TECHNICAL NOTE

5 ASTM B117 Salt Spray Fog Test

Powder Coated Aluminum

A Technical Supplement from NLS Engineering

SUMMARY AND CONCLUSION:

Test samples of all color offerings show no visible deterioration per ASTM D1654 and ASTM D714 after 3,000 hours of exposure to ASTM B117 test method with only slight discoloration of test coupon #5, silver metallic.

Eight powder coated aluminum coupons were tested per *ASTM B117 Salt Spray Fog Test*. Each test sample was coated with standard NLS color offerings; white, dark gray, light gray, dark green, metallic, bronze, black, and green. All 8 test coupons were exposed for 3000 hours. Coupons were inspected at 1000, 2000, and 3000 hours with specific inspection criteria of creepage at scribe, blister frequency, and blister size. Slight discoloration was noticed on test coupon #5, silver metallic; no creepage or blisters were present. Results of testing are for powder coated aluminum typically used in the construction of NLS fixtures.

1 Introduction

The ASTM B117 is a standard test carried out to determine the corrosive effect of salt on metallic objects. It is done by spraying salt on a specimen housed in a closed chamber. This is an accelerated form for atmospheric corrosion testing. In this test, the corrosive atmosphere is introduced, allowing the test to be completed in less time than these corrosive processes would naturally occur. This is because conditions in this test are normally harsher than the ones present in the natural environment, see Table 1. ASTBM B117 is also known as salt spray testing or fog testing.

Test Parameters	Value(s)
Salt Solution	5 parts (by weight) of sodium chloride to 95 parts water
pH Range	6.5 to 7.2
Test Temperature	35 ± 2°C (95 ± 3°F)
Test Cycle	Continuous spray (fog)
Exposure Duration	3000 hours

Table 1) **ASTM B117 Test Parameters**

2 Interpretation of Results

The painted test samples were evaluated per *ASTM D1654 Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments* and *ASTM D714 Evaluating Degree of Blistering of Paints*.

2.1 ASTM D1654

An X pattern is scribed into the powder coated test coupons, see Figure 1. The scribed test coupons are then exposed to ASTM B117 testing. After the exposure the rate the corrosion or loss of paint extending from a scribe mark as prescribed in Table 2.

Figure 1) **Scribed Test Coupons**

Representative Mean Creepage From Scribe		
Millimetres	Inches (Approximate)	Rating Number
Zero	0	10
Over 0 to 0.5	0 to 1/64	9
Over 0.5 to 1.0	1/64 to 1/32	8
Over 1.0 to 2.0	1/32 to 1/16	7
Over 2.0 to 3.0	1/16 to 1/8	6
Over 3.0 to 5.0	1/8 to 3/16	5
Over 5.0 to 7.0	3/16 to 1/4	4
Over 7.0 to 10.0	1/4 to 3/8	3
Over 10.0 to 13.0	3/8 to 1/2	2
Over 13.0 to 16.0	1/2 to 5/8	1
Over 16.0 to more	5/8 to more	0

Table 2) **Creepage Rating**

2.2 ASTM D714

This test method employs photographic reference standards to evaluate the degree of blistering that may develop when paint systems are subjected to conditions which will cause blistering, see Figure 2.

