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VANDERBILT Report

NYTAL® 3300

No. 917

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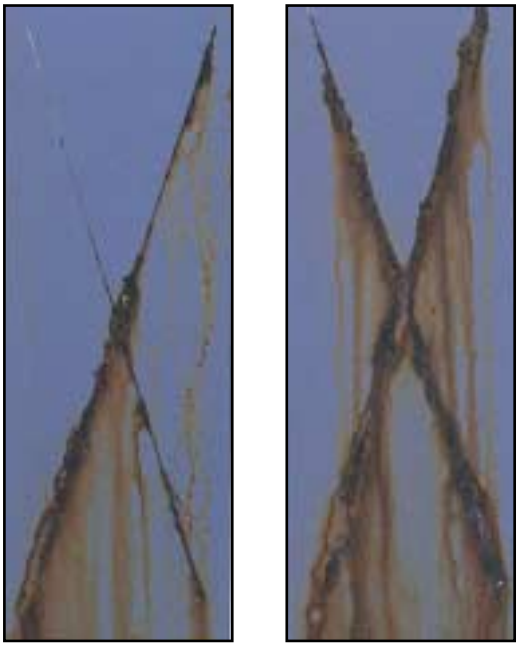
NYTAL® 3300

the filler that works smarter



NYTAL 3300 has changed the rules for formulating epoxy coatings that stand up to corrosive environments.

NYTAL 3300 vs. Platy Talc after 3000 hours of salt spray testing. The epoxy maintenance coating conatining NYTAL 3300 showed significantly less corrosion than the same coating containing a platy talc.

INTRODUCTION

NYTAL 3300 was compared with a 4 Hegman fineness platy talc in a MIL-SPEC two-part epoxy polyamide marine primer. After 3000 hours of salt-spray exposure, the NYTAL-containing coating was found to have better corrosion resistance and less blistering than did the same coating containing the 4 Hegman fineness platy talc.

DISCUSSION AND RESULTS

Platy talcs are thought to improve the corrosion resistance of epoxy marine primers to a greater degree than do non-platy talcs. It is theorized that platy talcs perform better than non-platy talcs because 1) plates form a better barrier than nodules and acicular particles, and 2) platy talcs are more hydrophobic than non-platy talcs, which helps to keep water and ionic substances away from the metallic substrate.

Studies done in this laboratory have shown this to not be the case.

NYTAL 3300 was compared to a 4 Hegman fineness platy talc in a MIL-P-24441 Type IV gray epoxy polyamide marine primer. The formula for this coating is given in Table 1. The talc loading was 350 lbs/100 gal. 30.8% by weight. The two talcs were used at an equivalent weight basis. The coating was high solids at 80% non-volatile by weight, 67.5% by volume. The VOC content was approximately 270 g/L (2.27 lbs/gal). The two parts of the coating were blended at equal volumes, mixed well and allowed to stand for two hours prior to use. The panels were coated at 2 mil dry film thickness and cured for seven days at ambient conditions. Salt-spray corrosion testing was run for 3000 hours (125 days). One panel of each coating was removed from the corrosion cabinet at one week intervals and inspected for the degree of corrosion at the scribe and the overall appearance.

The following observations were made:

1) After 3000 hours the NYTAL 3300 corrosion at the scribe was less than 1mm, whereas, the platy talc corrosion at the scribe was greater than 10mm.

2) The blistering tendency of the two types of talcs was quite different. The platy talc showed large blisters around and away from the scribe. The NYTAL 3300 showed a few very small blisters around the scribe and none away from the scribe.

EXPERIMENTAL

The two-part epoxy polyamide marine primers were prepared according to the formulas given in Table I. The two parts of the primer were blended together at equal volumes, mixed well and allowed to stand for two hours before the panels were coated. Drawdowns were made at 4 mil clearance onto Type S-412 4" x 12" panels from Q-Panel Company. The primers were cured for seven days at ambient conditions. The dry film thickness was measured using a GE Type B thickness gage. The panels were scribed with a "X" and then exposed for a total of 3000 hours of salt-spray according to ASTM B-117. One panel of each type was removed from the corrosion cabinet at one week intervals, the corrosion at the scribe was measured, and the overall appearance was assessed.

CONCLUSION

This study shows that NYTAL 3300 talc is superior to platy talc as an inert filler for improvement of corrosion resistance of a two-part epoxy polyamide marine primer. The corrosion at the scribe and the blistering tendency was greatly reduced when the NYTAL 3300 was used.

