



EverGlow TL300 Epoxy Coating

26 September 2019

EverGlow TL300 Complies with UL1994, UL 410 & ASTM E2072 (2014)

The following Underwriters Laboratories (UL) Test Report shows that EverGlow TL300 Epoxy Coating, when mixed and applied as we direct, and charged by LED, fluorescent, mercury vapor and metal halide, meets the performance requirements of UL1994, UL410 and ASTM E2072 (2014).

EverGlow offers glass beads which are sometimes added to TL300, applied to the coating while it is curing. These UL tests indicate that the glass beads are not necessary for compliance with UL1994 and UL410. In fact, EverGlow no longer recommends the use of these glass beads unless they are sanded after the TL300 coating has completely cured.

EverGlow recently submitted samples of EverGlow TL300 Photoluminescent Epoxy Coating to Underwriters Laboratories to test for compliance with UL1994 and UL410. EverGlow TL300 Epoxy Coating cannot be listed by UL since it is prepared and applied in the field.

The International Building Code and the International Fire Code (from which local building and fire codes are derived), and the NFPA 101 Life Safety Code specify compliance with either of two performance standards for code approved Luminous EGRESS PATH Marking Systems. These performance standards are:

UL1994 - Luminous EGRESS PATH Marking Systems
or
ASTM E2072 (2014) - Photoluminescent Safety Markings

EverGlow TL300 Epoxy Coating is typically used to mark the stair nosings, and other walking surfaces (perimeter of landings & corridors, etc.) in the exit stairs of high rise buildings. TL300 complies with the ASTM E2072 (2014) performance standard; it is NOT listed to UL1994.

EverGlow prepared and submitted samples of TL300 epoxy for testing by UL. The following UL Test Report shows that EverGlow TL300 Epoxy Coating, when mixed and applied as we direct, meets the requirements of UL1994, UL410 and ASTM E2072 (2014).

UL1994 specifies a visibility test to be performed after the samples have been placed in complete darkness for 90 minutes, with the samples having been charged for 60 minutes at an illumination of 1 foot candle. The charging light source must be specified.

ASTM E2072 (2014) specifies a luminance test requiring a minimum of 30 mcd/m² after 10 minutes and of 5 mcd/m² after 90 minutes in the dark, with a charging time of 60 minutes at an illumination of 1 foot candle.

This UL testing was conducted with these charging light sources: fluorescent, LED, metal halide, and mercury vapor.

For components of Luminous EGRESS PATH Marking Systems used on stair nosings, UL1994 requires compliance with UL410 – Slip Resistance. UL410 requires an average coefficient of static friction of at least 0.50 when tested with a James Machine.

EverGlow offers glass beads which are sometimes added to TL300, applied to the coating while it is curing. These UL tests indicate that the glass beads are not necessary for compliance with UL1994 and UL410. In fact, EverGlow no longer recommends the use of these glass beads unless they are sanded after the TL300 coating has completely cured.

EverGlow TL300 Epoxy Coating, Luminance Test Results (UL1994)

Type of Light Source	Measured Luminance, mcd/m ²			
	10 min	30 min	60 min	90 min
Fluorescent	59.2	27.0	13.1	10.7
LED	36.4	17.0	8.9	6.3
Metal Halide	75.6	31.3	16.3	10.5
Mercury Vapor	89.4	36.2	18.1	12.1
UL1994	Yes, these samples are visible, viewed by an observer 25 feet away.			
ASTM E2072	30, minimum	-	-	5, minimum

EverGlow TL300 Epoxy Coating, Static Friction Test Results (UL410)

	Static Coefficient of Friction	Average
Specimen 1		
As-received	0.56,0.59,0.59,0.59	0.58
Specimen 2		
As-received	0.52,0.58,0.57,0.54	0.55
Specimen 3		
As-received	0.55,0.58,0.56,0.59	0.57
UL410 Requirement	0.45, minimum for each test value	0.50, minimum