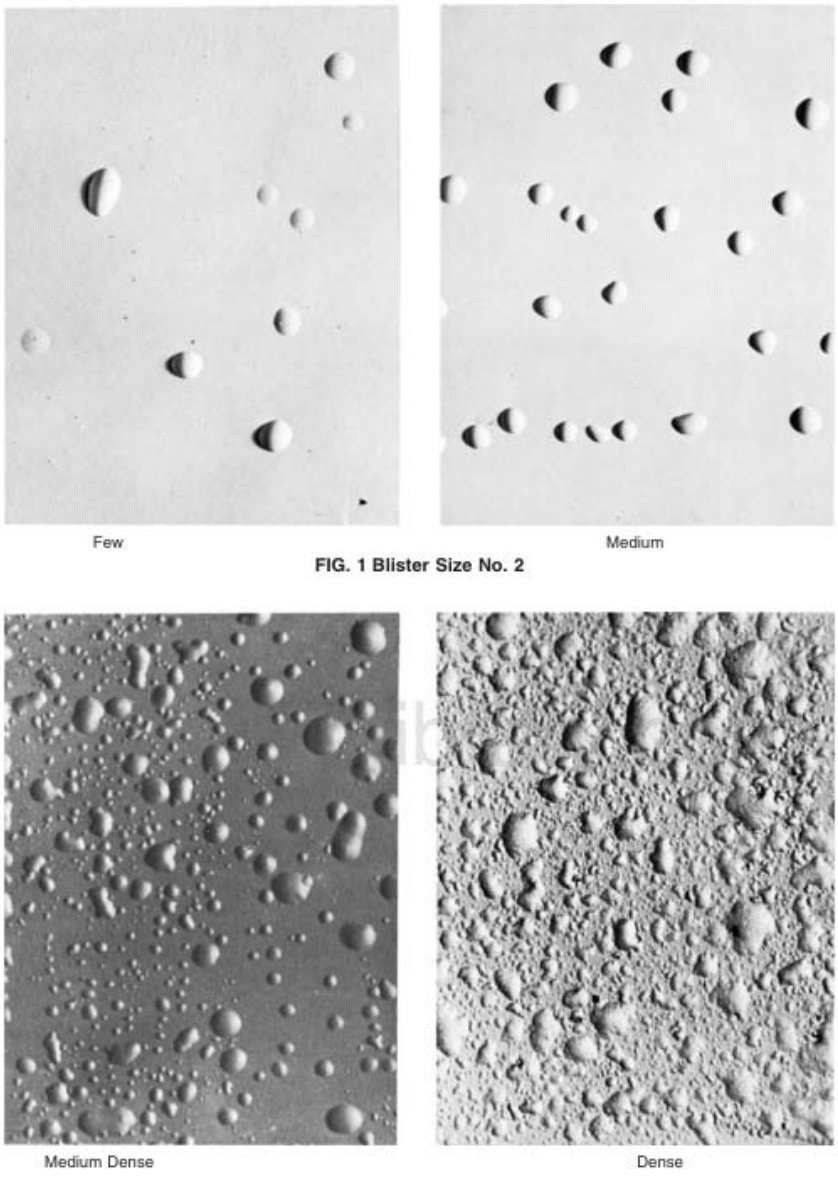

Figure 2) **Photographic Reference for Blistering**

3 Conclusion

Test samples of all color offerings show no visible deterioration of the finish per ASTM D1654 and ASTM D714 after 3,000 hours of exposure, see Table 3, with only slight discoloration of test coupon #5, silver metallic, see Figure3.

See Appendix A for complete test report.

Hours of Exposure	ASTM D1654	ASTM D714	
	Creepage at Scribe (Millimeters)	Blister Size (Area Failed %)	Blister Frequency
1000	0.0	No failure	None
2000	0.0	No failure	None
3000	0.0	No failure	None

Table 3) **Test Results**

1000 Hours 2000 Hours 3000 Hours

Figure 3) **Test Coupon #5, Silver Metallic – Slight Discoloration**

APPENDIX A

Salt Spray Test Report
(Per ASTM B117)

Customer: NLS Lighting
Product code: Not Known
Product color: Various
Project#: 2018R&D083
Date In: 06-19-2018
Date Out:

#1 Panel: White
#2 Panel: Light Gray
#3 Panel: Dark Gray
#4 Panel: Dark Green
#5 Panel: Metallic
#6 Panel: Bronze

Hours	Creepage at scribe						Blister frequency						Blister Size						Comments
	ASTM D1654			Rating			ASTM D714			Rating			ASTM D714			Rating			
	Panels						Panels						Panels						
	#1	#2	#3	#4	#5	#6	#1	#2	#3	#4	#5	#6	#1	#2	#3	#4	#5	#6	
1000	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
2000	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
3000	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	

Process: *The Panels are coated at the customer facility through their normal process*
Pre-treatment: *Not known*
Substrate: *Aluminum*

Equipment Parameters:
5% Salt solution in distilled water, ph7.1
Chamber temperature of 95f +/- 2f
Average collection rate of fog 1-2 ml/hour

ASTM Notations (as per ASTM D1654-92):

Creepage From Scribe		Creepage From Scribe		Rating of Unscribed Areas		Rating of Unscribed Areas	
Millimeters	Rating Number	Millimeters	Rating Number	Area Failed%	Rating Number	Area Failed%	Rating Number
0	10	Over 5.0-7.0	4	No Failure	10	21 to 30	4
Over 0 to 0.5	9	Over 7.0-10.0	3	0 to 1	9	31 to 40	3
Over 0.5 to 1.0	8	Over 10.0-13.0	2	2 to 3	8	41 to 55	2
Over 1.0-2.0	7	Over 13.0-16.0	1	4 to 6	7	56 to 75	1
Over 2.0-3.0	6	Over 16.0 to more	0	7 to 10	6	Over 75	0
Over 3.0-5.0	5			11 to 20	5		

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Salt Spray Test Report
(Per ASTM B117)

Customer: NLS Lighting
Product code: Not Known
Product color: Various
Project#: 2018R&D083
Date In: 06-19-2018
Date Out:

#7 Panel: Black
#8 Panel: Green

Hours	Creepage at scribe						Blister frequency						Blister Size						Comments
	ASTM D1654			Rating			ASTM D714			Rating			ASTM D714			Rating			
	Panels						Panels						Panels						
	#7	#8	#9	#10	#11	#12	#7	#8	#9	#10	#11	#12	#7	#8	#9	#10	#11	#12	
1000	10	10	-	-	-	-	10	10	-	-	-	-	10	10	-	-	-	-	
2000	10	10	-	-	-	-	10	10	-	-	-	-	10	10	-	-	-	-	
3000	10	10	-	-	-	-	10	10	-	-	-	-	10	10	-	-	-	-	

Process: *The Panels are coated at the customer facility through their normal process*
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Over 2.0-3.0	6	Over 16.0 to more	0	7 to 10	6	Over 75	0
Over 3.0-5.0	5			11 to 20	5		

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Salt Spray Test Report
(Per ASTM B117)

At 1000 hours

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Salt Spray Test Report
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At 2000 hours

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Salt Spray Test Report
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At 3000 hours

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