

Ecoglo International Limited

Technical Manual

for

Photoluminescent Emergency Visibility
(including Outdoor Means of Egress)
Specification for L Markers on Steps



Contents:

Photoluminescent Emergency Visibility (including Outdoor Means of Egress) Specification for L Markers on Steps.....	3
Appendices.....	9

Section 10 14 43

Ecoglo Photoluminescent Emergency Visibility (including Outdoor Means of Egress)
Specification for L Markers on Steps

This specification has been numbered, organized and formatted in accordance with the MasterFormat, Section Format and Page Format documents published jointly by Construction Specifications Institute (CSI).

It is offered as a guide to experienced and knowledgeable construction professionals who assume full responsibility for its interpretation and use.

Square brackets [] containing text indicate an option to be considered/inserted by the specifier. Remove brackets and unused options before printing.

Section 10 14 43

Photoluminescent Emergency Visibility (including Outdoor Means of Egress)
Specification for L Markers on Steps

Part 1 General

1.1 Summary

- A Work Included: Supply and installation of photoluminescent L markers to mark the sides of steps.

1.2 Design Requirements

- A This specification is intended to provide minimum requirements for photoluminescent L markers for steps that will aid in evacuation from buildings in the event of failure of both the power and back-up power to the lighting.
- B Photoluminescent L markers shall provide visibility of steps.
 - 1 Photoluminescent material in L markers shall be recessed within powder coated aluminium (aluminum) ridges which protect the photoluminescent material.
 - 2 Photoluminescent material utilized in L markers shall not have an abrasive texture that collects dirt and results in lower photoluminescent performance.
 - 3 Photoluminescent L markers shall be aluminium (aluminum) based and manufactured using High Temperature Curing (HTC) technology.
- C L markers shall meet the visibility requirements of UL 1994, OR New York Building Code Reference Standards RS 6-1 and RS 6-1A (2005).
- D Where photoluminescent L markers are installed, they shall be provided with not less than 54 lux of illumination for not less than 60 minutes prior to periods when the building is occupied, and continuously during the building occupancy.
Where the means of egress extends outdoors, daylight will provide sufficient illumination to ensure the photoluminescent L markings remain sufficiently charged to operate throughout the night.

1.3 References

- A [Underwriters Laboratories, Inc. (UL) UL 1994 Standard for Safety, Luminous Egress Path Marking Systems.]
[New York Building Code Reference Standards RS 6-1 and RS 6-1A (2005) – Photoluminescent Exit Path Markings.]

1.4 Quality Assurance

- A Manufacturer Qualifications: to have minimum of 25 years' experience with similar work.
- B Installer Qualifications: to be manufacturer trained/authorized installer.

1.5 Submittals

- A Submit the following [in accordance with Section 01 33 00 – Submittal Procedures]:

- 1 Product Data: Manufacturer's product data sheets for materials used in system.
- 2 Shop Drawings: Provide drawings showing details, dimensions, extent of work, and other data necessary for the satisfactory installation of the products stated herein for compliance with the local building code requirements.
- 3 Manufacturer's Instructions: Pre-printed material describing installation of product, system or material, including special notices, and maintenance and cleaning instructions.
- 4 Test Reports: Submit independent test reports to verify compliance with relevant standards as detailed in 2.2A(3) and 2.2A(4).
- 5 Substitutions: Substitutions must be submitted and approved prior to bid date. All requests shall include test results, product descriptions, confirmation of piece design and engineering calculations meeting design criteria.

Include the following for submission of sustainable design submittals.

- B Sustainable Design Submittals:
 - 1 Regional Materials: Certify manufacturing location.
 - 2 Construction Waste Management Divert from Land Fill: Certify if products are made with materials that are recyclable.
 - 3 Recycled Content: Certify percent recycled content and designate whether pre-consumer or post-consumer.
 - 4 VOC content for installation adhesives.
- 1.6 Delivery, Storage and Handling
 - A Handle and store products in a manner to prevent damage, deterioration and soiling to products, other building components, assemblies, other products, the structure, the site and surrounding property and in accordance with manufacturer's instructions.
 - B Store products subject to damage from weather in weatherproof enclosures.
- 1.7 Warranty
 - A Provide manufacturer's limited warranty. Warranty to cover defects in materials and workmanship.
 - 1 30 Year Warranty on photoluminescent performance of L markers when positioned indoors.
 - 2 15 Year Warranty on photoluminescent performance of L markers when positioned outdoors.

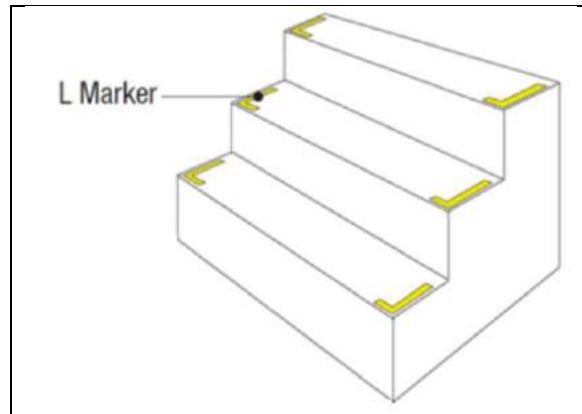
Part 2 Products

- 2.1 Manufacturers
 - A Contract Documents are based on products by Ecoglo International Ltd. (www.ecoglo.com)
 - B Substitutions: [Under provisions of Division 01.] Submit for consideration prior to bid closing.

2.2 Materials

- A High Temperature Curing (HTC) L Markers
- 1 Extruded 6063T5 Aluminium (Aluminum) Section
 - 2 Photoluminescent material: manufactured using HTC technology - strontium aluminate-based photoluminescent pigment embedded in thermoset polyester carriers that integrally bond the active ingredients into powder coated aluminium (aluminum) substrates following curing at 180°C.
 - 3 Materials shall meet the UL 1994 visibility test.
 - 4 All HTC L Markers to meet or exceed the performance criteria specified in the following tests or standards. PC = Performance Criteria
 - a. UV Resistance
ASTM G155-04 Cycle 1 1000hrs, Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials. PC – Loss in luminance after exposure < 10%
 - b. Salt Spray Resistance
ASTM B117-97, Standard Practice for Operating Salt Spray (Fog) Apparatus. PC – Slight corrosion build up along scribes, no blistering or filiform growth along scribes.
 - c. Washability
ASTM D4828-94 (2003), Standard Test Methods for Practical Washability of Organic Coatings. PC – crayon, pen, 3M soil: all rating 10, being complete removal of soilant.
 - d. Rate of Burning
ASTM D635-03, Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position. PC – Time of burn 0 seconds, does not burn.
 - e. Surface Flammability
ASTM E162-02, Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source. PC – Flame spread index 7.6, ignites with difficulty.
 - f. Toxicity
Bombardier Toxic Gas Generation Test SMP800-C.
PC – Pass.
 - g. Radioactivity
ASTM D3648-2004, Standard Practices for the Measurement of Radioactivity. PC – Pass.
 - h. High Temperature Curing
Independently tested by placing 3 samples in an oven at 150°C for 20 minutes and then examining the samples after removing from the oven. PC – the samples shall have no shrinkage, delamination, distortion, or yellowing.

