



NCIM Matting Additive

PRODUCT DESCRIPTION

The admixing of our proprietary NCIM Matting Additive into Nano-Clear® Industrial (NCI) reduces NCI's high specular gloss level to a desired "flatness" with no negative effect to its multifunctional properties. This "first-to-market" matting additive is based on Nanovere's proprietary multifunctional polymers (NCI) and the functional nanoparticles of NCIM.

Nano-Clear® NCI Industrial is a proprietary nanostructured (bottom-up engineered) transparent hybrid polyurethane/polyurea industrial high gloss top coat. NCI as a multi-functional coating has remarkable protective properties developed for the restoration, enhancement, and extended service life (10+ years) of high value commercial, industrial, and military assets.

MARKETING INFORMATION AND TECHNICAL ADVANTAGES



- NCIM admixed into NCI will easily produce a specific level of "flatness".
- VOC content for the NCIM (*less exempts*) Matting Additive is 0% by weight allowing NCI to retain its 150g/L VOC content figure.
- NCI + NCIM can be applied to new or highly oxidized coatings, powder coatings, polyesters, gel coats, 2K epoxies / polyurethanes, e-Coats, fibreglass, and anodized aluminum.
- Simple Part A+B Admix – Stir In process.
- High nano-particle count: 20% solids, extreme surface coverage.
- NCIM's addition to NCI will dramatically *increase*:
 - Pencil hardness from a 4H to 7H,
 - Chemical, atmospheric, weathering, environmental, and UV resistance,
 - Scratch, abrasion, and chip resistance,
 - Corrosion resistance,
 - The technical performance specification for coating requirements.

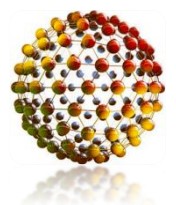
ADMIX % BY VOLUME AND BLENDING INSTRUCTIONS

To insure accurate and repeatable admixing of NCI and NCIM they should be mixed by weight. To verify the desired "flatness" finish we also recommend that a test panel be sprayed with the desired NCI + NCIM admix.



Once the panel has cured we suggest performing a gloss measurement using the appropriate measuring geometry of either 20°, 60°, or 85° for the finish captured. Record the test results onto a label and affix to the rear of the coated panel for future reference.

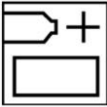
Desired Finish	Part A: NCI	Part B: NCIM
Matte	100%	20.1 – 30%
Eggshell	100%	10.1 – 20%
Semi-Gloss	100%	10%



ADMIX PROCEDURES



1. Shake NCIM well prior to admixing with NCI.
2. Using an appropriate sized painter's cup, weigh NCI (Part A) on an electronic scale. **DO NOT** remove cup from scale once weight is established.
3. Record the weight figure for the NCI. **(NOTE this figure can be applied to the test panel label)**
4. Next refer to the **Admix % by Weight Table** to determine the desired *Finish* for your project.
5. Calculate and use this weight figure for NCIM (Part B).
6. Record the weight figure for NCIM. **(NOTE this figure can be applied to the test panel label)**
7. Use the NCIM (Part B) weight figure and Admix it to the NCI (Part A).
8. Recap the NCIM container immediately after dispensing to avoid solvent evaporation.
9. Stir mixture for ~60 seconds.
10. The NCI + NCIM mixture is now ready for application.



NOTE: Theoretical: *Full Matte Finish @ 30%* - **Admix** 1.136 litre of NCIM (Part B) to 3.785 litre / 1 Gallon of NCI (Part A).

APPLICATION, EQUIPMENT, FLASH OFF, AND DRYING DETAILS Post NCI and NCIM Admix.

APPLICATION AND EQUIPMENT

- Following application procedures and use listed equipment as per information provided in the NCI TDS document.



FLASH OFF

Flash off time between coats:

- Allow at least 10 minutes between wet coats to allow particle to rise to the surface. Visual que: "A flattening effect" can be observed as the NCIM nanoparticles rise to the surface with the first, second, and third coats.



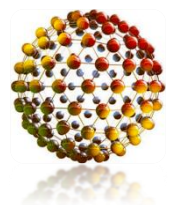
DRYING TIMES

- Drying Time information is supplied within the NCI TDS.
- Follow the specified drying times for Nano-Clear NCI.



EQUIPMENT CLEAN-UP

- Clean application equipment immediately after use with Acetone or MEK.
- **DO NOT** clean application equip with water or alcohol.



STORAGE AND SHELF LIFE INFORMATION



- **UNOPENED:** 6 months, tightly capped and in original container.
- **OPENED:** 2 months, tightly capped and in original container.
NOTE: Container must be closed and capped immediately after product dispensing to prevent and reduce solvent evaporation.
- **TEMPERATURES:** Store opened and un-opened NCIM in dry and low light area at temperatures between 40°F / 4°C and 72°F / 22°C. Higher temperatures will decrease shelf life.

HEALTH AND SAFETY



NCI and NCIM are for commercial and industrial use only, and are not to be used for purposes other than those specified. The information within this TDS is based on past, present, and ongoing scientific and technical knowledge, and it is the responsibility of the user to take all necessary steps in order to ensure the suitability of the products for the intended purpose. For Health and Safety information please refer to the material Safety Data Sheets (SDS).

NANOVERE TECHNOLOGIES, LLC

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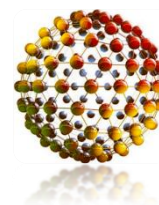
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Nano-Clear NCI
+
NCIM Matting Additive

Test Report



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 + 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,

Debra L. Hense

Technical Manager

Table 2: Test Protocol

Property	Test Method
<i>Optical Properties:</i>	
Gloss	ASTM D523
Color	ASTM D2244
Infrared Reflectance	ASTM E-903
<i>Physical Properties:</i>	
Adhesion	ASTM D3359
Hardness (Pencil)	ASTM D3363
<i>Resistance Properties:</i>	
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
<i>Gloss:</i>		
20°	0.7	0.6
60°	3.6	1.3
85°	7.4	7.8
<i>Color:</i>		
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>Wavelength (nm)</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
<i><u>MEK Resistance:</u></i>		
Double Rubs to Substrate	>200	>1500
Double Rubs to Start of Coating Dissolution	20	>1500
Appearance after 200 DRs	Moderate Burnishing	No Effect
<i><u>Water Immersion Resistance:</u></i>		
Visual Observation	No Effect	No Effect
Pencil Hardness	4B	>7H
Adhesion	5B	5B