2019-07-26
Mr. Charles Barlow
EVERGIOW NA INC
1122 Industrial Dr Po Box 830
Matthews, NC Mecklenburg 28106-0830
United States

Email: cvbarlow@everglow.us

Subject: Testing of Photoluminescent Strips TL-300 and TL-300Plus - Visibility Test, Luminance Measurement and Static Friction Test

Dear Mr. Barlow :

Per your request, project 4788922520 was established to conduct the Visibility Test, Luminance Measurement and Static Friction Test (required in UL 1994 as described in UL 410) on the subject Photoluminescent product in accordance to UL 1994, the Standard for Luminous Egress Path Marking Systems, 4th Edition with revisions through May 29, 2015. Our testing indicates the following for the Photoluminescent specimen. Also Test data and photos of the specimen have been included as an appendix to this report.

Compliance Test Results for Visibility Test – Strips TL-300 and TL-300Plus
Compliance Test Results for Static Friction Test - Strips TL-300
Non-Compliance Test Results for Static Friction Test - Strips TL-300Plus

UL Verification Services did not select the samples, determine whether the samples were representative of production samples, witness the production of the test samples, nor were we provided with information relative to the formulation or identification of component materials used in the test samples. The test results apply only to the actual samples tested.

The issuance of this report in no way implies Listing, Classification or Recognition by UL LLC and does not authorize the use of UL Listing, Classification or Recognition Marks or any other reference to UL LLC on any product or system. UL Verification Services authorizes Everglow NA INC to reproduce this Report provided it is reproduced in its entirety. The name, Brand or Marks of UL LLC cannot be used in any packaging, advertising, promotion or marketing relating to the data in this Report, without UL's prior written permission.

In no event shall UL be responsible to anyone for whatever use or nonuse that is made of the information contained in this Report and in no event shall UL, its employees or its agents, incur any obligation or liability for damages, including, but not limited to, consequential damages arising out of or in connection with the use, or inability to use, of the information contained in this Report.

This letter will serve to report that all tests on the subject product have been completed. This concludes all work associated with Project and we are therefore closing this project.

Thank you for the opportunity to provide your company with these services. Please do not hesitate to contact us if you should have any questions or comments.

Very truly yours,

Abdul Ahad
Staff Engineer

Reviewed by:

Ryan Barger
Engineering Leader

APPENDIX

VISIBILITY TEST:

UL 1994, Section 34

Facilities, equipment, and samples:

Item	Parameters/Characteristics
Observation Corridor	Able to exclude all light (including elimination of emergency lighting, exit signs, and light leakage from around doors or windows). Wide enough to accommodate 3 observers at – 0/+ 2 ft of the identified viewing distance. Marked for viewing distance of 25 ft.
Equipment	Stopwatch able to be read in dark conditions.
Observers	20/40 (or better) vision, as evidenced by a current license to operate a motor vehicle or any equivalent independent means of verification.
Path Marker Mounting Board	Matte black, 3' x 3' (unusually large path marker signs might require a larger mounting board), and with means to cover all markers and reveal them simultaneously.

Sample Conditioning:

1) The samples were conditioned in an air circulating oven for 7 hours @ 70 C. Upon removal, the samples were examined for shrinking, cracking, adhesive separation, or other evidence of deterioration. The samples were mounted to the Mounting Board as follows:

Path marker strips were arranged as three strips in the shape of a letter (“F”, “T”, or “H”), with no gaps between the adjacent strips.

After mounting, samples were stored for minimum 24 hours at room temperature and standard atmosphere with no light exposure.

2) Mounted samples were exposed to the following light sources for 60 minutes, at an intensity of 1 f-c (+/- 0.3 f-c) measured at the surface of the samples.

LED –Any LED array configuration, exposure to use an LED array of 4000 – 4500 K color temperature, seasoned for minimum 2 hours.

3) After the exposure period, samples were maintained in total darkness for 90 minutes.

4) At 90th minute, samples were exposed to the observers from a distance of 25 ft and a height from the floor of between 18 inches and 4 ft.