2.3 Components
A L Markers on Steps



- 1 L Marker Product Code: [S5-LM22080 L Marker]
Description: [26mm wide aluminium (aluminum) base photoluminescent L shaped side of steps marker. Long edge is 216mm. Short edge is 77mm. Available in a pack containing 10 x left side L Markers and 10 x right side L Markers.]

[Click Here](#) to view *Ecoglo L Marker*

Part 3 Execution

- 3.1 Examination
 - A Before installation, examine surfaces on which the work of this section depends. Notify [Contractor] if substrates do not comply with requirements of this section
 - B Ensure any painted surfaces are fully cured.
 - C Do not proceed with work of this Section until all unsatisfactory conditions have been corrected, if any.
 - D Commencement of Work will imply acceptance of surfaces.
- 3.2 Preparation
 - A Clean surfaces to remove dirt, dust, grease, oil, loose material, frost, paint, coatings, or other matter that may affect bonding or installation of photoluminescent products.
 - B Test substrates for fit with products before using adhesives or mechanical fastening.
- 3.3 Installation

Unless otherwise indicated in the specifications, install Products in accordance with manufacturer's instructions. Obtain written instructions directly from manufacturer.

3.4 Cleaning

- A Trim any excess adhesive with a sharp blade.
- B At completion of installation, clean soiled Product surfaces in accordance with manufacturer's instructions.

3.5 Waste Management and Disposal

- A Separate waste materials for [reuse] [and] [recycling] at nearest used building materials facility.
- B Divert unused caulking, sealants and adhesive materials from landfill through appropriate disposal procedures.

3.6 Protection

- A Allow 24 hours for adhesive cure with no foot traffic permitted.
- B Protect areas from damage using barriers, markers or temporary signs as required.
- C Do not allow heavy objects to come into contact with installed products.

End of Section

Appendices to

Ecoglo International Ltd

Technical Manual

for

Photoluminescent Disaster Preparedness

Signs



Contents:

Appendix 1 – Product Data Sheets	11
Appendix 2 – Installation Instructions	13
Appendix 3 – Product Test Reports	16
Appendix 4 – Quality Assurance Document	40
Appendix 5 – Warranty	42
Appendix 6 – Maintenance and Cleaning Instructions	44

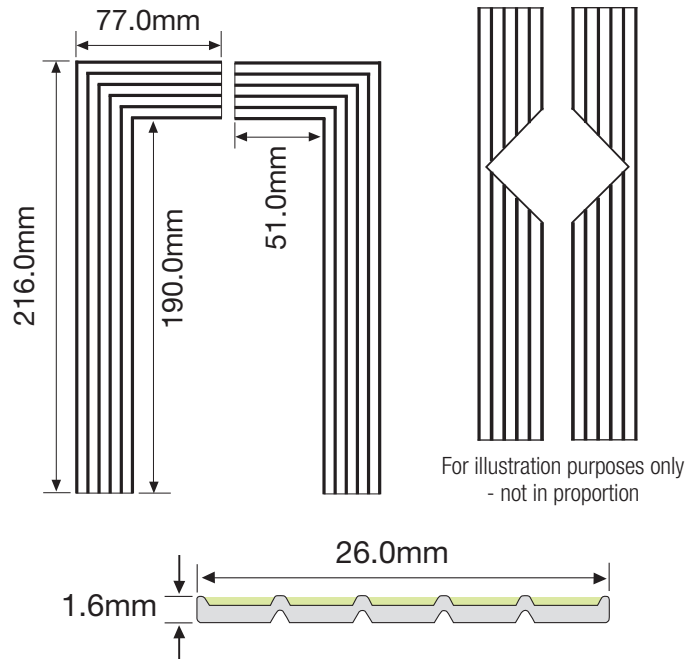
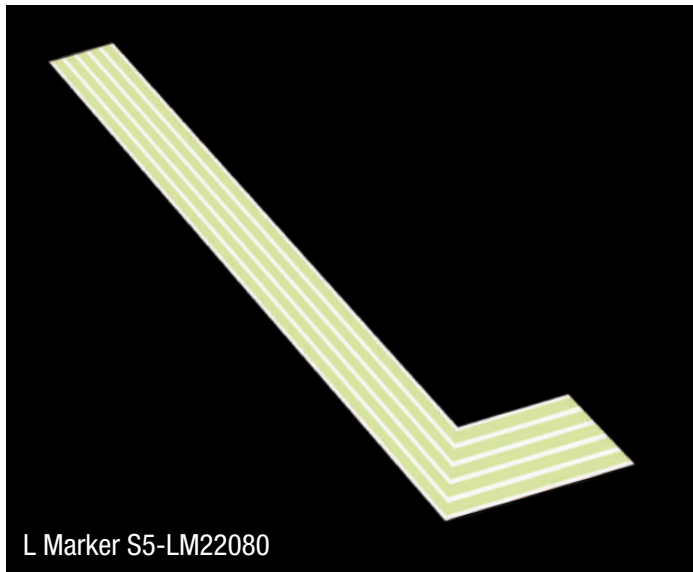
Appendix 1

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Product Data Sheet

Product Data Sheet - L Marker S5-LM22080

2023 V2



Ecoglo L Marker has been designed to ensure visibility of the sides of steps in buildings. The L Marker will be effective in all light conditions including during failure of the main lighting.

COMPLIANCE

The L Marker is suitable for use indoors and outdoors. UL1994 tested, the L marker will provide visibility in low light conditions.

UV Resistance - Loss of luminance after 1000 hrs ASTM G-155 Cycle 1 exposure: <10%: Pass

Salt Spray Resistance - ASTM B117: Pass

Washability - ASTM D4828: Pass

Rate of Burning - ASTM D635: Pass

Surface Flammability - ASTM E162: Pass

Toxicity - Bombardier Toxic Gas Generation Test SMP800-C: Pass

Radioactivity - ASTM D3648: Pass

High Temperature Curing: Pass

SUPPLY

The product is available in a pack containing 10 x left side L Markers and 10 x right side L Markers. The L Marker is supplied as a straight length with a notch cut out (as in drawing) so that it can be folded into an L shape at installation.



