

Product Data Bulletin: Firefly™ Flexible LLEPM Tracking Firefly™ HPPL LLEPM

Dated: 1/9/2020

Description:

International Nameplate Firefly™ Flexible LLEPM Tracking is a High Performance Photo luminescent (HPPL) for use in transit applications. Firefly™ Flexible LLEPM Tracking is compliant with the American Public Transit Association Low-Location Exit Path Marking (LLEPM) APTA SS-PS-004-99 Rev2 standard.

- Meets or exceeds Bombardier Smoke and Toxicity SMP800C requirements
- Meets or exceeds FRA 49 CFR 238 flame and smoke requirements
- Strontium Oxide Aluminate Pigmentation
- High impact resistance
- Chemical and stain resistant
- No Radioactive materials used in the manufacture of this product

Applications and Uses:

The intended field of use is on the interior floor of a passenger rail car. Firefly™ Flexible LLEPM Tracking has been successfully installed using either high strength acrylic adhesive transfer tape, two part Epoxy Adhesive or can be seamed to existing flooring using either hot or cold welds. Adhesive chosen is at the sole discretion of the end user based on product best suited for their application.

Firefly™ products are designed to be installed where the available ambient light is 1 fc (10 lux) at a minimum.

Effective Performance Life:

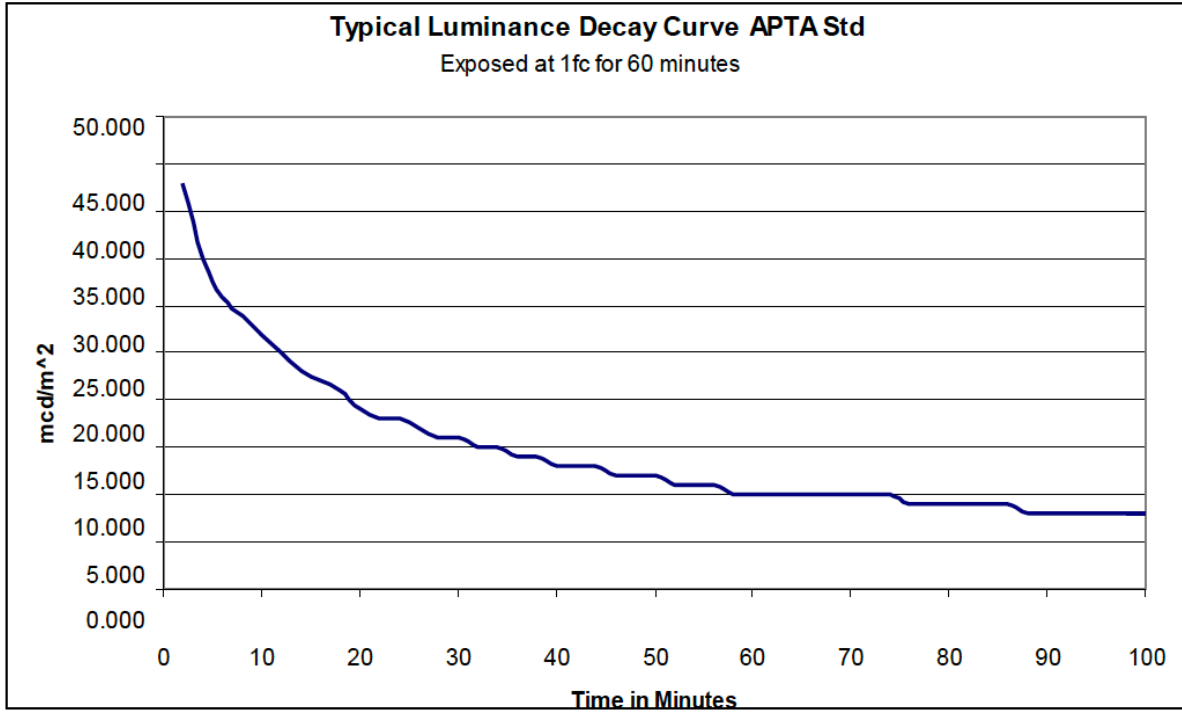
The effective performance life is based on field installations and laboratory results of the pigmentation. The effective performance life of Firefly products is expected to be in excess of 10 years from the date of purchase.

