

**Testing performed by Nippon Paint Singapore
Dr. Daniel Wang, Principal Scientist**

**Nano-Clear for Industrial Applications
Product # NCI Test Data**



Dry film property*	Nano-Clear	Test Method
Pencil Hardness	4H	ASTM D3363
Pendulum Hardness (Persoz)	> 250	ASTM D4366
Abrasion Resistance (CS-17, 1kg, 1000 cycles)	8.4 mg	ASTM D4060
Impact Strength (kg-cm)	> 140	ASTM D2794
Water immersion test (240 hours @ 50°C)	Pass	ISO 2812-2
CASS @ 50°C	Pass 240 hr.	JIS H8502-7
% Gloss retention (> 1500 hours QUV 313)	> 100	ASTM D4587
% Gloss retention (> 4000 hrs Xenon WOM)	> 99	ASTM G155
MEK resistance	> 1500	ASTM D4752
Salt Spray	Pass 4000 hr.	ASTM B117



Alcoa/ Nanovere

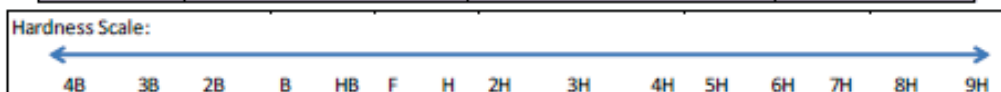


Summary of Macro-Testing of Diamond-like Coatings

Alcoa Team: Dr. Skiles & Dr. Sullivan

Nanovere: Thomas Choate, CTO

Supplier	PreTreatment	Coating	Pencil
Nanovere	F-PAA	Vecdor 164-50	6H
Nanovere	Non-Chrome (ALX009)	Vecdor 164-50	4H
Nanovere	Cleaned Only	Nano-Clear NCI-RC	4H
Nanovere	Cleaned Only	Vecdor 164-50	3H
Nanovere	Chrome Conv.	Vecdor 164-50	3H
Nanovere	SAA type II	Vecdor 164-50	3H
Nanovere	Cleaned Only	Vecdor X-SC2K	3H
Nanovere	R-995	Vecdor 164-50	2H
Nanovere	Cleaned Only	Vecdor 164-50	2H
Nanovere	R-995	Vecdor 164-50	F