COMPOSITION

The L Marker is manufactured from extruded 6063T5 aluminium section. Custom made photoluminescent pigment is embedded in thermoset polyester carriers to integrally bond the active ingredients into the aluminium following curing at high temperature. The photoluminescent area is also recessed into protective channels.



INSTALLATION

Indoors the L Marker can be surface mounted on all smooth surfaces. Outdoors the L Marker can be surface mounted onto concrete.

Installation needs to be carried out strictly in accordance with the Ecoglo installation instructions.

Consult Installation Instructions on website for full details and surface preparation.

(See order codes below for the product that best suits).

S5-LM22080 L Marker for polyurethane adhesive fixing

Contact

Ecoglo Fire Protection Product Trading

Address: 36-C Gloria Street, Barangay San Carlos, Binangonan Rizal 1940, Philippines

Office: +632-8802-4760

Cell: +63917-514-6803

+63968-356-4773

Email: keith.phillips@ecoglo.com

Web: www.ecoglo.ph www.EcogloAsia.com www.EcogloVenues.com

Appendix 2

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Installation Instructions

Installation Instructions For

L Marker S5-LM22080
Side of Steps Marker

Ecoglo markers are to be installed only where there will be sufficient natural or artificial light to keep them charged whenever the building is occupied.

If unsure, contact Ecoglo



L Marker S5-LM22080 Side of Steps Marker

Preparation of Surface

- Thoroughly clean the surface with industrial strength cleaner if necessary.
- Allow surface to dry.
- If painted or coated, remove using an angle grinder with abrasive flap disc.
- Brush/vacuum off the dust.
- Wipe surface with acetone.



Alignment of the Markers

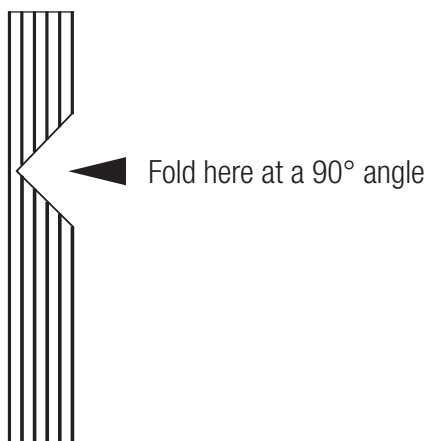
- Mark 5mm in from the left edge and right edge of each step.

Preparation of the Marker

- Clean the back of the marker with a soft cloth and if necessary use methylated spirits (or similar solvent) to remove any oil or grease.
- Allow to dry for approximately 1 minute.

Folding of the Marker

- Carefully fold the marker where indicated at a 90° angle
WARNING - it is important that folding is done correctly and once only to reduce the risk of breaking the marker.



Applying the Adhesive

- Apply a 3mm zigzag bead of polyurethane adhesive (such as Wurth KD Bond and Seal or Bostik Seal n Flex FC) to the back of the marker, 3mm in from all edges.

Ecoglo can supply Wurth KD Bond and Seal in 600ml Sausage form with Applicator Gun.

Placement of the Marker

- Line up the strip carefully with your alignment marks ensuring the marker is straight.



Apply Pressure to the Marker

- Apply even pressure to spread the adhesive beneath the marker using a hand roller.
- If necessary, stand on each marker to ensure good contact between the marker and the step.

Allow the Adhesive to Cure

- Immediately following installation close off the area for a period of 8 hours to avoid the Ecoglo marker being moved whilst the adhesive is in the early stages of "cure".
- Wait until adhesive has fully cured (allow at least 24 hours) before trimming any excess from each marker with a sharp blade.

Appendix 3

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Product Test Reports

Contents	Page
UL 1994 Standard for Luminous Egress Path Marking Systems	18
ASTM G155-04 Cycle 1 1000 hours, Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Metals	26
ASTM B117-97 500 hours, Standard Practice for Salt Spray (Fog) Apparatus	29
ASTM D4828-94 (2003), Standard Test Methods for Washability of Organic Coatings	30
ASTM D635-03, Standard Test Method for Rate of Burning and/or Extent and Time of Burning Plastics in a Horizontal Position	31
ASTM D3648-2004, Standard Practices for the Measurement of Radioactivity	32
ASTM E162-02, Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source	32
Bombardier Toxic Gas Generation Test SMP800-C	35
High Temperature Curing (HTC) Test (based on AS/NZS 1580.481.1)	38

CERTIFICATE OF COMPLIANCE

Certificate Number UL-US-L45151-11-03109102-1
Report Reference SA45151-20190130
Date 13-Sep-2021

Issued to: Ecoglo International Ltd
77 Kingsley St Christchurch
New Zealand 8023

This is to certify that representative samples of IMZI - Luminous Egress-path-marking Systems
See Addendum Page for Product Designation(s).

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

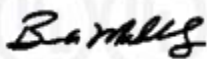
Standard(s) for Safety: UL 1994, 4th Ed., Issue Date: 2015-05-29

Additional Information: See the UL Online Certifications Directory at <https://iq.ulprospector.com> for additional information

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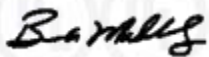


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Model	Category Description
E14-035	Photoluminescent Floor proximity egress path marking systems
E14-055	Photoluminescent Floor proximity egress path marking systems
E14-065	Photoluminescent Floor proximity egress path marking systems
E14-075	Photoluminescent Floor proximity egress path marking systems
E15-073	Photoluminescent Floor proximity egress path marking systems
E2-031	Photoluminescent Floor proximity egress path marking systems
E2-051	Photoluminescent Floor proximity egress path marking systems
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E2-071	Photoluminescent Floor proximity egress path marking systems
E2031	Photoluminescent Floor proximity egress path marking systems
E2051	Photoluminescent Floor proximity egress path marking systems
E2061	Photoluminescent Floor proximity egress path marking systems
E2071	Photoluminescent Floor proximity egress path marking systems
E3-031	Photoluminescent Floor proximity egress path marking systems
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E3051	Photoluminescent Floor proximity egress path marking systems



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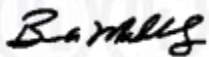
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E3061	Photoluminescent Floor proximity egress path marking systems
E3071	Photoluminescent Floor proximity egress path marking systems
E4-031	Photoluminescent Floor proximity egress path marking systems
E4-033	Photoluminescent Floor proximity egress path marking systems
E4-051	Photoluminescent Floor proximity egress path marking systems
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E4-061	Photoluminescent Floor proximity egress path marking systems
E4-063	Photoluminescent Floor proximity egress path marking systems
E4-071	Photoluminescent Floor proximity egress path marking systems
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G5001	Photoluminescent Floor proximity egress path marking systems
G6-001	Photoluminescent Floor proximity egress path marking systems
G6-003	Photoluminescent Floor proximity egress path marking systems
G6001	Photoluminescent Floor proximity egress path marking systems