Observation:

Observers' eyes were adapted to normal room lighting [30 - 50 f-c] for at least five minutes. Then the observers entered the (dark) observation corridor, and their eyes were allowed to naturally adapt to total darkness for five minutes at which time the sample observations were to occur for photoluminescent material testing, the observers entered the corridor 85 minutes (115 minutes for ULC-S572) after removal of the activating light source). Observers identified the letter configuration of each sample set. The observation was recorded within 10 seconds. Otherwise the sample was considered as not visible.

Additional sample sets were observed, the observer group re-acclimated to normal ambient light conditions (30 - 50 f-c) for at least five minutes. Then the observers entered the (dark) observation room, and their eyes allowed to naturally adapt to total darkness for five minutes at which time the next set of sample observations are to occur.

RESULTS

Model No.: TL300 and TL300plus

Conditioning	Start date	Start time	Finish date	Finish time
70 °C	2019/07/10	7:54 AM	2019/07/10	3:00 PM
Room Environment	22.6C	52.7% R.H.	22.8C	52.6% R.H.
Storage (Total Darkness)	2019/07/11	7:49 AM	2019/07/16	7:50 AM
Light activation	2019/07/16	7:50 AM	2019/07/16	8:50 AM
Discharge (Total Darkness)	2019/07/16	8:50 AM	2019/07/16	10:20 AM
Observation	2019/07/16	10:20 AM	2019/07/16	10:21 AM

Observer data:

Observer #	MIN. 20:40 VISION STATUS METHOD		
	Vision test	Driver license	Other (specify)
1	-	x	-
2	-	x	-
3	-	x	-

Photo luminescent activation data:

	Activation Source			
	Incandescent, fc	Fluorescent, fc	LED, fc	Color Temp
	-	-	1	4000 – 4500K

TL300

Observation Distance: 25 ft

Observer	Accurate Detection of Specimen Orientation [Y] [N]?
1	Y
2	Y
3	Y

TL300plus

Observation Distance: 25 ft

Observer	Accurate Detection of Specimen Orientation [Y] [N]?
1	Y
2	Y
3	Y

Compliance Criteria:

The configuration of the sample set were accurately identified by all three observers and the results were considered acceptable.

LUMINANCE MEASUREMENT TEST:

METHOD

The luminance of the path marker were measured after being subjected to the following conditioning sequence.

- The sample was stored in the total darkness for minimum 24 hours.
- The sample was exposed to straight tube, T8 or T12, 4000 – 4500 K color temperature fluorescent lamp, Metal Halide, --Mercury Vapor and LED array, 4000 – 4500 K color temperature for 60 minutes, at an intensity of 1 f-c (+/- 0.3 f-c) measured at the surface of the samples.
- The sample was maintained in total darkness while the measurements below were taken.
- The emitted luminance was recorded at 10, 30, 60, and 90 minutes after light exposure.

RESULTS

Fluorescent

Model	Measured Luminance, cd/m2			
	10 min	30 min	60 min	90 min
TL300	0.0592	0.0270	0.0131	0.0107
TL300plus	0.0548	0.0237	0.0127	0.0080

LED

Model	Measured Luminance, cd/m2			
	10 min	30 min	60 min	90 min
TL300	0.0364	0.0170	0.0089	0.0063
TL300plus	0.0301	0.0133	0.0072	0.0049

Metal Halide (MH)

Model	Measured Luminance, cd/m2			
	10 min	30 min	60 min	90 min
TL300	0.0756	0.0313	0.0163	0.0105
TL300plus	0.0750	0.0311	0.0157	0.0100

Mercury Vapor (MV)

Model	Measured Luminance, cd/m2			
	10 min	30 min	60 min	90 min
TL300	0.0894	0.0362	0.0181	0.0121
TL300plus	0.0781	0.0317	0.0162	0.0107

STATIC FRICTION TEST

UL 410, Section 4

METHOD

The James Machine was used in accordance to the method described within Section 4.16 of UL 410, the static coefficient friction of three specimen path markers intended to be installed on a stair nosing was measured (considered to be **WCM** material, in the context of UL 410).

