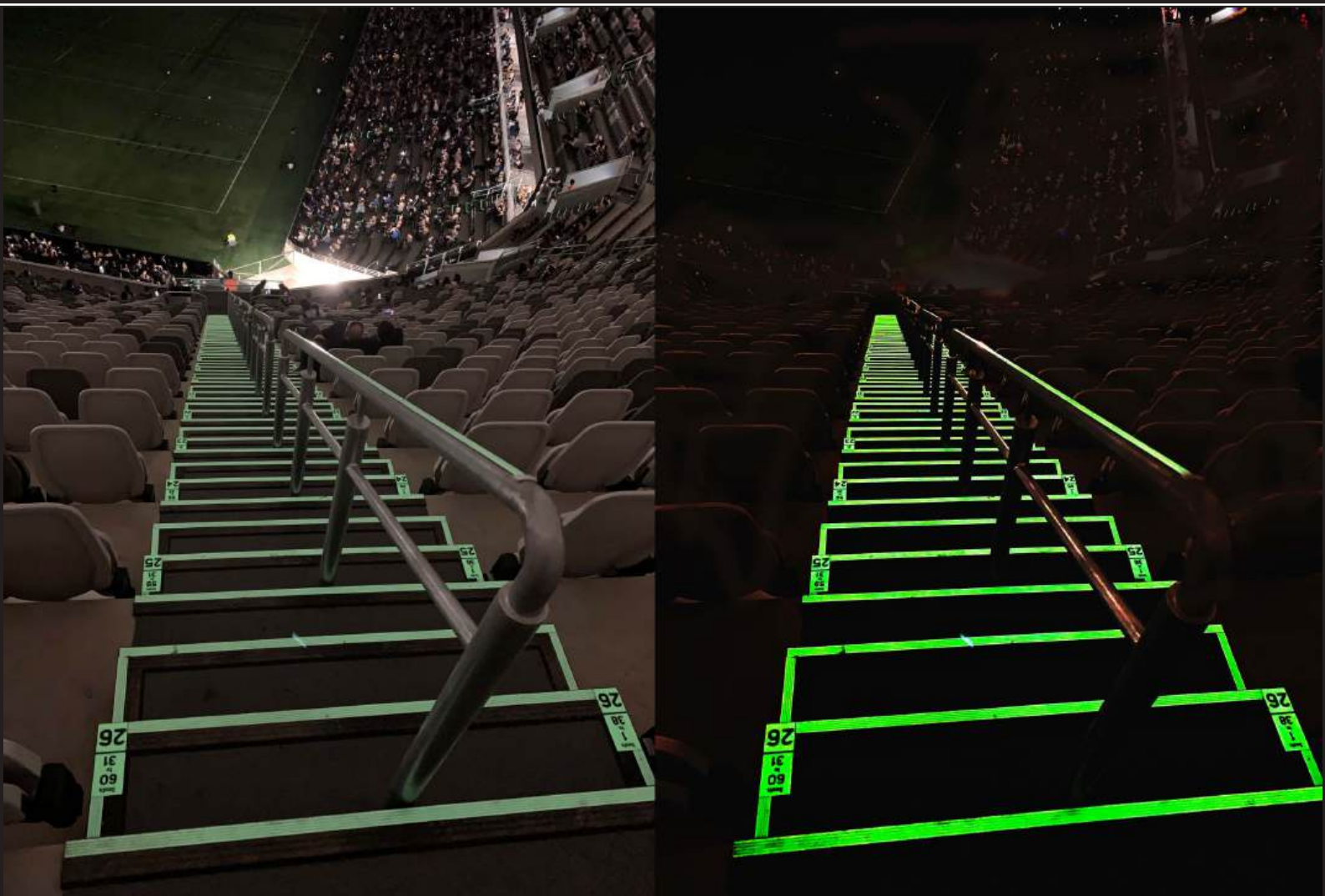


PL Safe Movement System Toolkit

FOR USE IN
Stadiums and Arenas



 **ecoglo**[®]
VISIBLY BETTER

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Contents.....	2
Exemplar Installations.....	3
PL Safe Movement System.....	5
Company Profile.....	6
HTC Manufacturing Process.....	7
Ecoglo Products.....	8
Other Useful Tools.....	14
Applicable Standards.....	16
Why Install Ecoglo.....	17