Testing performed by Musarrat Husain Jafri

Saudi Standards, Metrology and Quality Organization



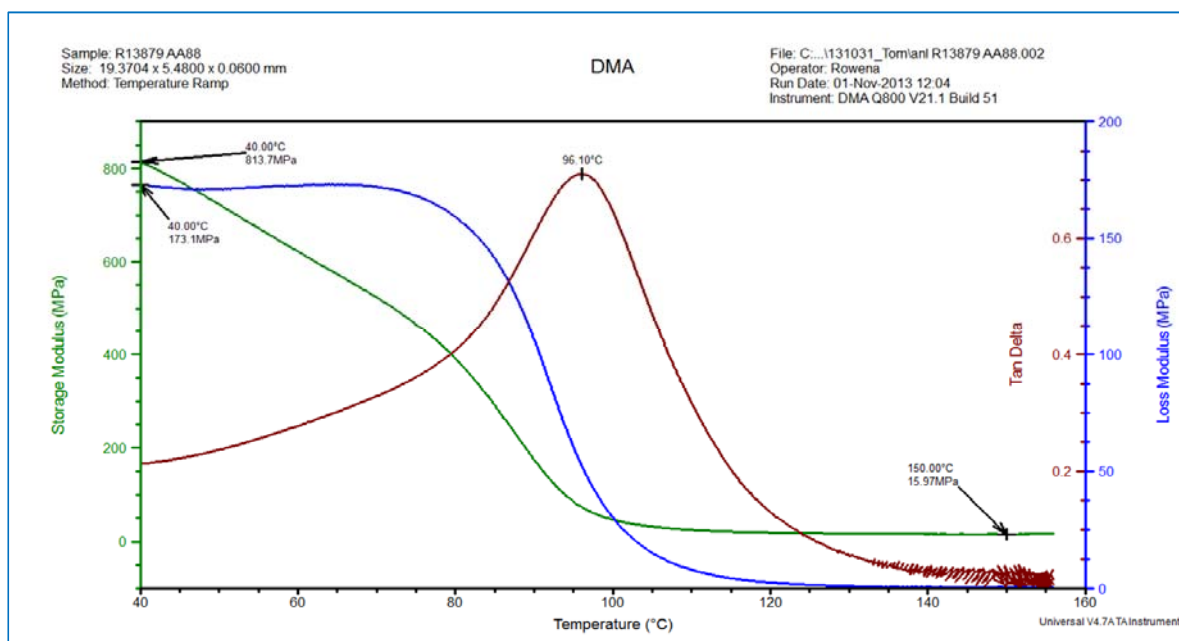
SINo	Characteristics	Test Results		Method of Tests
		Polyurethane White without Nano-Clear NCI	Polyurethane White with Nano-Clear NCI	
1	Gloss at 60°	80 (Good)	92.0 (Excellent)	SASO 2833
2	Scratch Hardness	1500 gm. (Good)	2500 gm. (Excellent)	SASO 2833
3	Abrasion Resistance (Loss in weight)	20.6 mg (Good)	8.5mg (Excellent)	SASO 2833
4	Impact Strength	100 kg-cm (Good)	145 kg-cm (Excellent)	ASTM D4060
5	Mar Resistance	2.0 kg (Good)	5.0 kg (Excellent)	ASTM D5178
6	Alkali Resistance	Good	Excellent	SASO 2833
7	Acid Resistance	Good	Excellent	SASO 2833
8	MEK Resistance	200 cycles (Gloss decreased -Fair)	> 1000 cycles (No effect on gloss - Excellent)	ASTM D4752
9	Flexibility	Passed 3mm mandrel test (Good)	Passed 1mm mandrel test (V. Good)	SASO 2833
10	Adhesion (Metal Surface)	1.5 Mpa (Good)	3 Mpa (Very Good)	ASTM D4541
11	Pencil Hardness	3H (Good)	5H (Excellent)	SASO ISO 15184
12	Cross Cut Adhesion	Rating 7 (Good)	Rating 10 (Excellent)	SASO ISO 2409
13	Flexibility Cylindrical Mandrel	5 mm Passed (Good)	3 mm Passed (Excellent)	SASO ISO 1519
14	Impact Resistance	1kg – 120cm (Good)	1kg – 160cm (Excellent)	SASO ISO 3248
15	Flammability: Retardant / Flame Spread	Class 4 (Fair)	Class 1 / Class A (Excellent)	BS476 / ASTM E84
16	Salt Spray Resistance	500 hours (Passed)	4000 hours (Passed)	SASO ISO 11997
17	Accelerated Weathering (1000 hours)	Fair (Change in color and gloss >10%)	Excellent (Change in color and gloss <2%)	SASO ISO 16474-2

Nano-Clear NCI & BASF Automotive OEM - Dynamic Mechanical Analysis (DMA) results (31/10/2013)

Request No. NTP13126

Report No. PR-NT-13-121

Sample Code	Sample Name	System	Tg by DMA (°C)	T _{E'min}	E' at T _{E'min} (MPa)	X-linking density by DMA, (X10 ³ mol/m ³)	E' at 40°C, MPa	E'' at 40°C, MPa
R13879	Nano-Clear NCI	1K Air Cure (72°F)	96.1	150	15.97	1.51	813.7	173.1
R13724	BASF Auto OEM	1K High Bake (285°F)	59.75	109	4.65	0.49	389.9	170.3



GENERAL DYNAMICS

Land Systems

General Dynamics Land Systems
6000 E. 17 Mile Road
Sterling Heights, MI 48313

Nanovere Technologies, LLC.
4023 S. Old US 23, Suite 101
Brighton, MI 48114
C/O: Dennis Haag / Tom Choate

RE: GD Corrosion Resistance Certification

Dear Dennis & Tom,

Our test data showed that the steel part after primer and top coat with your Nano-Clear NCI product has no sign of corrosion after 4193 hrs. This is very unusual for steel parts to pass 4000 hrs based on my past experiences with coatings. For Aluminum / Titanium joints, no sign of corrosion after 4193 hrs, indicates that this coating is well suited for dissimilar metal joint protection.

I would recommend sharing this data with ARL (Army Research Laboratory) and further evaluation through ARL. The Aluminum / Magnesium tests we are performing will also provide more information after we are done - so more supporting information will be available later.

Thank you for your support.

