February 2, 2017
Via Email: *sunbright200@verizon.net*

Mr. Craig T. Roberts VP
Sun Bright Coatings LLC
2005 Bay Breeze Court
Virginia Beach, VA 23454-1402

SUBJECT: Results of SR-17 Testing; KTA-Tator, Inc. Project No. 360740-R1

Dear Mr. Roberts:

In accordance with KTA-Tator, Inc. (KTA) Proposal No. PN167153-R1 and subsequent signed Authorization to Proceed dated October 11, 2016, KTA has completed specimen preparation and surface contaminant and adhesion testing of coupons treated with SR-17 on both blasted an unblasted surfaces. This report describes the testing procedures employed and contains the test results.

SUMMARY

Coupons were tested for chloride, sulfate and nitrates before and after pressure washing. Only chloride and a very small amount of sulfate was detected. The pressure washing did not substantially change the concentrations. The coupons were then treated with SR-17 and retested after seven days in an environmental chamber. The surfaces were again tested, and the levels of chloride were substantially reduced. Adhesion testing was then conducted following blasting of one-half of each coupon and coating application. The blasted portions exhibited an average coating tensile adhesion strength of 2246.1 psi, and the unblasted portions exhibited an average strength of 1608.7 psi (although results could not be obtained on two of the unblasted coupons)

SAMPLES

The materials listed in Table 1, "Samples" were received from Sun Bright Coatings LLC (Sun Bright) on October 13, 2016. It should be noted that at no time did KTA personnel witness the manufacturing or packaging of materials listed.

Table 1 – Samples

KTA ID	Sample ID	Description
360740-1	Designated as SR-17	1 Liter spray bottle of liquid
360740-2A Through 2D	2A, 2B, 2C, 2D	Four - 5″x 10″x ¼″ steel coupons with a diamond pattern on one side, each having rounded corners on one end, heavy rusting on all surfaces
360740-3A	Amercoat 235 Black 235B9903 Resin	0.8 Gallons of Resin component of Amercoat 235 two-part coating system
360740-3B	Amercoat 235 Cure USA	0.2 Gallons of Epoxy component of Amercoat 235 two-part coating system

LABORATORY INVESTIGATION

The laboratory investigation consisted of specimen preparation and exposure, and tensile adhesion. Descriptions of the testing performed and the results of the evaluations are provided below.

Specimen Preparation and Exposure

Two of the rusted panels (360740-2A and 360740-2B) were selected for chloride, sulfate, and nitrate testing throughout the course of preparation, and different test sites were employed for each test. The initial levels of chloride, sulfate, and nitrate were tested in accordance with ISO 8502:1998, "Preparation of Steel Substrates before Application of Paints and Related Products-Tests for the Assessment of Surface Cleanliness," Part 5, "Measurement of Chloride on Steel Surfaces Prepared for Painting (Ion Detection Tube Method)" and Part 11, "Field Method for the Turbidimetric Determination of Water-Soluble Sulfate." Testing was performed using a Chlor*Test™ CSN SCAT Kit with a LaMotte 1200 Chlor-Rid Colorimeter. All four of the coupons were then pressured washed at 2000 psi using an EX-CELL pressure washer and were allowed to dry at ambient laboratory conditions for 24 hours. The chloride, sulfate, and nitrates were tested again on the designated coupons. SR-17 (Sample 360740-1) was then applied to all coupons via spray bottle until the surface was completely saturated. The coupons were then placed in a Norlake Scientific cabinet to bake for 72 hours. Conditions during the bake continuously cycled between two hours set at 115°F and 85% relative humidity and two hours set at 115°F and ambient relative humidity. The SR-17 was then applied a second time as described above, and the coupons were returned to the Norlake Scientific cabinet for 168 hours (7 days) set at the same conditions. The coupons were then removed from the cabinet and remained at ambient conditions for 24 hours. A third test for surface chloride, sulfate, and nitrate was performed on the designated coupons, then all four coupons were again pressured washed at 2000 psi. The coupons were allowed to dry for 24 hours at ambient conditions. The results of the chloride, sulfate, and nitrate testing are provided in Table 2, "Results of Chlorides, Sulfates, and Nitrates Testing."

