 | 1 mil to 2 mils | Nanovere
Coverage | Nanovere | 1122 sq ft/gal (at 1 mil) | Nanovere
Gloss 20° / 60° | ASTM D523 | 86.0 / 92.2 | Stonebridge Technical Services

## ABUSE RESISTANCE

| PROPERTY/TEST | TEST METHOD | RESULTS | TESTING SOURCE |
--- | --- | --- | ---
Abrasion Resistance (CS-17, 1 kg, 1000 cycles) | ASTM D4060 | 8.4 mg loss | Nippon Paint
Pencil Hardness, Scratch | ASTM D3363 | 4H | Stonebridge
Scratch Hardness | SASO 2833 | 2500 gm | Saudi Standards, Metrology, & Quality Organization (SASO)
Pencil Hardness, Gouge | ASTM D3363 | 5H | Stonebridge
Pendulum Hardness (Persoz) | ASTM D4366 | > 250 oscillations | Nippon Paint
Impact Resistance 18°C Direct in/lbs | ASTM D2794 | 50 Pass / 60 Fail | Stonebridge
Impact Resistance 18°C Reverse in/lbs | ASTM D2794 | 10 Pass / 20 Fail | Stonebridge
Impact Resistance | SASO ISO 3248 | 1 kg - 160 cm | SASO
Impact Strength | ASTM D2794 | 145 kg-cm | SASO
Chip Resistance 23°C (2 mils) | ASTM D3170 | 7A | Stonebridge
Chip Resistance -29°C (2 mils) | ASTM D3170 | 7B | Stonebridge
Fallling Sand Abrasion 100 liters | ASTM D9468 | Pass | Stonebridge
Mar Resistance | ASTM D5178 | 5.0 kg | SASO

## ENVIRONMENTAL RESISTANCE

| PROPERTY/TEST | TEST METHOD | RESULTS | TESTING SOURCE |
--- | --- | --- | ---
Xenon W.O.M. Resistance 4000 hrs | SAE J1960 | 100% Gloss Retention | Stonebridge
QUV >1500 hrs | ASTM D4587 | 100% Gloss Retention | Nippon Paint
Water Immersion Test 240 hrs @ 50°C | ISO 2812-2 | Pass | Nippon Paint
Salt Spray, 4000 hrs | SASO ISO 11997 | Excellent | SASO
Humidity, 100% RH, 100°F, 240 hrs | ASTM D 1735-02 | No loss of adhesion. No change. | American Racing Custom Wheels
CASS 240 hrs @ 50°C | JIS H8502-7 | Pass | Nippon Paint
Thermal Shock (100°F 3 hrs, Freeze 3 hrs, Steam Blast 30 sec) | GM9525P | No loss of adhesion. No Change. | American Racing Custom Wheels

## CHEMICAL RESISTANCE

| PROPERTY/TEST | TEST METHOD | RESULTS | TESTING SOURCE |
--- | --- | --- | ---
10% Sulfuric Acid | ASTM D 1308 | No effect | Stonebridge
10% Hydrochloric Acid | ASTM D 1308 | No effect | Stonebridge
10% Sodium Hydroxide | ASTM D 1308 | No effect | Stonebridge
10% Ammonium Hydroxide | ASTM D 1308 | No effect | Stonebridge
Isopropyl Alcohol | ASTM D 1308 | No effect | Stonebridge
Xylene | ASTM D 1308 | No effect | Stonebridge
Skydrol® 500 Fluid | ASTM D6943-A | No effect | Stonebridge
M.E.K. Resistance | ASTM 4752 | 1500 double rubs | Stonebridge

## ADHESION, FLEXIBILITY & CLEANING

| PROPERTY/TEST | TEST METHOD | RESULTS | TESTING SOURCE |
--- | --- | --- | ---
Adhesion, Direct to Metal | ASTM D4541 | 3 Mpa | SASO
Adhesion, Cross Cut | ASTM ISO 2409 | Rating 10 | SASO
Flexibility, 1mm Mandrel | SASO 2833 | Passed (Very Good) | SASO
Flexibility, Cylindrical Mandrel | SASO ISO 1519 | 3 mm Passed (Excellent) | SASO
Flammability: Fire Retardant & Flame Spread | ASTM E84 / BS476 | Class 1 (Excellent) | SASO
De-icing Aid | | It was possible to flake off ice bits and melting was faster. | Schlumberger
Self-Cleaning Properties | | Oil & Dirt Release; Hydrophobic, Brake-Dust Release | Nippon Paint

## APPLICATION HIGHLIGHTS

| PROPERTY/TEST | RESULTS | TESTING SOURCE |
--- | --- | ---
Pot Life | 1 Component (1K) | Relative Humidity 20% to 80%
Viscosity | 200 cps | Dry Time: Dust Free @ 68-72°F 30 minutes
Spray Applicators | HVLP Conventional or Airless | Dry-To-Handle @ 68-72°F 4 hours
Wipe-On Application | ShurLine® Deck Pad | Recommended for small areas Yes
Application Temp | 40°F to 90°F | -
Operating (Service) Temp | -40°F to 250°F | -

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