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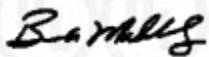
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H5-003	Photoluminescent Floor proximity egress path marking systems
H5001	Photoluminescent Floor proximity egress path marking systems
S5-ARD1010	Photoluminescent Floor proximity egress path marking systems
S5-ARS1010	Photoluminescent Floor proximity egress path marking systems
S5-DHM1010	Photoluminescent Floor proximity egress path marking systems
S5-RM2010	Luminous Egress-Path-Marking Systems
S5-RMDA2010	Luminous Egress-Path-Marking Systems
S5-RMDL2010	Luminous Egress-Path-Marking Systems
S5-RMDR2010	Luminous Egress-Path-Marking Systems
S5-RML2010	Luminous Egress-Path-Marking Systems
S5-RMR2010	Luminous Egress-Path-Marking Systems
S5-RMUA2010	Photoluminescent Floor proximity egress path marking systems
S5-RMUL2010	Luminous Egress-Path-Marking Systems
S5-RMUR2010	Luminous Egress-Path-Marking Systems



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New Zealand 8023

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for Canada

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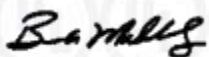
Standard(s) for Safety: ULC S572, 2nd Ed., Issue Date: 2017-02-01

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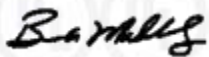


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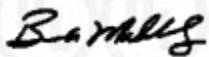
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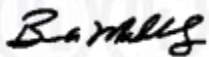
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S5-RMR2010	Luminous Egress-Path-Marking Systems
S5-RMUA2010	Photoluminescent Floor proximity egress path marking systems
S5-RMUL2010	Luminous Egress-Path-Marking Systems
S5-RMUR2010	Luminous Egress-Path-Marking Systems



Bruce Mahrenholz, Director North American Certification Program

UL LLC

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SINCE 1886

REPORT

Intertek ETL SEMKO

3933 US ROUTE 11 CORTLAND, NEW YORK 13045

Order No. 3078911

Date: November 15, 2005

REPORT NO. 3078911CRT-006

TEST OF FOUR PHOTOLUMINESCENT MATERIAL MODELS

RENDERED TO

ECOGLO LTD.
77 KINGSLEY ROAD
CHRISTCHURCH, NEW ZEALAND 8002

DATA REQUESTED

Luminance measurements after activation tests on four photoluminescent material models after UV exposure in accordance with New York City Building Code Reference Standards RS 6-1 and RS 6-1A: Photoluminescent Low-level Exit Path Markings.

AUTHORIZATION

This test service was authorized by signed quote number 18761099.

DEVICES SUBMITTED

The client submitted three photoluminescent material samples each of four Models: G3001C/E2071C, and G5001C/H5001C. The samples were received by Intertek on June 18, 2005 in undamaged condition, and tested as received. The sample designations are E2218Z through E2223Z.

DATE OF TESTS

June 28, 2005 through November 13, 2005.

TEST SUMMARY

NYC Building Code RS 6-1A Photoluminescent Low-level Exit Path Markings	Model G3001C/E2071C	Model G5001C/H5001C
Clause 1.0 Brightnes Rating Post UV Exposure	Complies	Complies

An independent organization testing for safety, performance, and certification.

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EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Calibration Date
Optronic Luminance Standard	455-6-2	Y174	09/30/04
Optronic based Luminance Meter consisting of:			
Optronic Photometer	730C	E290	06/23/05
Optronic Direct Viewing Module	600	---	---
Optronic Amplified Photodetector	730-5H-LED	---	---
Fisher Scientific Stopwatch	---	N853	05/05
UDT Illumination Meter	S371R	L060	09/02/04

TEST AND TEST METHODSelective Process

After evaluation at Intertek, it was determined that Models G3001C and E2071C are identical in regards to luminance performance and that Models G5001C and H5001C are identical in regards to luminance performance.


Luminance Measurements Before and After Weathering Test

The luminance measurements were made on the photoluminescent test samples with the Intertek License Plate Test Apparatus. The center of each test sample was measured at normal (0°) viewing angle. The aperture of the Optronic based luminance meter was adjusted in order to view the maximum area on the test sample. The Intertek License Plate Test Apparatus consists of a Optronic based luminance meter and a horizontal and vertical movement system. The luminance calibration of the luminance meter is traceable to the National Institute of Standards and Technology through the calibration of the Optronic Luminance Standard.

The test samples were conditioned for at least 16 hours at zero footcandle illumination. The photoluminescent material samples were then conditioned for 120 minutes (two hours) by 2 footcandle illumination from a 4100K fluorescent light source. Luminance measurements were made on each test sample at two minutes intervals after conditioning for a period of one hour and at ninety minutes after conditioning. Luminance measurements were reported for ten minutes, sixty minutes and ninety minutes after conditioning.

Weathering Tests

The test samples were sent to Canesis Network Limited for 1000 hours exposure to Xenon Arc light apparatus per ASTM G155 Cycle 1. The samples were returned to Intertek for the post UV luminance measurements. Average post UV luminance measurements must be at least 90% of the initial average luminance measurements at each time interval.

Checked by: 

RESULTS OF TESTLuminance Measurements After Two Hours Activation Period

Model No. G5001C/H5001C
Intertek Sample Nos. E2220Z, E2218Z, E2219Z
 Luminance (mcd/m²)

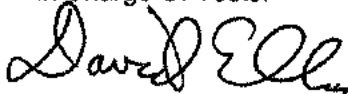
Time After Exposure	Sample One	Sample Two	Sample Three	Average	Specified Minimum
<u>Pre UV Exposure</u>					
Ten Minutes	41.1	40.8	42.3	41.4	30
One Hour	9.96	9.66	10.25	9.96	7.0
Ninety Minutes	6.56	6.37	6.78	6.57	5.0
<u>Post UV Exposure</u>					
Ten Minutes	37.6	37.5	36.9	37.3	37.3*
One Hour	10.09	9.54	10.19	9.94	8.96*
Ninety Minutes	6.97	6.41	7.02	6.80	5.91*

Model No. G3001C/E2071C
Intertek Sample Nos. E2222Z, E2221Z, E2223Z
 Luminance (mcd/m²)

Time After Exposure	Sample One	Sample Two	Sample Three	Average	Specified Minimum
<u>Pre UV Exposure</u>					
Ten Minutes	105.6	104.7	107.3	105.9	30
One Hour	29.0	28.5	29.2	28.9	7.0
Ninety Minutes	20.2	19.7	20.1	20.0	5.0
<u>Post UV Exposure</u>					
Ten Minutes	99.1	97.2	100.0	98.8	95.3*
One Hour	27.3	28.4	27.6	27.8	26.0*
Ninety Minutes	18.1	19.4	18.4	18.6	18.0*

* Specified minimum is 90% of average initial luminance value at each time interval

In Charge Of Tests:



David Ellis
 Project Engineer
 Photometric Testing

Report Reviewed By:



Ernest Dykeman
 Senior Project Engineer
 Photometric Testing

Attachment: None



Scientific Services
Laboratory

Report No: XC2278/R1

TEST REPORT
SALT SPRAY TESTING OF STAIR NOSING

File: BPB/MISC

1. SAMPLE DETAILS

Client: Delwyn Ralston
LincLab Ltd
Private Bag 4749
Christchurch New Zealand

Sample Details: Five samples of aluminium stair nosings with anti-slip and photoluminescence inserts.