Jing Zhang
CBRN and HazMat
Mechanical Systems & Materials
General Dynamics Land Systems
6000 E. 17 Mile Road
Sterling Heights, MI 48313



Mr. Thomas Choate
 Nanovere Technologies
 4023 S. Old US 23, Suite 101
 Brighton, MI 48116

We have completed 4,000 hour weatherometer (WOM) testing of your Nano-Clear NCI. It was compared to PPG's CeramiClear product and an OEM clearcoat from DuPont. In all categories tested, the Nano-Clear NCI product performed better than or equivalent to the PPG and DuPont products. Nano-Clear NCI performed exceptionally well after 4,000 hours of WOM exposure. Refer to Table 3 for detailed test results.

Table 1 details the clearcoats that were tested along with their physical properties. All tests were performed on the Nano-Clear NCI and PPG clearcoats (A & B) and some additional tests were performed on the DuPont OEM clearcoat (C).

Table 1: Clearcoats

Sample Clearcoat Manufacturer	A Nano-Clear Nanovere Technologies	B D8126/D8226 CeramiClear PPG Industries	C Acrylic Silane DuPont
% Non-Volatile (Weight)	37%	---	
% Non-Volatile (Volume)	---	49.8%	
Volatile Organic Content less Exempts	Solvents are VOC Exempt	2.01 lbs/gal	
Mix Ratio (by Volume)	1	2 : 1	
Potlife @ 68 °F / 20 °F	No Potlife	1 hour	
Recommended Dry Film Thickness	2 mils	2 - 2.5 mils	
<u>Dry Times:</u>			
Dust-Free @ 68-72 °F	30 minutes	30 minutes	
Dry-to-Handle @ 68-72 °F	4 hours	4 hours	
Dry-to-Handle @ 150 °F	30 minutes	30 minutes	

Clearcoats A and B were mixed according to their directions and applied to coated steel panels, within 15 minutes of mixing, using wire wound applicator method. They were allowed to flash off for 3 – 5 minutes prior to baking for 30 minutes at 150°F. They were aged for 24 hours under ambient conditions prior to testing. Total clearcoat thickness for both clearcoats was 1.9 – 2.1 mils. Table 2 details the test panels that were prepared.

Table 2: Test Panels

Panel ID	A	B	C
Clearcoat	Nano-Clear	D8126/D8226 CeramiClear	RK8010A DuPont
Basecoat Code	542AC301 White	542AC301 White	542AC301 White
Primer	None	None	None
E-Coat	ED6060	ED6060	ED6060
Pretreatment	B952 P60 DIW: Unpolish	B952 P60 DIW: Unpolish	B952 P60 DIW: Unpolish
Substrate	Cold Rolled Steel	Cold Rolled Steel	Cold Rolled Steel
ACT Labs Product ID No.	APR45582	APR45582	APR44364

Panels were tested for appearance, mechanical and durability properties similar to those required of BMW. Descriptions of test methods can be found at the end of this report.

The Nano-Clear showed superior cold temperature chip resistance, direct and reverse impact resistance compared to the CeramiClear and OEM clearcoats. It showed slightly more haze than the CeramiClear product. Both Nano-Clear and CeramiClear showed no breakthrough of clearcoat after exposure to 100 liters of sand via the Falling Sand Abrasion Test. The OEM clearcoat failed after 100 liters.

The initial 20° gloss of the OEM clearcoat was slightly higher than the other clearcoats, but the Nano-Clear (A) showed the best gloss retention (100%) after 4,000 hours of WOM exposure. It had similar color change than the DuPont OEM and PPG CeramiClear clearcoats. The CeramiClear showed better gloss retention than the control with little color change. Table 3 details the test results.

Please call me should you have questions or comments at (810) 750-0040. Thank you for the opportunity to perform the above work for Nanovere Technologies, Inc.

We look forward to working with you in the future.