Exemplar Installations



Al Thumama Stadium, Qatar



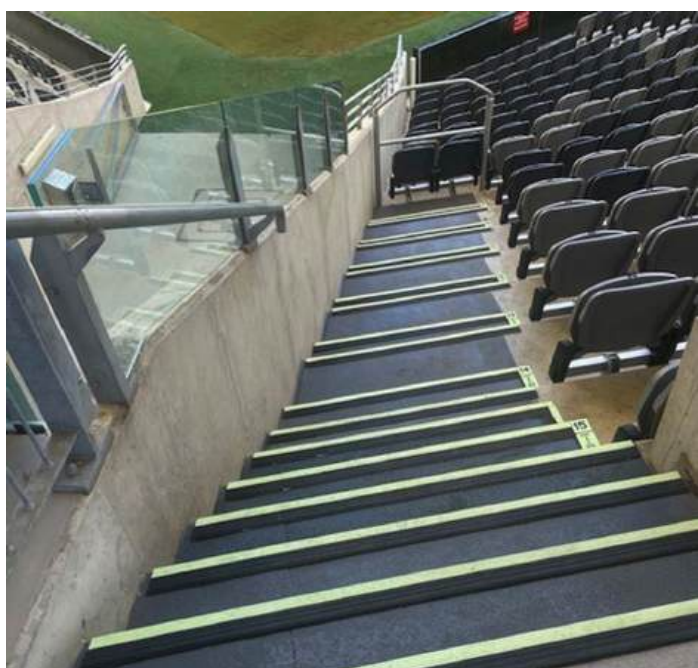
Allianz Stadium, Sydney, Australia



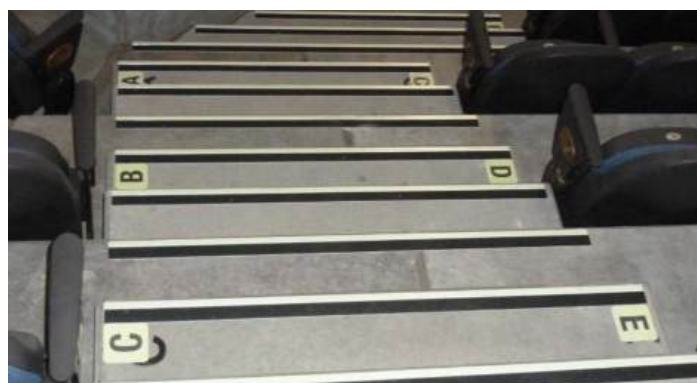
American Airlines Center, Texas, USA



Broward Center for Performing Arts, Florida, USA



CommBank Stadium, Parramatta, Australia



AO Arena, Manchester, UK



Coca-Cola Arena, Dubai, UAE

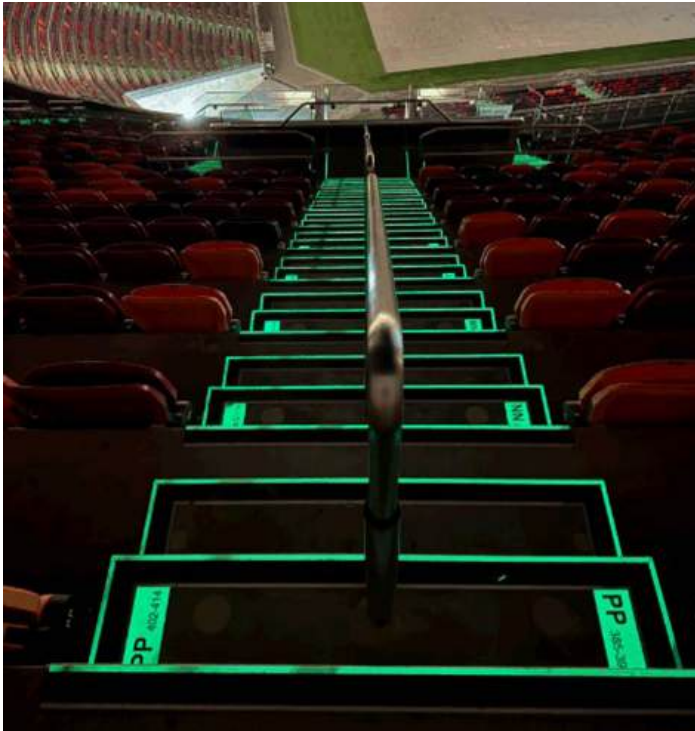
Exemplar Installations



Te Kaha / One New Zealand Stadium, Christchurch, New Zealand



The Kennedy Center, Washington DC, USA



Kai Tak Stadium, Hong Kong



MCG, Melbourne, Australia



Allegiant Stadium, Las Vegas, USA



Qudos Bank Arena, Sydney, Australia



The Rose Bowl Stadium, California, USA

Photoluminescent (PL) Safe Movement System

Modern sports and entertainment venues are required to balance many factors. These include spectator experience, functionality, safety, flexibility and sustainability.

A well designed and installed Photoluminescent (PL) Safe Movement System will mitigate related issues and assist the balancing of these factors. By providing continuous, highly visible cues, the PL Safe Movement System enhances safety and helps the stadium meet or exceed regulatory performance requirements for safe movement and egress.

The PL Safe Movement System is intended for international use and is specifically designed to mitigate non-compliance issues relating to NFPA 101 and the Green Guide (Guide to Safety at Sports Grounds).

Local expert advice should be sought for compliance with local codes and regulations.

Issues Mitigated by a PL Safe Movement System

- **Visibility and Step Definition in Low-light or No-light Conditions**
PL Safe Movement Systems maintain visibility of steps ensuring safe movement regardless of operational mode - operates in light, dim and completely dark conditions.
- **Visibility in an Emergency**
PL Safe Movement Systems provide continuous, passive illumination, ensuring that evacuation routes, step edges, and handrails are clearly marked even if electrical systems fail.
- **Shadows Created from High Bay Lighting**
Shadows from architectural elements or crowd created shadows are a significant hazard in stadiums and arenas, particularly on stepped aisles, ramps, and stairs but are mitigated by increasing the visibility of all essential building elements with suitable PL markings.
- **Trip Hazards from Variable Riser Heights and Stepped Ramps**
Variability in riser heights and the configuration of stepped ramps in both the upper and lower bowls pose trip hazards. PL markings directly address this by highlighting step edges and transitions.
- **Long Runs of Steps Without Change in Direction**
Stepped aisles with steep gradients and "long run" stairs increase descent risk and fear. A PL Safe Movement System improves user confidence and reduces fall risk by maintaining clear, continuous visual cues along the entire egress route.
- **Visibility of Handrails and Balustrades**
Handrails can be difficult to see in low light. The PL system includes marking of handrails, ensuring they are easily locatable and usable even in darkness.
- **Lack of Handrails or Balustrades**
Without handrails, patrons lack reliable support when ascending or descending stairs. PL markings on step edges will make movement safer.

Ecoglo was established in 1997 with operations in the USA, Canada, New Zealand, Australia, The Philippines and Singapore.

Ecoglo designs and manufactures photoluminescent (PL) exit signs and emergency visibility products using High Temperature Curing (HTC) technology to integrally bond the photoluminescent polymers to the aluminium base. This results in products with very high light storage capabilities and unparalleled durability.



By harvesting sunlight or recycling the existing light in a building, Ecoglo PL products provide sustainable and cost effective building solutions. The solutions are fail-safe, operate immediately and will last the life of a building (PL characteristics are warranted for 30 years when product is positioned indoors).

Research and development is focused on refining Ecoglo's proprietary manufacturing process to create products that have superior durability, rapid charging and predictable visibility.

While Ecoglo products are versatile and used in many different applications they are particularly suitable for venues such as stadia and event centres as they operate in all light conditions from full light to low light to complete darkness. Products include PL and anti-slip markers for step edges and stairways as well as PL row and seat markers.

Ecoglo products can be seen in many renowned international venues, including, but by no means limited to, Melbourne Cricket Ground in Australia, Al Thumama Stadium in Qatar, both Capital One Arena and The Kennedy Center in Washington DC, USA, and the Verizon Theater, Texas, USA.

Building codes around the world are recognising the contribution that such products make, not only to effective and economical emergency visibility systems, but also to the environment – Ecoglo products are battery-free and only need ambient light for charging.

Countries that have already adopted this technology into their respective building codes include the USA, Canada, Australia, Japan and New Zealand.



The proprietary manufacturing process used to make Ecoglo's products is known as High Temperature Curing or HTC.

HTC involves the precisely controlled application of a powder mix of customised photoluminescent pigments and customised carriers onto an aluminium base.

