



# solar<sup>eye</sup>®

SOLAR POWERED PATHWAY DELINEATION



# solareye®

Developed in the UK, in conjunction with end users, the solareye is a solar powered, low profile, in- set, 360 degree high visibility delineator, providing a strong LED signal during the hours of darkness -throughout the year. Operational performance has been based upon actual western European weather/ sunlight – with the objective of CO2 neutrality.

## Delineation applications

- Cycle tracks and pedestrian walkways.
- Car parks.
- Driveways for golf courses / country clubs.
- Decking areas & decorative patio lighting.
- Boat marinas & dock areas.
- Campuses & large residential areas.
- Caravan & camp sites

## Advantages

- Constructed from durable engineering grade polymer.
- Low profile–nominal 6 mm when installed.
- Easy for cyclists / vehicles to move over.
- Simple installation into asphalt or wooden decking
- In loose stone areas, just place and push in.
- Long life LFP Type battery–8 years + anticipated.
- High visibility–up to 500m.
- LED life–100,000 hrs.
- Light sensitive auto on/off for economical operation.
- Independent operation-no electrical supply required.
- Renewable and maintenance free green energy.
- Realistically priced based on market feedback.
- Installation service available
- Fully sealed integrated unit–100% waterproof

## Product range

- LED signal, steady or slow flash.
- Standard colours: White steady, Bat Hat and Red flash
- Special colours to order: Yellow, Green, Blue & Red steady.
- Bat Hat option available for conservation areas
- Supplied in a box of 20: Weight 5.5kg

## Technical Characteristics

- **Material:** High impact durable engineering grade polymer
- **Light source:** LED (100,000hrs life)
- **Battery:** LFP Type battery (8yrs + anticipated)
- **Working temperature:** -20 to +70 C
- **Body dimensions:** 80mm diameter
- **Installed height:** 6 mm nominal
- **Milling Depth:** 30mm
- **Weight:** Approx. 275g
- **Fixing adhesive:** Structural 2 component moisture tolerant epoxy
- **Working time after full charge:**  
Flashing 400hrs+  
Steady 200hrs+
- **Flash rate:** 1 sec on , 1 sec off
- **Water proof quality:** IP 68
- **High Visibility:** Up to 500m

## Installation & Product FAQs:

- Simple installation equipment, 2 persons required for larger jobs
- Dry cut using a milling tool
- Up 200 pieces per day can be installed
- Adhesive take 30 mins to set at 25° meaning minimal disruption
- Can be installed in damp conditions
- Automatic on/ off using light sensors
- Can be used on low traffic private roads





## WHAT IS THE SOLAREYE?

The solareye is a solar powered delineator with an omni-directional LED producing 360° visibility. Initially designed for cycle track and pathway installations as an economical alternative to hard wiring, there are also numerous other applications where the product can be used such as driveways, marinas and campsites.

### How is the solareye installed?

We use a unique milling cutter to bore the hole where the blade creates debris rather than dust, therefore making the process less harmful to the environment. The product is then fixed in to place using a structural 2 component all weather adhesive.

### How long does installation take?

Following preparation of the site by clearing the area and marking the required placement of the units, each cut into a typical asphalt takes less than 2 minutes. We estimate that 200+ pieces can be installed in one day.

### How long before the path is ready to use following installation?

At 25°C the adhesive will be tack free within 30 minutes but please allow 24 hours before the path is completely ready.

### Do you provide the installation service or can I do it myself?

We can provide a full installation service but if you would like to do this yourself, we can provide you with a step

step guide on how to install.

### What are the installation costs?

Costs vary depending on size of project/location and substrate of surface. Each quote is individually tailored to each customer's requirements.

### Where should we place the solareye on our path?

Firstly you need to consider the location, if there are large areas of shade or if the path is prone to overgrown borders/debris then this may have an impact on the performance of the product.

There are many ways in which you can position the units for installation - here are our suggestions:

- Narrow or irregularly maintained path - Use a centre line spaced at 4.5m
- Wider paths or highly maintained areas - Use either side of the path spaced at 9m but staggered at every 4.5m (as suggested by Sustrans)
- 3m+ wide shared use paths - A centre line can be created but offset so that 2/3 are created for cyclists and the remaining 1/3 for pedestrians and other users

### In applications, you mention slipways - does the solareye really work underwater?

Yes! We have discovered through testing that even in several inches of water the unit will still charge (although it may take longer than if left out in direct sunlight). The unit is also completely sealed/waterproof and rated as IP68 - the highest IP rating available for dust and water immersion.