Sincerely,

Debora L. Hense

Consultant

STS #306_1C

Table 3: Detailed Test Results

Sample	A	B	C
Clearcoat	Nano-Clear	CeramiClear	Acrylic Silane
Manufacturer		PPG	DuPont
Cure Schedule	30' @ 150°F	30' @ 150°F	OEM
Clearcoat DFT (mils)	2.0 +/- 0.1	2.0 +/- 0.1	2.0 +/- 0.1
<u>Scrape Adhesion per ASTM D2197</u>			
Scratch	0.25 Kg	0.10 Kg	
Gouge	> 11 Kg	> 11 Kg	
<u>Chip Resistance Per ASTM D3170 *</u>			
Room Temperature (23°C)	7A	6A	6A
Cold Temperature (-29°C)	7B	5B	5B
Falling Sand Abrasion per ASTM D968 (100 Liters)	Pass	Pass	Fail
<u>Impact Resistance per ASTM D2794 at -18°C</u>			
Direct (inch-pounds)	50P / 60F	30P / 40F	40 P / 50F
Reverse (inch-pounds)	20F / 10P	5F	5F
<u>Humidity Resistance per ASTM D4585</u>			
500 Hours - Blistering per ASTM D714	No Effect	No Effect	No Effect
500 Hours - Appearance	No Effect	No Effect	No Effect
<u>Transmission & Haze per ASTM D1003</u>			
Haze (%)	1.29	1.09	
Total Luminous Transmittance (%)	89.18	89.91	
Diffuse Transmittance (%)	1.15	0.98	
<u>WOM Resistance per SAE J1960</u>			
20° Gloss - Initial	82.0	82.4	87.8
20° Gloss - 500 Hours	88.0	86.8	88.0
20° Gloss - 1,000 Hours	95.0	91.0	95.0
20° Gloss - 2,000 Hours	83.5	79.9	84.0
20° Gloss - 3,000 Hours	83.4	77.9	82.4
20° Gloss - 4,000 Hours	83.1	78.4	80.8
% Gloss Retention - 4,000 Hours	100%	95%	92%
ΔE - 500 Hours	0.35	0.27	0.61
ΔE - 1,000 Hours	0.41	0.35	0.44
ΔE - 2,000 Hours	0.55	0.48	0.32
ΔE - 3,000 Hours	0.57	0.48	0.30
ΔE - 4,000 Hours	0.63	0.48	0.41

* Number & Letter Categories for Chip Ratings:

<u>Rating</u>	<u>No. of Chips</u>	<u>Chip Size</u>
10	0	A = <1 mm
9	1 - 4	B = 1-3 mm
8	5 - 9	C = 3-6mm
7	10 - 24	D = >6mm
6	25 - 49	
5	50 - 74	
4	75 - 99	
3	100 - 150	
2	151 - 250	
1	> 250	

DESCRIPTION OF TEST METHODS

Chip Resistance – Per ASTM D3170. This method covers the determination of the resistance of coatings to chipping damage by stones or other flying objects. One pint of standardized road gravel (~ ½” diameter) was projected by means of controlled air blast (70 +/- 5 psi) at the panels. One set was tested under ambient conditions and another set tested at -29°C +/- 2°C. After gravel blast, tape is applied and removed from the surfaces. The panels are rated using visual standards in the test method. They are summarized below:

<u>Rating</u>	<u>No. of Chips</u>	<u>Chip Size</u>
10	0	A = <1 mm
9	1 - 4	B = 1-3 mm
8	5 - 9	C = 3-6mm
7	10 - 24	D = >6mm
6	25 - 49	
5	50 - 74	
4	75 - 99	
3	100 - 150	
2	151 - 250	
1	> 250	

Delta E (ΔE) – Per SAE J1545. This method measures the color of the exposed samples and the color of the unexposed samples and calculates a color difference (ΔE) by the square root of the sum of the squares of the delta L*, a* and b* values obtained from the color measurements.

Falling Sand Abrasion – Per ASTM D968 Method A. This method covers the determination of the resistance of organic coatings to abrasion produced by abrasive sand falling onto coatings applied to a plane, rigid surface. A specified amount of sand was allowed to fall from a specified height through a guide tube onto the panels until a minimum of 4mm area of clearcoat was removed. This is the end point.

Gloss – Per ASTM D523. This method covers the measurement of specular gloss of non-metallic specimens for glossmeter geometries 20°, 60° and 85°.

Humidity Resistance – Exposure per ASTM D4585. This practice covers basic principles and operating procedures for testing water resistance of coatings using controlled condensation. A vapor temperature of 60oC was maintained for the duration of testing. Immediately upon removal from the humidity chamber, the panels were observed for defects including blisters, blushing, color change, rust, water spots, etc. If no defects were observed, the panels were rated as PASS.