FRA Test results:

Test	Performance Criteria	Observed Measurement	
ASTM E 648-99	C.R.F. $\geq 5\text{kW/m}^2$	9.0	
ASTM E 662-97	Ds (1.5) ≤ 100	2	
	Ds (4.0) ≤ 200	19	
Bombardier SMP 800-C	Toxic Gas	Flaming Mode	Non Flaming Mode
	CO ≤ 3500 ppm	415	17
	CO ₂ ≤ 90000 ppm	19900	<50
	NO ₂ ≤ 100 ppm	7	7
	SO ₂ ≤ 100 ppm	<1	<1
	HCl ≤ 500 ppm	<1	<1
	HF ≤ 100 ppm	<1	<1
	HBr ≤ 100 ppm	<1	<1
	HCN ≤ 100 ppm	14	<1

Typical APTA Luminance Test Results

Time in Mins. mcd/m ²	Time in Mins. mcd/m ²	Time in Mins. mcd/m ²	Time in Mins. mcd/m ²
0	43	50	12
4	35	54	11
8	31	58	11
12	25	62	10
16	22	66	10
20	25	70	10
24	18	74	10
28	16	78	9
32	15	82	9
36	14	86	9
40	13	90	8
44	13	94	8
48	12	98	8



Physicals Properties			
Property	Conditions	Test	Value
Specific Gravity		ASTM D 792	1.49
Tensile Strength		ASTM D 412	2164 psi
Tensile Elongation		ASTM D 412	522%
Flexural Strength		ASTM D 790	377 psi
Flexural Modulus		ASTM D 790	0.01 psi E6
Impact Notched		ASTM D 256	2.72 N
Impact UnNotched		ASTM D 256	2.51 N
Impact Resistance	=>160 in./lb	ASTM D 2794	No Effect
Shore Hardness		ASTM D 2240	85A
Taber Abrasion	H-18 wheel; 1,000 g; 1,000 cycles	ASTM D 4060	20 – 30 mg
Bayshore resilience		ASTM D 2632	45%
Relative temperature index	Mechanical with impact	UL 746 B	252 °F
Low Temperature Brittle		ASTM D 746	<-90 °F
Coefficient of Friction		ASTM D 2047	.72/.92 Dry/Wet
Average Critical Radiant		ASTM E 648	0.78
Flexibility		ASTM D 4145	Passes
Salt Spray		ASTM B 117	Passes
Scrub Resistance		ASTM D 2486	1,000 – 5,000 cycles
Smoke Emissions		ASTM E 662	Passes
Solvent Resistance	MEK double rubs	ASTM D 4752	100

Resistance to Chemicals and Spillage (ASTM D 471-98)

Solutions Used	p ^H	Effects After 24 hrs		
		Stain Effects	Swelling	Gloss Change
5% Acetic Acid	4.6	None	None	None
Salt +Water (1:4ratio by wt.)	6.2	None	None	None
Coffee	6	None	None	None
Disinfectant Cleaner (1:20)	6.8	None	None	None
Window Cleaner	7	None	None	None
Cola	6	None	None	None
General Purpose Cleaner	>10	None	None	None

Resistance to Fumes, Splash, and Spillage, not Immersion (ASTM D 3912)

Solutions Used	Value
Acetone	Pass
Ammonium Hydroxide	Pass
Butyl Cellosolve	Pass
Cellosolve Acetate	Pass
Ethyl Alcohol	Pass
Hyjet #3	Pass
Isopropyl Alcohol	Pass
MEK	Pass
Methyl Alcohol	Pass
Perchloroethylene	Pass
Phosphoric Acid 35%	Pass
Potassium Hydroxide	Pass
Skydrol 500 A&B	Pass
Sodium Chloride	Pass
Toluene	Pass
Urine	Pass
Xylene	Pass

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