Requirements: To determine the salt spray resistance on the stair nosing.

2 TEST DETAILS-NATA REGISTRATION 219

2.1 Salt Spray

The samples were exposed in a Singleton Model 21 Salt Spray Cabinet for 500 hours. A second sample of 120201 J was kept as a reference sample. The salt spray testing was carried out in accordance with ASTM B117-97 'Standard Test Method of Salt Spray (Fog) Testing'.

2.2 Evaluation

After exposure, the samples were evaluated in accordance with ASTM D1654-92 'Evaluation of Painted or Coated Specimens Subject to Corrosive Environment'. The degree of corrosion was determined in accordance with ASTM D610. The anti-slip properties were assessed visually at 10 x magnification. The photoluminescence of the exposed samples was compared with that of the reference sample in a dark room.

3 RESULTS

Sample No	XC 2278/F	XC 2278/G	XC 2278/H	XC 2278/I	XC 2278/J
Details	Aluminium stair nosing Labelled 120201F	Aluminium stair nosing Labelled 120201G	Aluminium stair nosing Labelled 120201H	Aluminium stair nosing Labelled 120201I	Aluminium stair nosing Labelled 120201J
Degree of Corrosion	0.5 % (Rating 9)	0.3 % (Rating 9)	0.3 % (Rating 9)	0.2 % (Rating 9)	0.2 % (Rating 9)
Anti Slip Properties	No deterioration observed	No deterioration observed	No deterioration observed	No deterioration observed	No deterioration observed
Photo - luminescence	No deterioration observed	No deterioration observed	No deterioration observed	No deterioration observed	No deterioration observed

G. Eccleston

G Eccleston
Senior Materials Scientist
9 April 2001



National Association of Testing
Authorities, Australia

NATA Endorsed Test Report
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AS/NZS ISO 9001 Quality System Certified Organisation

177 Salmon St, Port Melbourne, Vic, 3207 Telephone (03) 9248 4900 Fax (03) 9646 5165
A Business Unit of the Australian Government Analytical Laboratories (AGAL)
Industry, Science and Resources



TEST REPORT

DATE: 07/07/2005

TEST NUMBER: 096346

CLIENT	Ecoglo Ltd
--------	------------

TEST METHOD CONDUCTED	ASTM D4828 Washability of Organic Materials
-----------------------	---

DESCRIPTION OF TEST SAMPLE	
IDENTIFICATION	E2071
COLOR	Photoluminescent
ROLL	-----
CONSTRUCTION	-----
FIBER	-----
BACKING	-----
REFERENCE	

GENERAL PRINCIPLE

This test method covers the determination of the relative ease of removal of common soil and stains from interior coatings. The stains used in this procedure include: crayon, pen, lipstick, and 3M soil. The soilants are applied to the material and are subsequently removed manually using a sponge and liquid cleaner. The area stained is rated for color change and the number of cleaning cycles reported at the point of complete removal. Three replicates of each stain were applied with the results reported as the average of all three ratings.

TEST RESULTS

	Crayon	Felt Tip Pen	Lipstick	3M soil
Gloss Change	None	None	None	None
Color Change	None	None	None	None
Erosion	None	None	None	None
Cycles to Clean	74	7	31	14
Rating	10	10	10	10

NOTE: This sample **PASSES** the requirements as listed in the New York Department of Buildings RS6-1A section 6-1A 2.0

APPROVED BY:

This report is provided for the exclusive use of the client to whom it is addressed. It may be used in its entirety to gain product acceptance from duly constituted authorities. This report applies only to those samples tested and is not necessarily indicative of apparently identical or similar products. This report, or the name of Professional Testing Laboratory Inc. shall not be used under any circumstance in advertising to the general public.



TEST REPORT

DATE: 07/07/2005

TEST NUMBER: 096346

CLIENT	Ecoglo Ltd
--------	------------

TEST METHOD CONDUCTED	ASTM D635 Standard Test Method for Rate of Burning and or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
-----------------------	---

DESCRIPTION OF TEST SAMPLE	
IDENTIFICATION	E2071
COLOR	Photoluminescent
ROLL	-----
CONSTRUCTION	-----
FIBER	-----
BACKING	-----
REFERENCE	

GENERAL PRINCIPLE

This method covers a small scale procedure for comparing the relative rate of burning and the extent and time of burning of self-supporting plastics that are tested in the horizontal position. A bar of the material is supported at one end. The free end is exposed to a gas flame for 30 seconds. The time and extent of burning are measured and reported. An average burn rate is reported over ten test specimens.

TEST RESULTS

	Burn Rate	Time of Burn	Extent of Burn
Specimen 1	No Burn Rate	0 Seconds	Did Not Ignite
Specimen 2	No Burn Rate	0 Seconds	Did Not Ignite
Specimen 3	No Burn Rate	0 Seconds	Did Not Ignite
Specimen 4	No Burn Rate	0 Seconds	Did Not Ignite
Specimen 5	No Burn Rate	0 Seconds	Did Not Ignite
Specimen 6	No Burn Rate	0 Seconds	Did Not Ignite
Specimen 7	No Burn Rate	0 Seconds	Did Not Ignite
Specimen 8	No Burn Rate	0 Seconds	Did Not Ignite
Specimen 9	No Burn Rate	0 Seconds	Did Not Ignite
Specimen 10	No Burn Rate	0 Seconds	Did Not Ignite
Average	No Burn Rate	0 Seconds	Did Not Ignite

APPROVED BY:

This report is provided for the exclusive use of the client to whom it is addressed. It may be used in its entirety to gain product acceptance from duly constituted authorities. This report applies only to those samples tested and is not necessarily indicative of apparently identical of similar products. This report, or the name of Professional Testing Laboratory Inc. shall not be used under any circumstance in advertising to the general public.