The polymer mix and aluminium base pass through a bespoke oven to be baked at temperatures above 160° C. This high temperature curing process integrally bonds the polymer mix to the aluminium, eliminating the possibility of peeling, shrinkage or delamination. It also provides permanent protection of the photoluminescent pigments from degradation due to moisture or weathering.

These performance properties cannot be guaranteed for photoluminescent PVC products, tapes and liquid applied products.

Ecoglo's manufacturing process produces products with exceptionally high visibility and durability. So confident are we in the performance of our products that we provide a 30 year warranty for products installed indoors and a 15 year warranty for products installed outdoors.

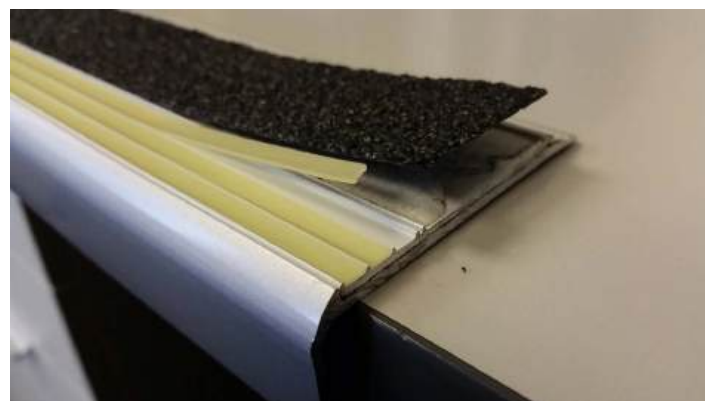


Beware of products that look like Ecoglo but aren't manufactured using the HTC process

Clearly the aluminium extrusion in the examples here has been made to resemble an Ecoglo product. Unfortunately, the process used to manufacture the products looks to be a liquid pour (wet pour) process.

The photoluminescent material has shrunk and is slowly delaminating - totally unacceptable for an emergency visibility system. HTC products won't suffer from shrinkage, delamination or discolouring and are therefore more durable delivering higher and more reliable luminance and visibility.

Specifiers and construction companies need to be alert and make sure that "Ecoglo equivalents" use HTC technology and have well documented and rigorous testing.



Luminance of Different Grades of Ecoglo Photoluminescent Material (PLM)

The results displayed in Tables 2 and 3 were collected via independent luminance testing carried out on different grades of Ecoglo PLM in September 2018, while the information in Table 1 is from the Photoluminescent Safety Products Association's (PSPA) latest material classification system (with Class A being the minimum requirement).

TABLE 1 PSPA Classification Table showing luminance of different classes of PLM after being exposed to 1000 lux for a period of 5 minutes.

AFTER NUMBER OF MINUTES	LUMINANCE mcd/m2				
	CLASS				
	A	B	C	D	E
2	108	210	690	1100	1800
10	23	50	140	260	400
30	7	15	45	85	120
60	3	7	20	35	55

Note: Class A is minimum requirement with Classes B – E having increasingly superior levels of luminance and decay times.

Class C is the PSPA minimum recommended for safety signage.

TABLE 2 Showing luminance of different grades of Ecoglo PLM after exposure to 1000 lux for a period of 5 minutes.

TIME AFTER REMOVAL OF CHARGING SOURCE (Mins)	LUMINANCE mcd/m2				
	GRADE				
	S5	S10	S15	S20	S25
2	2179	2559	3505	4284	4861
5	860	1019	1468	1794	2160
10	413	491	714	871	1087
20	192	227	3344	405	517
30	120	142	210	252	327
60	52.4	62.0	93.4	107.5	144.4
120	22.4	25.8	39.8	44.6	61.1
180	13.7	15.5	23.3	26.6	36.5
240	9.1	10.7	16.3	18.8	25.1
300	6.9	8.0	12.2	14.1	18.7
480	3.7	4.3	6.5	7.5	10.3
600	2.7	3.0	4.8	5.7	7.8

Conditions:

Charging source:

150W Xenon Lamp

Exposure:

1000 lux for period of 5 minutes

The results show the following:

Ecoglo S5 Grade PLM easily exceeds PSPA Class D.

Ecoglo S10, S15, S20 and S25 Grades easily exceed PSPA Class E.

TABLE 3 Showing luminance of different grades of Ecoglo PLM after exposure to 5000 lux for a period of 60 minutes.

TIME AFTER REMOVAL OF CHARGING SOURCE (Mins)	LUMINANCE mcd/m2				
	GRADE				
	S5	S10	S15	S20	S25
2	2058	2504	3930	4971	6556
5	794	944	1522	2006	2772
10	379	452	725	956	1362
20	178	212	339	453	656
30	114	136	216	289	422
60	52.3	62.2	98.5	132.9	195.3
120	23.0	27.8	43.4	60.0	89.2
180	14.0	17.2	26.5	35.8	55.9
240	9.7	11.6	18.8	25.5	38.7
300	7.3	8.5	14.4	19.5	28.9
480	4.1	5.0	8.3	10.8	15.8
600	3.2	3.8	6.5	8.5	12.1

Conditions:

Charging source:

20W Fluorescent Lamp

Exposure:

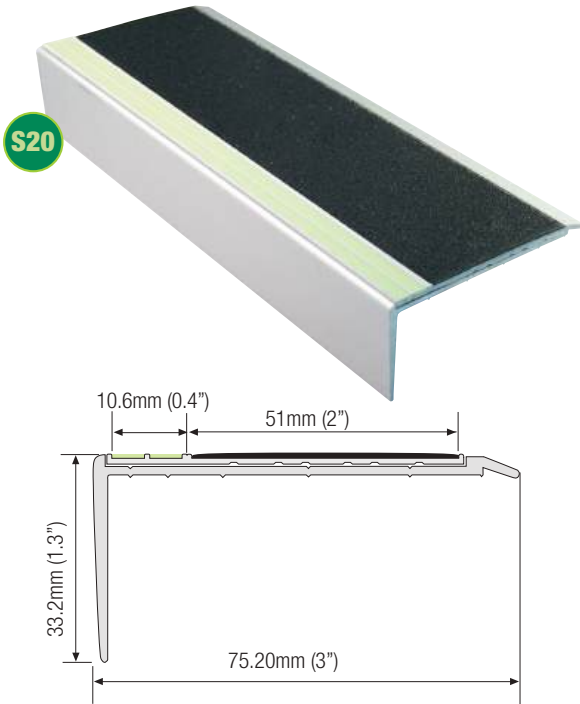
5000 lux for period of 60 minutes

Note: 5000 lux equates to the least amount of daylight PLM is likely to be exposed to.