Table 2 – Results of Chlorides, Sulfates, and Nitrates Testing

Condition	Panel #	Chlorides	Nitrates	Sulfates
Initial	2A	22 µg/cm²	0 µg/cm²	2 µg/cm²
	2B	23 µg/cm²	0 µg/cm²	1 µg/cm²
Post-Pressure Washing	2A	16 µg/cm²	0 µg/cm²	1 µg/cm²
	2B	30 µg/cm²	0 µg/cm²	0 µg/cm²
Post SR-17 Application and 7 days in heat/humidity chamber	2A	2 µg/cm²	0 µg/cm²	0 µg/cm²
	2B	2 µg/cm²	0 µg/cm²	1 µg/cm²

Abrasive blast-cleaning was performed with 120 steel grit on one-half of the flat side of each coupon in an Empire glove box until a Near-White condition was achieved. The side that was not blasted was masked by clamping a steel panel over the half during blast-cleaning operations. The flat sides of the coupons were then coated on both the rusted and blasted halves with Amercoat 235 (Sample 360740-3) via conventional spray. The coating was thinned 15% by volume, and a Binks 2100 spray gun was used employing 10 psi pot pressure and 50 psi atomization pressure. The coating was applied at 10 mils wet film thickness per the product data sheet. The coated coupons were cured for 30 days at ambient laboratory conditions

Tensile Adhesion

Tensile adhesion (pull-off strength) was measured on the blasted and unblasted areas of all four coupons in accordance to ASTM D4541-09e1, "Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers," Annex A4, "Self-Aligning Adhesion Tester Type IV (Test Method D)." The testing surfaces were wiped clean and abraded gently using fine sandpaper. Loading fixtures with an abraded test surface were attached to the coating using a two component epoxy adhesive (Araldite 2011), which was allowed to cure for 24 hours at ambient laboratory conditions. The loading fixtures were then detached using a self-aligning pneumatic adhesion tester (PATTI-Pneumatic Adhesion Tensile Testing Instrument) employing the F-20 piston (range: 1013.8 – 10193 psi). The force (in psi) required to remove each loading fixture was recorded along with the location of break and approximate percentage of each. The results of the testing are provided in Table 3, "Results of Tensile Adhesion Testing." The location of break is defined as follows:

Adhesive Failure: A split between layers or a split between the substrate and the first layer.

Cohesive Failure: A split within a single layer.

Glue Failure: Coating strength exceeds glue strength.

Table 3 – Results of Tensile Adhesion Testing

Panel #	Substrate Condition	System	Pull Stub	Pull-off Strength (psi)	Avg. Pull-off Strength (psi)	Avg. Pull-off Strength (psi)	Location of break
2A	Blasted	Amercoat 235 (Black)	A	2441.6	2305.6	2246.1	100% cohesive failure within coating
			B	2237.6			100% cohesive failure within coating
			C	2237.6			100% cohesive failure within coating
2B	Blasted	Amercoat 235 (Black)	A	2441.6	2237.6		100% cohesive failure within coating
			B	2237.6			100% cohesive failure within coating
			C	2033.7			100% cohesive failure within coating
2C	Blasted	Amercoat 235 (Black)	A	2237.6	2305.6		100% cohesive failure within coating
			B	2237.6			100% cohesive failure within coating
			C	2441.6			100% cohesive failure within coating
2D	Blasted	Amercoat 235 (Black)	A	2237.6	2135.6		100% cohesive failure within coating
			B	2033.7			100% cohesive failure within coating
			C	2135.6			100% cohesive failure within coating
2A	Rusted	Amercoat 235 (Black)	D	1625.7	1489.7	1608.7	75% adhesive failure to the substrate, 25% cohesive failure within coating
			E	1421.7			90% adhesive failure to the substrate, 10% cohesive failure within coating
			F	1421.7			75% adhesive failure to the substrate, 25% cohesive failure within coating
2B	Rusted	Amercoat 235 (Black)	D*	-	-		100% cohesive failure within the rust layer
			E*	-			100% cohesive failure within the rust layer
			F*	-			100% cohesive failure within the rust layer
2C	Rusted	Amercoat 235 (Black)	D*	-	-		100% cohesive failure within the rust layer
			E*	-			100% cohesive failure within the rust layer
			F*	-			100% cohesive failure within the rust layer
2D	Rusted	Amercoat 235 (Black)	D	1319.8	1727.7		85% adhesive failure to the substrate, 15% cohesive failure within coating
			E	1829.7			95% adhesive failure to the substrate, 5% cohesive failure within coating
			F	2033.7			95% adhesive failure to the substrate, 5% cohesive failure within coating

** Strength required to remove loading fixture could not be determined. The underlying rust was too great and the loading fixtures were detached while attempting to place the piston on the fixture. Failure was entirely within the rust layer.*

If you have any questions or comments regarding this report, please contact me by telephone at 412.788.1300 extension 194, or by email at jcookson@kta.com.

Sincerely,

KTA-TATOR, INC.

Joshua Cookson
Project Manager/Coatings Application Specialist

R1 – A revision was issued at the client's request to clarify the results provided in Table 3, Pull-off Strength.

JHC/CSQ:pm:tbr
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