CALIFORNIA INSTITUTE OF ELECTRONICS AND MATERIALS SCIENCE
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JALITE USA P. O. No. APR 15 of APRIL 15, 2005

DIVISION OF ELECTRONIC MEASUREMENTS AND DEVICES

Page 1 of 2

TEST REPORT
 NO. 850850821B of 20 MAY 2005

BRIGHTNESS, RADIOACTIVITY AND FLAME SPREAD TEST

Table 1. LUMINANCE TEST (Contact Method)

No.	Sample	Tested Area Geometry		Excitation		Luminance (Brightness), mcd/m ² after the time period of		
		Diameter mm	Area cm ²	Duration min	Illuminance lx	10 min	60 min	90 min
1	Ecoglo-G3001c	56.39	25.0	120.0	21.63	111	28.8	19.7

CONCLUSION: *1. The tested samples of Ecoglo-G3001c meet the requirements of NYC Building Code Ref. STD RS 6-1, para. 1.4.*
2. The material tested has the Brightness Rating of 111-29-20.

Table 2. RADIOACTIVITY TEST

No.	Material	Test Result, μSv/hr			Comments
		α-count	β-count	γ-count	
1 radioactive	Ecoglo-G3001c	<0.01	<0.01	<0.01	Non-

CONCLUSION: *The tested samples of Ecoglo-G3001c meet the requirements of NYC Building Code Ref. STD RS 6-1, para. 4.2.*

(continued on page 2)

3. FLAME SPREAD TEST

No.	Material	Test Parameters		Flame Spread	Flame Spread	Comments
		Temperature Drop $\Delta T, K$	Spec. Temperature Rise, $\beta, K/kW$	Factor, F_s 1	Index, I_s 1	
1	Ecoglo-G3001c	21.5	31.4	1.51	7.59	Ignites with difficulties

CONCLUSION: *The tested samples of Ecoglo-G3001c meet the requirements of NYC Building Code Ref STD RS 6-1, para. 5.2.*

TEST DESCRIPTION

1. The test per ISO 17398:2000, Clause 7.11 and NYC BC Ref. STD RS-1, para. 1.1 - 1.4 (brightness); ASTM D3648 and NYC BC Ref. STD RS-1, para. 4.1 - 4.2 (radioactivity); and ASTM E162 and NYC BC Ref. STD RS 6-1, para. 5.1 - 5.2 (flame spread). Test conditions: T=22°C, RH=47±2%, P=101.0±0.2 kPa.
2. The samples were preconditioned for the luminance test in the dark chamber and being wrapped in the black photographic paper for 63 hours, and were removed from the chamber immediately before the test. The test was performed in the windowless room lighted with the red photo-processing light. The excitation fluorescent light source has the maximum equivalent radiation intensity of $1.94 \cdot 10^7 \text{ W/m}^2$ ($4.3 \cdot 10^3 \text{ K}$) with $\lambda_{\text{max}}=674 \text{ nm}$.
3. The radiation intensity readings were taken at nine different points on the surface of each of the samples tested with the samples located inside and outside of the radiation insulation chamber and under twelve angles between the normal to the sample surface and the direction of the field of gravity. The data in Table 2 were processed to exclude both the cosmic and the earth radiation background noise.
4. The experimental error evaluated by the partial derivatives and least squares methods does not exceed 5%, 4% and 6.5% for the luminance, radioactivity and flame spread measurements, respectively. The data on the standard deviation are kept on file at CIEMS.

5. INSTRUMENTS AND DEVICES USED

- Digital Photometer Model 840006 SSL (0 to 20,000 lx), Digital Scotopic/Photopic Meter Model SL-3101 SLC
- Radiometer/Photometer Model DR-2000 w/Si Detector GS
- Goniometer Model 3501-08 FD
- Moseley X-Y Recorder Model 7035B HP
- 50A, 6V Stabilized Power Supply Model SC-506FAVD HBC
- Precision Micrometer Model 25/100 Krupp/Hommelwerke
- Radiation Pyrometer Model ST-30 Raynger
- Digital Timer Model Labchron-1402 LLI
- Programmed Temperature/Humidity Controller Model 100
- Geiger-Mueller Counter Model SGM-49C PRI

(continued on page 3)

- Scintillator Counter Model 111 PRI
 - Digital Nuclear Radiation Monitor Model DX-1 ITS
 - Flame Spread Testing Device Model 394-19DI BD
 - Digital Pyrometer Model Metis-MP25 SensorTherm GmbH (100°C - 700°C, 2.0 µm - 2.8 µm)
 - Optical Pyrometer Model MX-2 Raytek
 - IR Thermometer Model IR550 DKS
 - Precision Potentiometer/Thermometer Model 8659-AZ L&N
 - Microscopes: Model 9700 TSC, Model 500 PH, Model Tukon-300 Wilson
 - Starrett Dial Indicator Model 25-109 (1.27 µm/div)
 - Digital Hydrothermometer Model 63-844 MI, Barometer Model 602650 SB.
6. Reference materials used for the test setup calibration:
- NIST SRM 4233C (Cs-137-Ba-137m) - for the radiation measurements
 - NIST SRM 1002d ($I_s=153$, $Q=36.5$) - for the flame spread test.
7. The equipment used in the test meets the applicable NIST, ASTM, ASME, OSHA and State requirements and was calibrated with the standards traceable to the NIST. The calibration was performed per ANSI/ISO ASQ Q9004-2000, ISO 10012-1:1992, ISO 10012-2:1997, MIL-STD-45662, MIL-I-45208, NAVAIR-17-35-MTL-1, CSP-1/03-93 and the instruments manufacturers' specifications.
8. The equipment passed a periodic accuracy test in June 2004. The linear and volume measure instruments and equipment were calibrated in December 2004. Next test - June 2005.

TEST ENGINEER: 51

DIVISION MANAGER: *Cynthia Smythe*



BODYCOTE • 2395 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO, CANADA L5K 1B3 • TEL: (905) 822-4111 • FAX: (905) 823-1446

Bombardier SMP 800-C Toxic Gas Generation on "Ecoglo E2071" HPPL Composite

A Report To: **Professional Testing Laboratory, Inc.**
714 Glenwood Place
Dalton, GA 30721
USA

Phone: (706) 226-3283
Fax: (706) 226-6787

Attention: Lee Phillips

Submitted By: Fire Testing

Report No. 05-02-519
3 pages + 1 appendix

Date: July 12, 2005

ACCREDITATION Standards Council of Canada, Registration #1.

REGISTRATIONS

- ISO 9001:2000, registered by QMI, Registration #001109.
- New York City Department of Buildings, MEA Division, Registration #110-05-L.