These luminance results show the minimum performance that can be expected of these Ecoglo materials when installed outdoors, even if covered by a roof overhang of up to 4 metres.

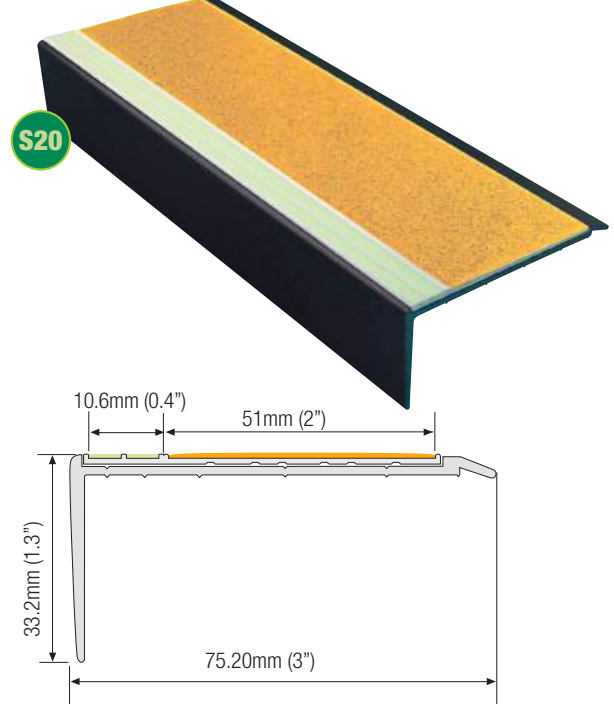
Surface Mounted

F15-179 Step Nosing 75.2mm (3") x 33.2mm (1.3")



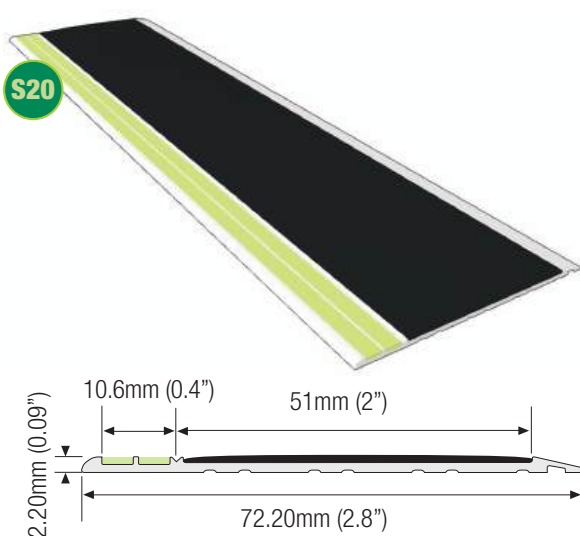
- Supplied pre-drilled with fixers
- Adhesive and caulking gun available separately
- Available in 2450mm (8') and 3060mm (10') lengths for custom cutting

F15-289 Step Nosing 75.2mm (3") x 33.2mm (1.3")



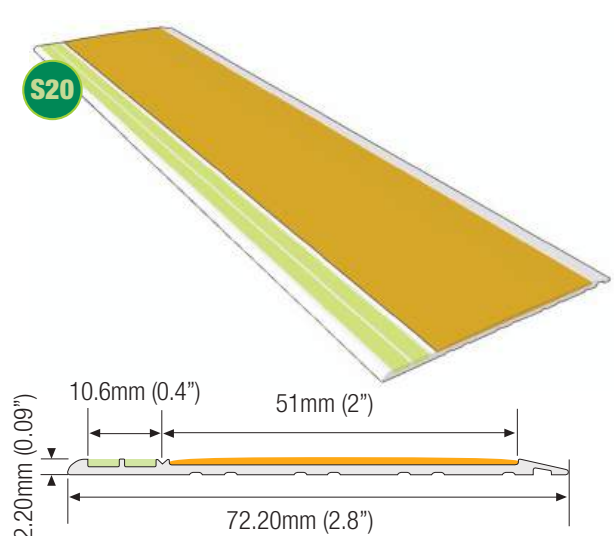
- Supplied pre-drilled with fixers
- Adhesive and caulking gun available separately
- Available in 2450mm (8') and 3060mm (10') lengths for custom cutting

ET14-079 Step Threshold 72.2mm (2.8")



- Adhesive and caulking gun available separately
- Pre-drilling and fixers are optional if adhesion is uncertain
- Available in 2450mm (8') and 3060mm (10') lengths for custom cutting

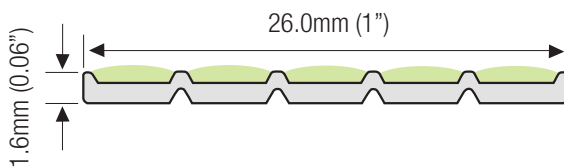
ET14-089 Step Threshold 72.2mm (2.8")



- Adhesive and caulking gun available separately
- Pre-drilling and fixers are optional if adhesion is uncertain
- Available in 2450mm (8') and 3060mm (10') lengths for custom cutting

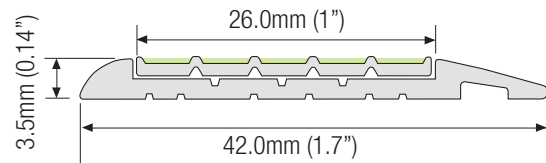
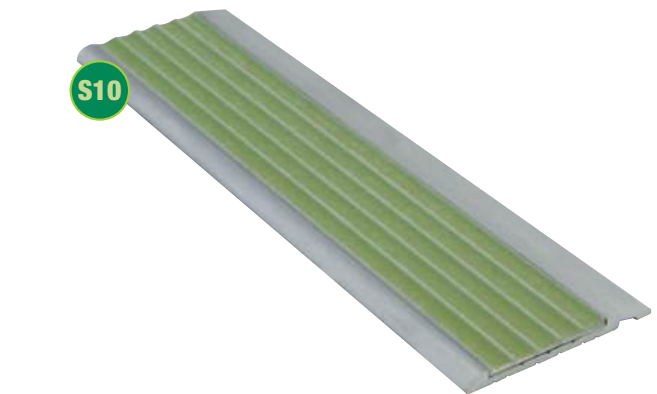
Surface Mounted

G6-011 Step Return Markings 26mm (1")