A simulated corrugated leather shoe was used on **WCM** products. The test shoe did have two equally spaced grooves 1/8 by 1/8 by 3 inches (3.2 by 3.2 by 76.2 mm) in each direction; 90 degrees apart. See Figure 4.3 of UL 410. The corrugated leather test shoe was securely glued to the steel shoe holder of the James Machine.

The test was conducted on three stair nosing path marker specimens in an “as-received” condition, and on three additional specimens that were to be belt-sanded with 1/2 (60) grit aluminum oxide paper for 1 minute. No coatings (water, oil, etc.) were applied to any specimens.

RESULTS

Model TL-300

Specimen 1	Static Coefficient
as-received	0.56,0.59,0.59,0.59,=0.58AVG
sanded	0.89,0.89,0.87,0.86,=0.88AVG
Specimen 2	Static Coefficient
as-received	0.52,0.58,0.57,0.54,=0.55AVG
sanded	0.88,0.89,0.84,0.88,=0.87AVG
Specimen 3	Static Coefficient
as-received	0.55,0.58,0.56,0.59,=0.57AVG
sanded	0.91,0.88,0.88,0.91,=0.90AVG

Compliance Criteria:

The average static coefficient of friction shall be at least 0.50 and individual static coefficients of friction shall be at least 0.45 when tested in accordance with the requirements of UL 410.

3 samples of Model TL300 covered by this report were found to have a slip resistance characteristic greater than the minimum acceptable value of 0.50 and the results of this test complied with the requirements.

STATIC FRICTION TEST (Cont'd)

Model TL300 PLUS

Specimen 1	Static Coefficient
as-received	0.35,0.37,0.33,0.36,=0.35AVG
sanded	0.62,0.65,0.63,0.66,=0.64AVG

Specimen 2	Static Coefficient
as-received	0.32,0.33,0.36,0.36,=0.34AVG
sanded	0.58,0.62,0.59,0.62,=0.60AVG

Specimen 3	Static Coefficient
as-received	0.36,0.33,0.35,0.36,=0.35AVG
sanded	0.61,0.64,0.62,0.60,=0.62AVG

Compliance Criteria:

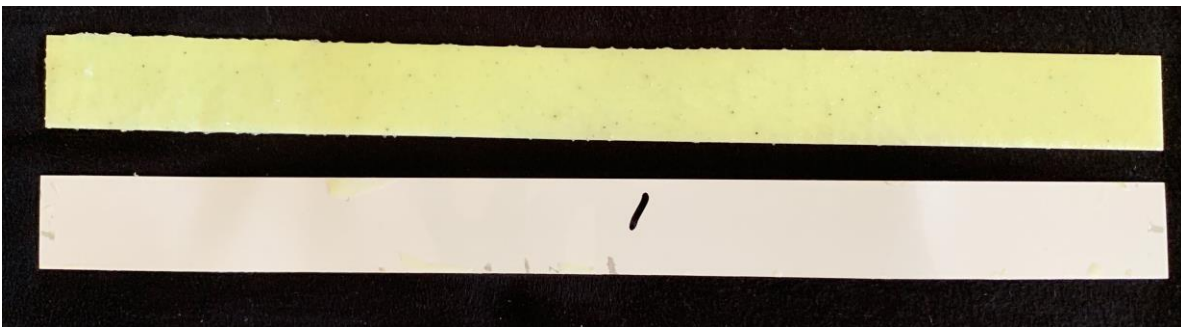
The average static coefficient of friction shall be at least 0.50 and individual static coefficients of friction shall be at least 0.45 when tested in accordance with the requirements of UL 410.

3 samples of Model TL300 PLUS covered by this report were found to have a slip resistance characteristic LESS than the minimum acceptable value of 0.50 when tested as received . The results of this test did not comply with the requirements.

Photos



Model TL300 [Top PL (yellow), back thin painted aluminum (white)]



Model TL300 PLUS [Top PL (yellow), back thin painted aluminum (white)]