Impact Resistance – Per ASTM D2794. This method covers a procedure for rapidly deforming by impact a coating film and its substrate. A standard weight is dropped a distance so as to strike an indenter that deforms the coating and the substrate. The indentation can be either an intrusion (direct impact) or extrusion (reverse impact). Films generally fail by cracking. The results are reported as the maximum number of inch-pounds of force applied to the coating and substrate at which the coating does not crack (P for pass) or when the coating cracks (F for fail).

Scrape Adhesion – Per ASTM D2197. This method covers the determination of the adhesion of organic coatings when applied to smooth, flat (planar) panel surfaces. The adhesion is determined by pushing the panels beneath a rounded stylus or loop that is loaded in increasing amounts until the coating is removed from the substrate surface. Two measurements were recorded, the first the load at which marring of the surface was observed, and the second the load at which the clearcoat was removed by the stylus.

Transmission & Haze – Per ASTM D1003. This method covers the evaluation of specific light-transmitting and wide-angle-light-scattering properties of the planar sections of materials. The clearcoats were drawn down over glass panels, cured and measured.

Weatherometer Resistance – Exposure per SAE J1960. This method covers the practices and procedures for the simulated weathering of coated panels.

Table 3: Detailed Test Results

Sample	A	B	C
Clearcoat	Nano-Clear	CeramiClear	SB Acrylic Silane
Manufacturer	Nanovere	PPG	Melamine OEM
Cure Schedule	30' @ 150°F	30' @ 150°F	DuPont
Clearcoat DFT (mils)	1.8 - 2.0	1.8 - 2.0	OEM
			2.1 - 2.0
Gloss per ASTM D523 (20 °/60°)	86.0 / 92.2	85.8 / 92.0	88.1 / 94.1
Adhesion per ASTM D3359 Method B to White (A1 & B1)	5B / 100%	5B / 100%	5B / 100%
Adhesion per ASTM D3359 Method B to Silver (A2 & B2)	0B / 0%	0B / 0%	---
Pencil Hardness - Scratch per ASTM D3363	4H	F	4H
Pencil Hardness - Gouge per ASTM D3363	5H	3B	2B
Pencil Hardness - Gouge per ASTM D3363 After 24 Hr. Recovery	2H	3B	2B
Taber Abrasion per ASTM D4060 (mg lost per 1,000 cycles)	19.85	36.20	52.20
Impact Resistance per ASTM D2794 - Initial			
Direct (inch-pounds)	150 Fail / 140 Pass	90 Fail / 80 Pass	50 Fail / 40 Pass
Reverse (inch-pounds)	160 Pass	120 Fail / 100 Pass	10 Fail / 5 Pass
Impact Resistance per ASTM D2794 - After 48 Hrs. @°F (250h/lbs)			
Direct (inch-pounds)	70 Fail / 60 Pass	60 Fail / 50 Pass	20 Fail / 10 Pass
Reverse (inch-pounds)	5 Fail	5 Fail	5 Fail
Flexibility per ASTM D522	Pass 1/4	n/a	Fail 3/4" / Pass 1" **
Chemical Spot Resistance per ASTM D1308			
10% Sulfuric Acid	No Effect	No Effect	No Effect
10% Hydrochloric Acid	No Effect	No Effect	No Effect
10% Sodium Hydroxide	No Effect	No Effect	No Effect
10% Ammonium Hydroxide	No Effect	No Effect	No Effect
Isopropyl Alcohol	No Effect	No Effect	No Effect
Xylene	No Effect	Slight Softening	Slight Swelling
Xylene (24 hour recovery)	No Effect	No Effect	No Effect
MEK	No Effect	No Effect	No Effect
Skydrol 500 Fluid Resistance per ASTM D6943 Method A	No Effect	No Effect	No Effect
MEK Resistance per ASTM D4752 (Double Rubs)	> 1,500	260	> 1,500



July 17, 2017

Mr. Tom Choate
Nanovere Technologies
4023 S. Old 23, Suite 102
Brighton, MI 48114

Re.: SCLI Job No. 617_146D –Testing of Chemical Agent Resistant Coatings

Dear Mr. Choate:

We have completed the initial screening testing of your chemical agent resistant coatings. Two coated carbon fiber composite samples were received and labeled as CARC and CARC + Nano-Clear NCIM Matt Clear. Table 1 summarizes the samples received. The Sherwin Williams CARC paint was applied as per the enclosed instructions @ 2 mils DFT and allowed to air cure for 24 hours at RT w/50% R.H. The Nanovere NCIM Matte Clear Coating was also applied @ 2 mils DFT and allowed to air cure for 24 hours at RT w/50% R.H.