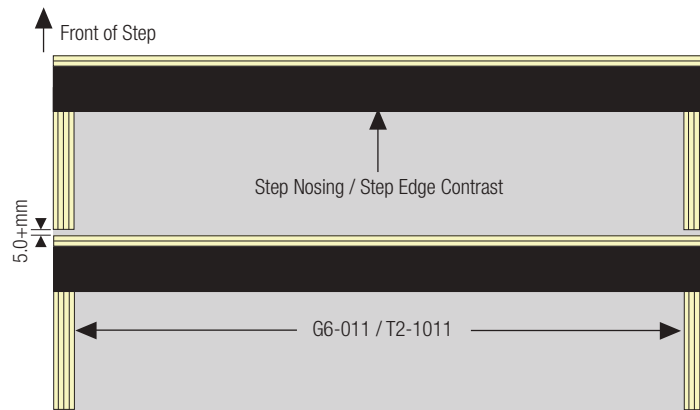


- Adhesive and caulking gun available separately
- Available in 3060mm (10') lengths for custom cutting

T2-1011 Step Return Markings 42mm (1.7") x 3.5mm (0.14")



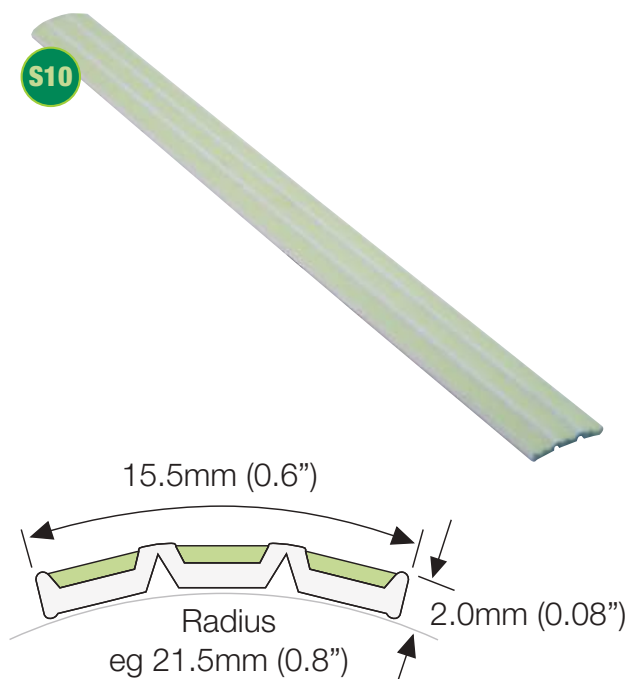
- Pre-drilling and fixers are optional if adhesion is uncertain
- Adhesive and caulking gun available separately
- Available in 3060mm (10') lengths for custom cutting



The markers should be placed as above

H3-001 Handrail Marker 15.5mm (0.6")

For rounded handrails



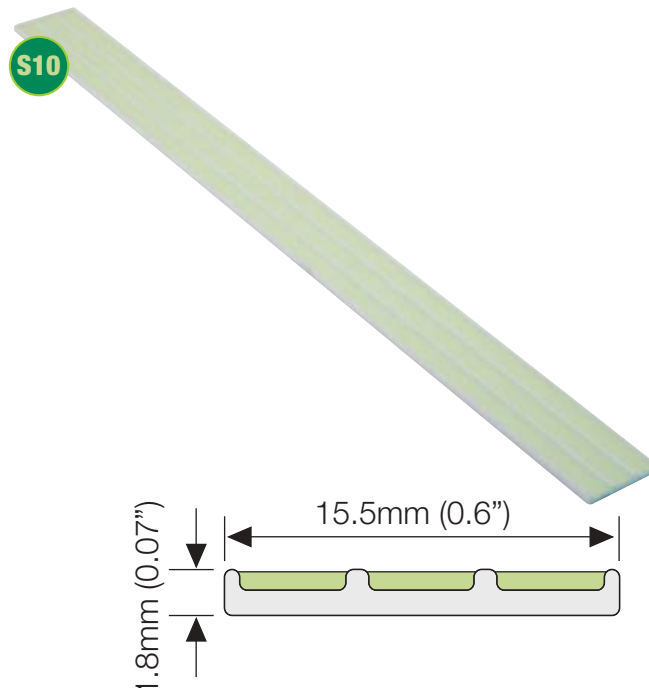
- Available in 3060mm (10') lengths for custom cutting

H3-001-3060 For polyurethane adhesive fixing

H3-001T-3060 Release tape pre-fitted

G3-001 Handrail Marker 15.5mm (0.6")

For flat handrails



- Available in 3060mm (10') lengths for custom cutting

G3-001-3060 For polyurethane adhesive fixing

G3-001P-3060 Punched for screw fixing

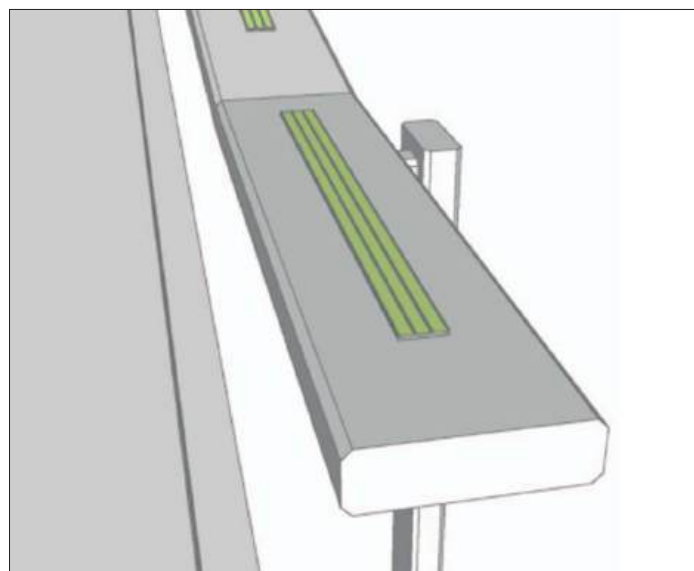
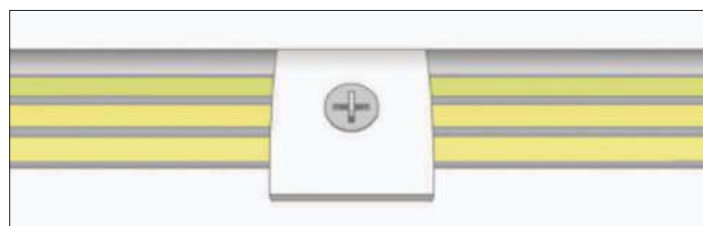
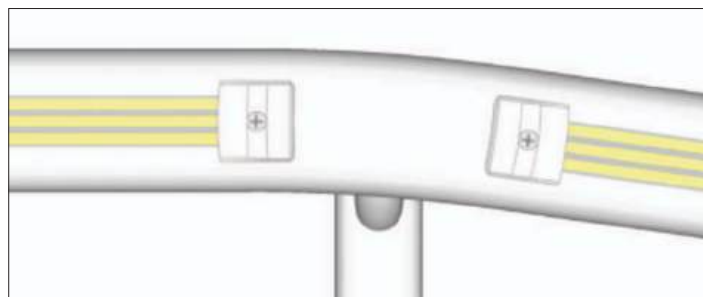
G3-001T-3060 Release tape pre-fitted

End and Joiner Caps

Metal end caps and joiner caps to fit H3-001 are also available if required. These are fixed using a screw or rivet and are suitable for use outdoors.