SPECIFICATIONS OF ORDER

Determine toxic gas production according to Bombardier SMP 800-C, as per your P.O. #2005-062905 dated June 29, 2005.

IDENTIFICATION (BMTc sample identification number 05-02-S0519)

Composite, abrasive strip and high performance photoluminescent (HPPL) material on aluminum tracking substrate, approximately 2.1 to 2.4 mm in total thickness, identified as "Ecoglo E2071".

SAMPLE PREPARATION

Specimens were supplied as a two-material composite strip with two separate, and compositionally different materials attached to an aluminum tracking substrate. Since this strip represents the final product, it was determined that this test procedure was appropriate. Requisite specimen sizes were created by butting two strips of the material together vertically in the specimen holders, in alternate stripes, in an attempt to offer maximum exposure to both materials.



Far Left. Composite marking system shown as supplied (cut to length).

Right: Test specimen (2 sections butted together vertically) shown in sample holder with abrasive strip and HPPL ridges alternating.

TEST RESULTS

Bombardier SMP 800-C

Toxic Gas Generation

		Flaming <u>Mode</u>	Non-Flaming <u>Mode</u>	Specified <u>Maxima</u>
Carbon Monoxide (CO ppm)	at 1.5 minutes	<10	<10	-
	at 4.0 minutes	10	<10	-
	at maximum	463	<10	3500
Carbon Dioxide (CO2 ppm)	at 1.5 minutes	<50	<50	-
	at 4.0 minutes	1850	<50	-
	at maximum	13400	<50	90000

TEST RESULTS (Cont..)

Bombardier SMP 800-C

Toxic Gas Generation

	<u>Flaming Mode</u>	<u>Non-Flaming Mode</u>	<u>Specified Maxima</u>
Nitrogen Oxides (as NO2 ppm)	2	1	100
Sulfur Dioxide (SO2 ppm)	<1	<1	100
Hydrogen Chloride (HCl ppm)	7	9	500
Hydrogen Fluoride (HF ppm)	<2	<2	100
Hydrogen Bromide (HBr ppm)	<1	<1	100
Hydrogen Cyanide (HCN ppm)	2	<1	100
Original Weight (g) (including substrate)	24.8	24.4	-
Final Weight (g) (including substrate)	<u>20.9</u>	<u>24.2</u>	-
Weight Loss (g)	3.9	0.2	-
Weight Loss (%)	15.86	0.78	-
Time to Ignition (s)	125	Did not ignite	-
Burning Duration (s)	Not determinable	-	-

CONCLUSIONS

The photoluminescent composite material on aluminum identified in this report, when tested at a total approximate thickness of 2.1 to 2.4 mm, meets Bombardier requirements as they pertain to toxic gas production (Bombardier SMP 800-C) and therefore meets the toxicity requirements of paragraph 3.0 of the New York City Building Code § 27-383(b) Reference Standard RS 6-1A (Photoluminescent exit path markings).

Note: This is an electronic copy of the report. Signatures are on file with the original report.

I. Smith,
Fire Testing.

Richard J. Lederle,
Fire Testing.

Note: This report consists of 3 pages, including the cover page, that comprise the report "body". It should be considered incomplete if all pages are not present. Additionally, the Appendix of this report comprises a cover page, plus 1 page.



Allunga Exposure Laboratory

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Email: test@allunga.com.au
Web: www.allunga.com.au

Mail: Locked Bag 369, Aitkenvale
Mail Centre, Queensland,
AUSTRALIA 4814

Attention Delwyn Ralston
Ecoglo International Ltd
77 Kingsley St
Sydenham Christchurch 8023
New Zealand

Report Name Samples / 1-6 @ 20 min @ 150°C
Duration 20 min @ 150°C
Your Reference Samples / 1-6
Our Reference 20D06WW1-6
Report Date 07-Apr-2020

Exposure Type: See Below
Date Exposed 06-Apr-2020

Book & Page: 909/66
Site: Townsville (Main)

Authorised AEL Signatory: Chris Cooper

Notes:

EXPOSURE

Expose samples for 20 minutes at 150°C, as per client instructions.

Instrument: WiseVen WOF-105 Precision Laboratory Oven.

REPORT STANDARDS

VISUAL ASSESSMENT OF CHANGE

Based on Standard: AS/NZS 1580.481.1:1998 Coatings Exposed to Weathering (12 Parameters of Change)

Degree of colour change - AS/NZS 1580.481.1.12

Degree of Blistering - AS/NZS 1580.481.1.9 Blistering

Degree of distortion/shrinkage

AS/NZS, ISO Rating scale: 0-5. 0 = No change, 5 = Complete change

NOTE: AS/NZS 1580.481.1.9 Degree of Blistering

Rating is in two parts, Density (D) and Size (S)

Method 481.1.1.9: Degree of Blistering

0 = None

1 = Less than few

2 = Few

3 = Medium

4 = Medium-dense

5 = Dense

Note: Report prepared >24 Hours post exposure to allow any colour changes associated with energy absorption/radiation to dissipate. Photos taken at 45 minutes and at 24 hours.

Exposure conducted: 06 April 2020.

Report Prepared: 07 April 2020.

Evaluation based on As 1580.481

1.1	General Appearance	1.9 (J)	Blistering
1.2	Discolouration	(K)	Visible Rusting
1.3	Dirt Collection	1.11 (L)	Chalking
1.4	Dirt Retention	1.13	Mould, Algae, Fungus
1.5	Change of Gloss	FIC	Ford Image Clarity
1.6 (E)	Erosion	FD	Film Defects
1.7 (F)	Checking	d	Darker
1.8 (G)	Cracking	l	lighter
1.9 (H)	Flaking & Peeling	r	redder

Colour: D65/10

All Samples Tested As Received

b	bluer
y	yellow
g	greyer
wh	whiter
f	fade
i	increase
c	continued
w	wide variation
t	trace

length measurements in mm

m	includes mould
loc	localized
nnc	no noticeable change
sd	surface distortion
ws	water spotting
af	adhesion failure
S	slight
md	moderate
sv	severe



Allunga Exposure Laboratory

DURABILITY

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Mail Centre, Queensland,
AUSTRALIA 4814

Attention Delwyn Ralston
Ecoglo International Ltd
77 Kingsley St
Sydenham Christchurch 8023
New Zealand

Report Name Samples / 1-6 @ 20 min @ 150°C
Duration 20 min @ 150°C
Your Reference Samples / 1-6
Our Reference 20D06WW1-6
Report Date 07-Apr-2020

Exposure Type: See Below
Date Exposed 06-Apr-2020

Book & Page: 909/66
Site: Townsville (Main)

Authorised AEL Signatory: Chris Cooper

Client Ref	Colour Change	Blistering	Distortion
Hazard tape	0 t	0	1-2
G3-001	0	0	0
S5 sign (1)	0	0	0
S5 sign (2)	0	0	0
S20	0	0	0
A20	1 d g	-	5

Client Ref.	Comments
Hazard tape	Tape has an 'orange peel' wrinkling across whole surface. See photographs
A20	Sample melted onto substrate trapping air in small voids that subsequently expanded giving appearance of blistering, substrate distorted as sample cooled. Exposed material appears a trace darker and greener 24 hours after exposure. See photographs.