Table 1: Samples

	Sample ID	
	A SW CARC Only	G CARC + NCIM Matt Clear
Basecoat	Tan CARC CC-M25 *	Tan CARC CC-M25 *
Topcoat	None	NCIM Matt Clear**

* **Sherwin-Williams MIL-DTL-53039E, Type IX**, 1K Aliphatic Polyurethane 3.5 VOC, CARC

** **Nanovere NCIM Matte Clear**, Nanostructured Polyurethane/Polyurea Hybrid System

The samples were tested for a variety of optical and physical properties. On the following pages, Table 2 lists the tests that were performed while Tables 3 – 5 detail the test results. Test panels will be returned under separate cover.

We thank you for the opportunity to assist you in your testing needs.

Sincerely,

Debora L. Hense

Technical Manager

Table 2: Test Protocol

Property	Test Method
<u>Optical Properties:</u>	
Gloss	ASTM D523
Color	ASTM D2244
Infrared Reflectance	ASTM E-903
<u>Physical Properties:</u>	
Adhesion	ASTM D3359
Hardness (Pencil)	ASTM D3363
<u>Resistance Properties:</u>	
Acid Spot Resistance	MIL-DTL-53039E Sec 4.6.24
MEK Resistance (Double Rubs)	ASTM D4752
Water Immersion Resistance	MIL-DTL-53039 Sec 4.6.22

Regarding optical properties, the 20° and 85° gloss was unchanged by the addition of the topcoat, while the 60° gloss dropped. Color values were not significantly different. Regarding IR reflectance, the topcoat sample was comparable to the control without topcoat from 800 to 1100nm, slightly higher in % IRR from 700 to 800nm and lower than the control for wavelengths greater than 1100nm. Refer to Table 3 for detailed gloss and color measurements and Table 4 for % IR Reflectance.

Table 3: Optical Property Test Results - Gloss & Color

	Sample A Tan CARC	Sample G Tan CARC with NCIM Matt Clear
<u>Gloss:</u>		
20°	0.7	0.6
60°	3.6	1.3
85°	7.4	7.8
<u>Color:</u>		
L	65.05	66.66
a	6.36	6.02
b	20.88	20.71

Table 4: Optical Property Test Results – Infrared Reflectance

	Sample A Tan CARC	Sample G Tan CARC w/ NCIM Clear
<i><u>Wavelength (nm)</u></i>		
1500	70.76%	59.36%
1467	70.85%	61.55%
1433	71.49%	62.88%
1400	73.98%	66.65%
1367	76.18%	71.32%
1333	76.94%	72.75%
1300	76.94%	73.04%
1267	76.68%	72.04%
1233	74.20%	68.59%
1200	74.52%	69.86%
1167	74.60%	72.21%
1133	72.83%	71.98%
1100	68.72%	68.06%
1067	66.79%	66.79%
1033	65.25%	65.26%
1000	64.14%	64.37%
980	63.55%	63.92%
960	63.10%	63.30%
940	62.43%	62.63%
920	62.48%	62.67%
900	63.33%	63.38%
880	64.10%	64.02%
860	65.25%	65.32%
840	67.19%	67.24%
820	68.90%	68.95%
800	70.16%	70.13%
780	69.73%	70.36%
760	66.54%	67.69%
740	62.03%	63.24%
720	59.31%	60.41%
700	56.86%	58.27%

Regarding physical properties, both the control and topcoat samples showed good adhesion, acid spot and water immersion resistance. The topcoat sample showed superior hardness before and after water immersion and exceptional MEK resistance. The control showed moderate burnishing after 200 MEK double rubs and showed dissolving of the tan coating within 20 MEK double rubs. The topcoat sample was unaffected by 200 MEK double rubs. Table 5 details these test results.