HREC3 Metal End Cap

HRJC3 Metal Joiner Cap





S5

Pictogram

Exit straight on from here

Product No. S5-RM2010

Size 200mm (8") x 100mm (4")



S5

Pictogram Up Arrow

Exit straight on up from here

Product No. S5-RMUA2010

Size 200mm (8") x 100mm (4")



S5

Pictogram Down Arrow

Exit down from here

Product No. S5-RMDA2010

Size 200mm (8") x 100mm (4")



S5

Pictogram Up Left Arrow

Exit up left from here

Product No. S5-RMUL2010

Size 200mm (8") x 100mm (4")



S5

Pictogram Down Left Arrow

Exit down left from here

Product No. S5-RMDL2010

Size 200mm (8") x 100mm (4")



S5

Pictogram Up Right Arrow

Exit up right from here

Product No. S5-RMUR2010

Size 200mm (8") x 100mm (4")



S5

Pictogram Down Right Arrow

Exit down right from here

Product No. S5-RMDR2010

Size 200mm (8") x 100mm (4")



S5

Pictogram Left Arrow

Exit left from here

Product No. S5-RML2010

Size 200mm (8") x 100mm (4")



S5

Pictogram Right Arrow

Exit right from here

Product No. S5-RMR2010

Size 200mm (8") x 100mm (4")

The row markers can have square or rounded corners and are available in the sizes below.



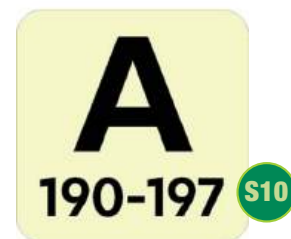
Row Marker

SQ63RP-R - 63mm x 63mm (2.5" x 2.5")
SQ90RP-R - 90mm x 90mm (3.5" x 3.5")



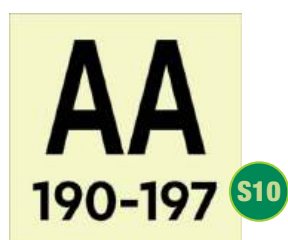
Row Marker

SQ63RP-S - 63mm x 63mm (2.5" x 2.5")
SQ90RP-S - 90mm x 90mm (3.5" x 3.5")



Row and Seat Marker

SQ63RSP-R - 63mm x 63mm (2.5" x 2.5")
SQ90RSP-R - 90mm x 90mm (3.5" x 3.5")



Row and Seat Marker

SQ63RSP-S - 63mm x 63mm (2.5" x 2.5")
SQ90RSP-S - 90mm x 90mm (3.5" x 3.5")



Row Marker

SQ63RN-R - 63mm x 63mm (2.5" x 2.5")
SQ90RN-R - 90mm x 90mm (3.5" x 3.5")



Row Marker

SQ63RN-S - 63mm x 63mm (2.5" x 2.5")
SQ90RN-S - 90mm x 90mm (3.5" x 3.5")



Row and Seat Marker

SQ63RSN-R - 63mm x 63mm (2.5" x 2.5")
SQ90RSN-R - 90mm x 90mm (3.5" x 3.5")



Row and Seat Marker

SQ63RSN-S - 63mm x 63mm (2.5" x 2.5")
SQ90RSN-S - 90mm x 90mm (3.5" x 3.5")



Row and Seat Marker

RE10063RSP-R - 100mm x 63mm (4" x 2.5")



Row and Seat Marker

RE10063RSP-S - 100mm x 63mm (4" x 2.5")



Row and Seat Marker

RE10063RSN-R - 100mm x 63mm (4" x 2.5")



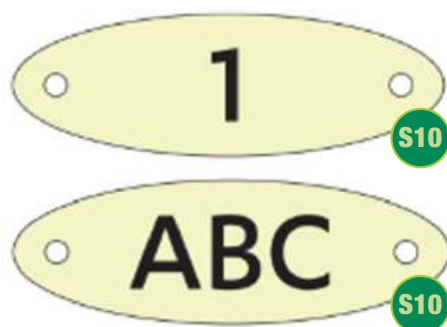
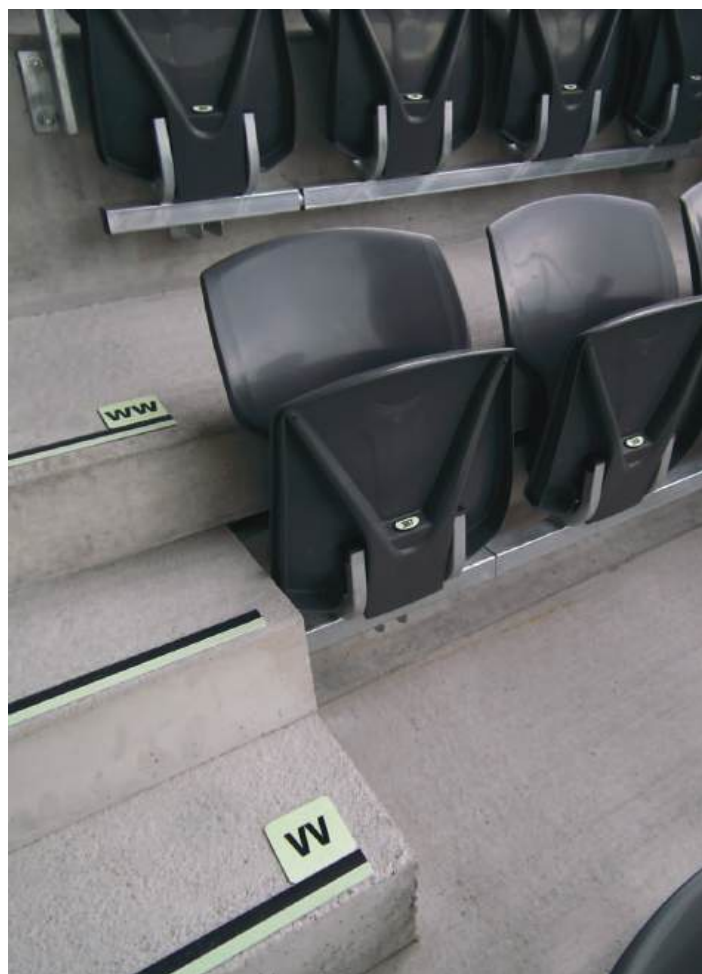
Row and Seat Marker