Evaluation based on As 1580.481

1.1 General Appearance
1.2 Discolouration
1.3 Dirt Collection
1.4 Dirt Retention
1.5 Change of Gloss
1.6 (E) Erosion
1.7 (F) Checking
1.8 (G) Cracking
1.9 (H) Flaking & Peeling

1.9 (J) Blistering
(K) Visible Rusting
1.11 (L) Chalking
1.13 Mould, Algae, Fungus
FIC Ford Image Clarity
FD Film Defects
d Darker
l lighter
r redder

Colour: D65/10

All Samples Tested As Received

b bluer
y yellower
g greyer
wh whiter
f fade
i increase
c continued
w wide variation
t trace

length measurements in mm

m includes mould
loc localized
nnc no noticeable change
sd surface distortion
ws water spotting
af adhesion failure
S slight
md moderate
sv severe

Appendix 4

Ecoglo International Ltd

Quality Assurance Document

Ecoglo International Ltd

QUALITY POLICY

E.I.L is a world leader in the manufacture of photoluminescent signage and path marking. We pride ourselves on our strong focus on compliance and durability. Our policy is to achieve sustainable growth by offering quality products and service. All of our staff are committed to continual quality improvement. The company has earned respect and credibility, at an international level, as a result of our contributions to building code development around photoluminescent system design.

E.I.L maintains an ISO 9001:2015 compliant Business Management System. Management will ensure that all staff are committed to the principles of this system and its continual development.

Our key objectives are:

- To ensure that all products meet contractual and relevant regulatory obligations, both national and international.
- To offer a cost effective and sustainable alternative to traditional electrical lighting that all areas of industry can adopt in a safe and practical manner.
- To offer the most durable photoluminescent products on the market and back them with the best warranty and after-sales support.
- To identify and implement new processes to reduce our product cost without increasing our environmental impact.

Our strategy to achieve these goals is:

- Maintain a high level of staff input on quality control.
- Focus on keeping our staff fully aware of our expected quality output.
- Explore all opportunities to improve our products and processes.
- Effectively recognise the limitations of our product range and work with our clients and competitors to deliver the best result for our clients.
- Be active and engaged in the wider fire safety industry.
- Review any complaints or criticism and use them to construct educational material that assists all levels of industry, both national and international.

Ecoglo International Ltd.

77 Kingsley Street
Christchurch, New Zealand
www.ecoglo.com

Signed: Trevor Dimond
 Name: Trevor Dimond
 Date: 31 March 2023



Appendix 5

Ecoglo International Ltd

Warranty

Ecoglo International Limited

Warranty for Photoluminescent Performance of HTC* Signs and Products

1. We warrant the photoluminescent performance of both Signs and Products, manufactured using our High Temperature Curing (HTC) process, for a period of:

thirty years from the date of installation for standard Signs and Products which are positioned **indoors**; and

fifteen years from the date of installation for **outdoor** Signs (specially coated for **outdoor** conditions) and Products which are positioned **outdoors**.
2. This warranty assumes correct installation and normal conditions of use and maintenance but does not cover normal wear and tear. This warranty does not cover deterioration due to abuse, mistreatment, natural disasters (e.g. fire, flood), exposure to harmful chemicals or environments or any other use or exposure not recommended in our product literature. In particular, this warranty is void in the following circumstances:
 - 2.1 The Signs and/or Products have been misused, neglected, damaged, abused or involved in an accident.
 - 2.2 The Signs and/or Products have been improperly installed, operated, repaired or maintained.
 - 2.3 The Signs and/or Products have been modified.
 - 2.4 The Signs and/or Products have been used outside their stated specifications, capacity and operating parameters.
3. If you have a claim that, in our reasonable judgement, satisfies the terms of this warranty, we shall replace the defective Sign or Product (material only).
4. This is an express warranty. It is your sole and exclusive remedy. We disclaim any other express or implied warranties, including warranties of merchantability or fitness for purpose, to the maximum extent permitted by law. Under no circumstances shall we accept liability for any injury to persons, damage to property, loss of profits, loss of operations or other direct, indirect, special, incidental, or consequential losses, costs and damages whether incurred by you, your guests, licensees, invitees or other third parties. Our liability under any circumstance, whether in contract, tort or otherwise, shall not, in the aggregate, exceed the price that you paid for the Sign and/or Product.
5. Some countries do not allow certain disclaimers, limitations or exclusions in warranties. Therefore, the above disclaimers, limitations and exclusions may not apply to you. This warranty gives you specific legal rights. You may have other rights or remedies pursuant to the laws of your country. Nothing in this limited warranty should be construed as limiting or restricting any other right or remedy available to you, except as allowed by the law in your country.

Appendix 6

Ecoglo International Ltd

Maintenance and Cleaning Instructions

Instructions For

Maintenance and Cleaning

Exit Signs and Escape Path Markings



Maintenance and Cleaning Instructions For Exit Signs and Escape Path Markings

Overview

- Regular maintenance and cleaning to remove any obstructions or built up dirt and deposits will ensure the Ecoglo products continue performing to expectation.
- The photoluminescence will continue performing even after UV exposure or exposure to moisture.

Floor Mounted Products

- Check nothing is covering up the product.
- Visually inspect for any sign of damage.
- Vacuuming or brushing with a stiff bristle head brush (dry or wet) is often enough to keep the strips clean.
- The glowing strip can also be wiped clean with a (dry or wet) sponge or cloth.
- High-pressure water (but not steam cleaning) can also be used.
- Observation will determine if cleaning is required however a regular clean every 4 to 6 weeks or after particularly heavy use should ensure correct performance.

Wall Mounted Products

- Check nothing is covering up the sign.
- Visually inspect for any sign of damage.
- Dusting with a soft cloth or brush is often enough to keep the signs clean.
- The glowing material can also be wiped clean with a (dry or wet) sponge or cloth.
- Observation will determine if cleaning is required.

Note

- Do not use highly alkaline or acidic cleaning agents. The pH of the cleaning agents should be between pH 5 and pH 12.
- If cleaning agents are applied at more than pH 10, the Ecoglo material should be rinsed with pH neutral (pH 6 to pH 8) solution afterwards.

Ecoglo Fire Protection Product Trading

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