Table 5: Adhesion, Hardness & Resistance Properties

	Sample A Tan CARC	Sample G Tan CARC with NCIM Matt Clear
Adhesion	5B	5B
Hardness (Pencil)	2B	>7H
Acid Spot Resistance	No Effect	No Effect
<u>MEK Resistance:</u>		
Double Rubs to Substrate	>200	>1500
Double Rubs to Start of Coating Dissolution	20	>1500
Appearance after 200 DRs	Moderate Burnishing	No Effect
<u>Water Immersion Resistance:</u>		
Visual Observation	No Effect	No Effect
Pencil Hardness	4B	>7H
Adhesion	5B	5B



**Missouri
Department of Transportation**
888-ASK MoDOT (275-6636)

Nano-Clear NCI for Industrial - Ammon Painting Restoration & Abatement

Summary of Bridge Testing, MoDOT Chemical Laboratory

Test Panels	Test Conditions	Test Method	Testing Time	Test Results Nano-Clear NCI	Test Results Conventional Topcoat
Coating applied over existing paint system	UV Exposure / Condensation	ASTM G154	2000 hr.	PASS No Weathering Observed	Fail
Coating applied over existing paint system	Salt Fog Exposure / Corrosion Resistance	ASTM B117	2000 hr.	PASS No Weathering or Corrosion Observed	Fail
Coating applied over existing paint system	UV Exposure on MoDOT Laboratory Roof	NONE	4000 hr.	PASS No Weathering Observed	Fail

Kit Bond Bridge - Kansas City, MO



Lewis & Clark Viaduct - Kansas City, MO



Nano-Clear®



July 17, 2017

Mr. Tom Choate
Nanovere Technologies
4023 S. Old 23, Suite 102
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Sincerely,

Debora L. Hense

Technical Manager

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<u>Resistance Properties:</u>	
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1433	71.49%	62.88%
1400	73.98%	66.65%
1367	76.18%	71.32%
1333	76.94%	72.75%
1300	76.94%	73.04%
1267	76.68%	72.04%
1233	74.20%	68.59%
1200	74.52%	69.86%
1167	74.60%	72.21%
1133	72.83%	71.98%
1100	68.72%	68.06%
1067	66.79%	66.79%
1033	65.25%	65.26%
1000	64.14%	64.37%
980	63.55%	63.92%
960	63.10%	63.30%
940	62.43%	62.63%
920	62.48%	62.67%
900	63.33%	63.38%
880	64.10%	64.02%
860	65.25%	65.32%
840	67.19%	67.24%
820	68.90%	68.95%
800	70.16%	70.13%
780	69.73%	70.36%
760	66.54%	67.69%
740	62.03%	63.24%
720	59.31%	60.41%
700	56.86%	58.27%

Regarding physical properties, both the control and topcoat samples showed good adhesion, acid spot and water immersion resistance. The topcoat sample showed superior hardness before and after water immersion and exceptional MEK resistance. The control showed moderate burnishing after 200 MEK double rubs and showed dissolving of the tan coating within 20 MEK double rubs. The topcoat sample was unaffected by 200 MEK double rubs. Table 5 details these test results.

Table 5: Adhesion, Hardness & Resistance Properties

	Sample A Tan CARC	Sample G Tan CARC with NCIM Matt Clear
Adhesion	5B	5B
Hardness (Pencil)	2B	>7H
Acid Spot Resistance	No Effect	No Effect
<u>MEK Resistance:</u>		
Double Rubs to Substrate	>200	>1500
Double Rubs to Start of Coating Dissolution	20	>1500
Appearance after 200 DRs	Moderate Burnishing	No Effect
<u>Water Immersion Resistance:</u>		
Visual Observation	No Effect	No Effect
Pencil Hardness	4B	>7H
Adhesion	5B	5B

Leading US Tank Car Manufacture / Leasing Company

Technical Challenge

- Reduce Material Cost
- Reduce Labor Cost
- Reduce Energy Cost
- Extend In-Service Life
- Reduce VOC
- Improve UV Resistance

Technical Solution:

Nano-Clear for Industrial Applications was chosen to replace epoxy 2K black. Nano-Clear 1K restores oxidized paint, enhances underlying black color, dramatically improves surface hardness and prevent further UV degradation of underlying paints.

Nano-Clear Coating Benefits:

- Material Savings - 5 gal of Nano-Clear vs. 30 gal of Epoxy
- Energy Savings - No Heat Required to Cure
- Environmental - Lower VOC per Facility
- Higher Production Throughput with Nano-Clear
- 2X Extended Service Life of Tank Car
- Savings - \$925 per Tank Car using Nano-Clear