RE10063RSN-S - 100mm x 63mm (4" x 2.5")



Note: The following markers, with a depth of 63mm and straight edges, can fit into F14 and F15 nosings alongside step edge contrast (shown here): SQ63RP-S, SQ63RN-S, SQ63RSP-S, SQ63RSN-S, RE10063RSP-S, RE10063RSN-S

Above are examples only, all markers are custom printed and can include single or double letters.



Ellipse Seat Marker

EL187567 - 18.7mm x 56.7mm (0.7" x 2.2")



Round Seat Marker

DS40 - 40mm (1.6")

Round Seat Marker

DS30 - 30mm (1.2")

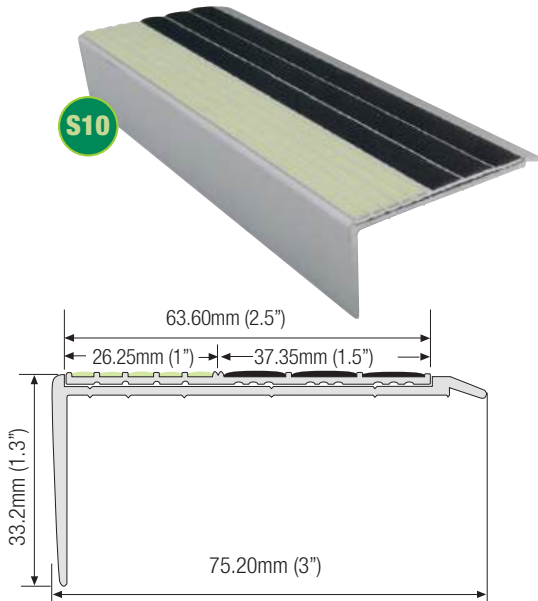


Obround Seat Marker

OB1130S - 30mm x 10.5mm (1.2" x 0.4")

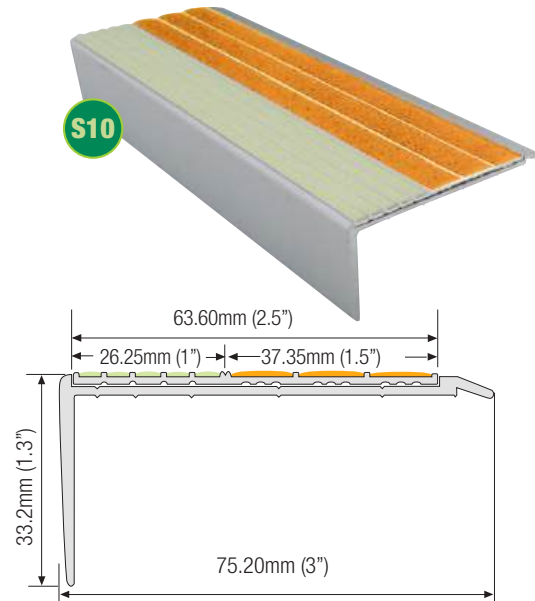
Step Nosings

F15-1711 Step Nosing 75.20mm (3") x 33.2mm (1.3")



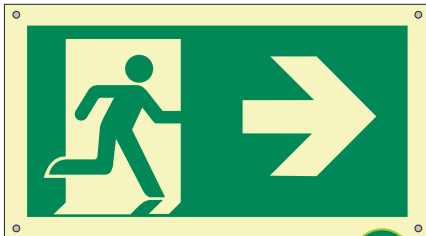
- Supplied pre-drilled with fixers
- Adhesive and caulking gun available separately
- Available in 2450mm (8') and 3060mm (10') lengths for custom cutting

F15-1811 Step Nosing 75.20mm (3") x 33.2mm (1.3")



- Supplied pre-drilled with fixers
- Adhesive and caulking gun available separately
- Available in 2450mm (8') and 3060mm (10') lengths for custom cutting