Table 1
MIL-P-24441
Paint, Epoxy Polyamide, Gray Primer Formula 150, Type IV

		NYTAL 3300[1]		Platy Talc	
	% by weight	Pounds	Gallons	Pounds	Gallons
PART A					
Disparlon® NS 30[2]	0.89	10.0	1.38	10.0	1.38
Gennamid® 2000[3]	3.12	35.0	4.27	35.0	4.27
Aradur® HY 283[4]	26.76	300.0	35.97	300.0	35.97
Ti-Pure® R-960[5]	8.92	100.0	3.00	100.0	3.00
Talc	36.93	414.0	17.47	414.0	18.08
Black Iron Oxide[6]	0.89	10.0	0.24	10.0	0.24
Disperse at high speed for 15 minutes. Reduce speed and add:					
Butanol	22.48	252.0	37.28	252.0	37.28
Total PART A	99.99	1121.0	99.61	1121.0	100.22
PART B					
Disparlon® 6500[2]	1.30	15.0	1.84	15.0	1.84
Epon® 828[7]	43.44	500.0	51.55	500.0	51.55
Talc	24.85	286.0	12.07	286.0	12.49
Iceberg® Clay[8]	13.03	150.0	6.85	150.0	6.85
Disperse at high speed for 15 minutes. Reduce speed and add:					
Aromatic® 1008[9]	17.38	200.0	27.47	200.0	27.47
Total PART B	100.00	1151.0	99.78	1151.0	100.20

Blend equal parts by volume of PART A and PART B. Mix well, let stand for 2 hours prior to use.

PAINT PROPERTIES (of combined coating)

		NYTAL 3300	Platy Talc
Weight per gallon		11.36	11.34
% Solids	by weight	80.1	80.1
	by volume	67.5	67.7
PVC		30.2	30.7
Pigment to Binder Ratio		1.15:1	1.15:1
Calculated VOC	lbs/gal	2.27	2.27
	g/L	272	272

Raw Material Suppliers:

[1] R.T. Vanderbilt Company, Inc.
[2] Kusumoto Chemicals, Ltd.
[3] Cognis Corporation
[4] Vantico
[5] E.I. Du Pont de Nemours
[6] Elementis Pigments, Inc.
[7] Resolution Performance Products
[8] Burgess Pigment Company
[9] ExxonMobil Chemical Company

NYTAL® 3300

Industrial Talc

Description:

NYTAL 3300 is a hydrous calcium magnesium silicate mineral mixture mined and processed in Northern New York State. NYTAL 3300 has a tightly controlled particle size distribution and has applications in low VOC coatings. NYTAL 3300 provides lower viscosity than NYTAL 300 and can be used in low VOC and other coatings where the chemical inertness and the suspension properties of talc are desirable, but with less viscosity is required.

Typical Chemical Analysis (calculated as oxides):

Silicon Dioxide (SiO_2) by difference	56.3%
Magnesium Oxide (MgO)	30.7%
Calcium Oxide (CaO)	7.0%
Iron Oxide (Fe_2O_3)	0.1%
Aluminum Oxide (Al_2O_3)	0.3%
Ignition Loss (1000°C)	5.6%

Gouverneur Talc Company, Arnold Pit. The source of the talc ore for NYTAL 3300.

Typical Properties:

(certified properties are marked with an asterisk).

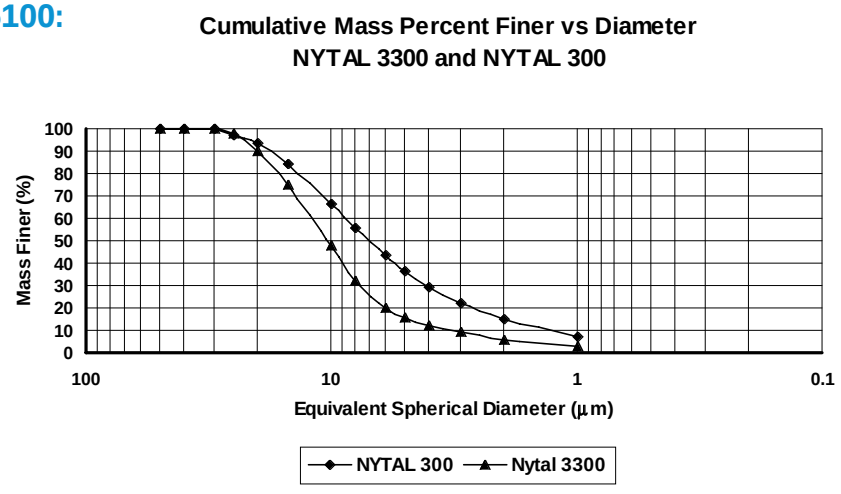
Density (Mg/m³)	2.85
Pounds per gallon	23.7
G.E. Brightness (TAPPI T646)	90
pH (ASTM D 1208)	9.4
Plus 325 mesh (ASTM D 185)*	<0.05%
Oil Absorption (ASTM D 281)	21
Viscosity (T-1012)*	58-68 KU
Hegman Fineness (T-1011)*	4
Color in oil (T-950)*	55 min.

*Test Methods T-1012 for Viscosity and T-1011 for Hegman Fineness are the procedures used to maintain uniformity of NYTAL 3300. By testing NYTAL 3300 in a resin system, we find that these test procedures duplicate customers' coating requirements.

Particle Size Distribution - SediGraph 5100:

% finer than indicated size

	NYTAL 3300	NYTAL 300
Equivalent Spherical Diameter:		
20 µm	90	94
15 µm	75	85
10 µm	48	67
5 µm	16	37
2 µm	6	15
1 µm	3	7
Median Particle Size (µm)	10.5	7.2



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