Outdoor UL 924 PL Exit Signs



Pictogram Right Arrow

Exit right from here

Maximum Viewing Distance: 50 feet

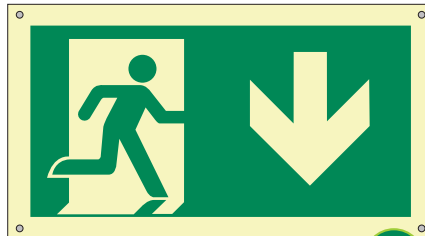
Product No: S20-UL-RMR392223C-50

Size 392mm x 223mm

Maximum Viewing Distance: 75 feet

Product No: S20-UL-RML480280C-75

Size 480mm x 280mm



Pictogram Down Arrow

Exit down from here

Maximum Viewing Distance: 50 feet

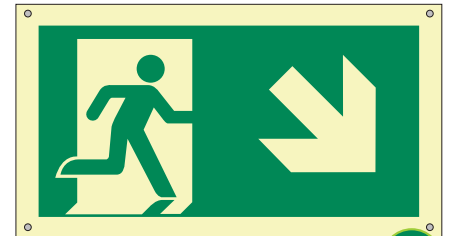
Product No: S20-UL-RMDA392223C-50

Size 392mm x 223mm

Maximum Viewing Distance: 75 feet

Product No: S20-UL-RMDA480280C-75

Size 480mm x 280mm



Pictogram Down Right Arrow

Exit down right from here

Maximum Viewing Distance: 50 feet

Product No: S20-UL-RMDR392223C-50

Size 392mm x 223mm

Maximum Viewing Distance: 75 feet

Product No: S20-UL-RMDR480280C-75

Size 480mm x 280mm



Pictogram Left Arrow

Exit left from here

Maximum Viewing Distance: 50 feet

Product No: S20-UL-RML392223C-50

Size 392mm x 223mm

Maximum Viewing Distance: 75 feet

Product No: S20-UL-RML480280C-75

Size 480mm x 280mm



Pictogram Up Right Arrow

Exit up right from here

Maximum Viewing Distance: 50 feet

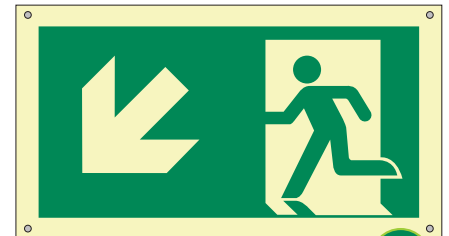
Product No: S20-UL-RMUR392223C-50

Size 392mm x 223mm

Maximum Viewing Distance: 75 feet

Product No: S20-UL-RMUR480280C-75

Size 480mm x 280mm



Pictogram Down Left Arrow

Exit down left from here

Maximum Viewing Distance: 50 feet

Product No: S20-UL-RMDL392223C-50

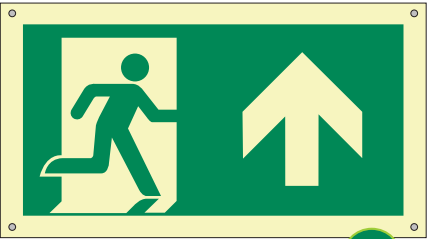
Size 392mm x 223mm

Maximum Viewing Distance: 75 feet

Product No: S20-UL-RMDL480280C-75

Size 480mm x 280mm

Outdoor UL 924 PL Exit Signs



Pictogram Up Arrow
Exit straight on from here
Maximum Viewing Distance: 50 feet
Product No: S20-UL-RMUA392223C-50
Size 392mm x 223mm
Maximum Viewing Distance: 75 feet
Product No: S20-UL-RMUA480280C-75
Size 480mm x 280mm



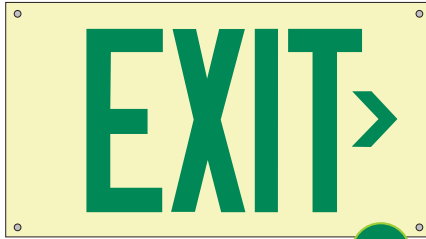
Pictogram Up Left Arrow
Exit up left from here
Maximum Viewing Distance: 50 feet
Product No: S20-UL-RMUL392223C-50
Size 392mm x 223mm
Maximum Viewing Distance: 75 feet
Product No: S20-UL-RMUL480280C-75
Size 480mm x 280mm



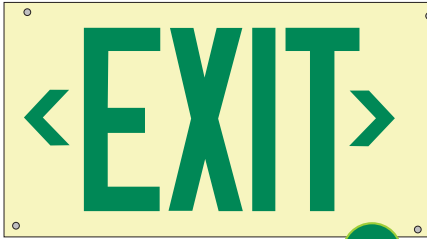
Exit
Exit straight on from here
Maximum Viewing Distance: 50 feet
Product No: S20-UL-EX353183C-50
Size 353mm x 183mm
Maximum Viewing Distance: 75 feet
Product No: S20-UL-EX481249C-75
Size 481mm x 249mm



Exit Left
Exit left from here
Maximum Viewing Distance: 50 feet
Product No: S20-UL-EXL353183C-50
Size 353mm x 183mm
Maximum Viewing Distance: 75 feet
Product No: S20-UL-EXL481249C-75
Size 481mm x 249mm



Exit Right
Exit right from here
Maximum Viewing Distance: 50 feet
Product No: S20-UL-EXR353183C-50
Size 353mm x 183mm
Maximum Viewing Distance: 75 feet
Product No: S20-UL-EXR481249C-75
Size 481mm x 249mm



Exit Double Arrow
Exit straight on from here
Maximum Viewing Distance: 50 feet
Product No: S20-UL-EXRL353183C-50
Size 353mm x 183mm
Maximum Viewing Distance: 75 feet
Product No: S20-UL-EXRL481249C-75
Size 481mm x 249mm

Hybrid LED Exit Sign

The Hybrid LED Exit Sign combines Ecoglo's internationally recognised photoluminescent technology with Class II LED's and next generation patented electronics. Requiring no backup, the internally illuminated photoluminescent exit sign is effective in all lighting scenarios.



Surface Mount

Flag Mount
Bracket

Ceiling Recess
Bracket

Hybrid LED Exit Sign



RM Exit straight on from here

RML Exit left from here

RMR Exit right from here



EX Exit straight on from here

EXL Exit left from here

EXR Exit right from here

PRODUCT CODE	PRODUCT DESCRIPTION	GRAPHICS INCLUDED	MAXIMUM VIEWING DISTANCE
HYU1.3-RM-WHT	Single sided sign white	1 x RM, 1 x RML 1 x RMR	24 metres (78.74ft)
HYU1.3-BFP-WHT	Single sided sign white	1 x EX, 1 x EXL 1 x EXR	24 metres (78.74ft)
HYU2.3-RM-WHT	Double sided sign white	2 x RM, 1 x RML 1 x RMR	24 metres (78.74ft)
HYU2.3-BFP-WHT	Double sided sign white	2 x EX, 1 x EXL 1 x EXR	24 metres (78.74ft)
BR3-CR-WHT	Ceiling recess bracket white	N/A	N/A
BR3-FM-WHT	Flag mount bracket white	N/A	N/A

Photoluminescent Lighting Council Ltd (PLC) Daylight Charging Simulation
Test Method for Photoluminescent Egress Path Marking Systems

Photoluminescent Lighting Council Ltd (PLC)
Test Method for High Temperature Cured (HTC) Products.
(www.plcouncil.com.au)

Underwriters Laboratories, Inc. (UL) UL 1994
Standard for Safety, Luminous Egress Path Marking Systems.
(www.ul.com)

Underwriters Laboratories, Inc. (UL) UL 410
Standard for Slip Resistance of Floor Surface Materials.
(www.ul.com)

Standards Australia. AS 4586-2013
Slip Resistance Classification of New Pedestrian Surface Materials.
(www.standards.org.au)

Ecoglo Product Features and Benefits

Safe movement factors are interactive and expert advice should be sought when considering the interaction of various products.

- Improves emergency egress safety
- Mitigates shadows from high bay lighting
- Mitigates inconsistent riser heights
- Mitigates height of, or lack of, handrails and balustrades
- Improves step edge contrast for visually impaired
 - options for light and dark concrete finishes
- Improves anti-slip performance
 - options for contrast available
- Uses ambient light to charge the PL
 - no power or batteries required
- Will last the lifetime of the facility
 - 30 year warranty indoors
 - 15 year warranty outdoors



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