### I want to put solar units in to my fence panel, will the solareye work vertically?

Yes, as long as they receive some direct sunlight they work just as well vertically. The dimpled surface helps to capture more light.

### What about the effects of artificial light in conservation areas?

Artificial lighting is a major concern for Bats and their nocturnal friends. We have given our original product

a little hat to reduce the upward slight spillage by 98% making it a far friendlier option for sensitive conservation areas. Please see our dedicated Bat Hat page for further information.

### How much pressure can the solareye withstand?

Firstly, the solareye has not been designed for highways - although it is a fully sealed unit molded with the toughest polycarbonate we have not designed this for road use. However, we have recently had an independent compression test carried out and the results were quite amazing.

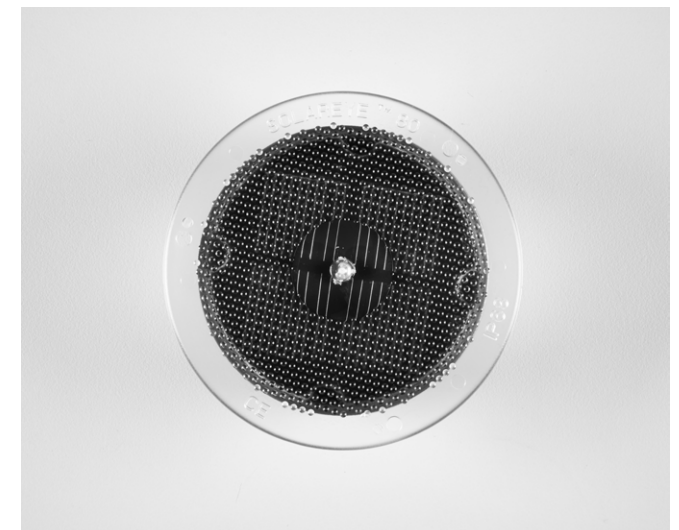
Please see the data sheet attached here for the results.

### How do we deal with vandalism such as graffiti?

Graffiti can be easily removed from the solareye using a standard graffiti remover.

### Is the solareye certified?

Yes, the solareye is CE certified and also carries a rating of IP68.



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## APPLICATIONS

**Over the last few months we have seen the product go in to numerous applications from driveways to marinas. Here are some examples of where the solareye can be applied:**

- Cycle tracks & Pathways
- Recreational areas/Community spaces
- National parks
- Car parks/Driveways
- Canal paths
- Boat marinas/Docking areas & slipways
- Golf clubs/Estate grounds
- Campuses & large residential areas
- Holiday villages/Caravan & Camp sites
- Garden/Patio lighting

As well as being detrimental to Bats, artificial light also disturbs invertebrate feeding, breeding & movement which may reduce and fragment populations due to the disruptive natural patterns of light and dark caused by artificial lighting

A number of our British mammals are nocturnal and have adapted their lifestyle so that they are active in the dark in order to avoid predators. Artificial illumination of the areas

in which these mammals are active and foraging is likely to be disturbing to their nocturnal activities and their foraging areas could be lost in this way. It is thought that the most pronounced effect is likely to be on small mammals due to their need to avoid predators. However, this in itself has a knock-on effect on those predators.

The detrimental effect of artificial lighting is most clearly seen in bats. Our resident bat species have all suffered dramatic reductions in their numbers in the past century. Light falling on a bat roost exit point, regardless of species, will at least delay bats from emerging, which shortens the amount of time available to them for foraging.

As the main peak of nocturnal insect abundance occurs at and soon after dusk, a delay in emergence means this vital time for feeding is missed. At worst, the bats may feel compelled to abandon the roost. Bats are faithful to their roosts over many years and disturbance of this sort can have a significant effect on the future of the colony. It is likely to be deemed a breach of the natural and European legislation that protects British bats and their roosts. In addition to causing disturbance to bats at the roost, artificial lighting can also affect the feeding behavior of bats and their use of commuting routes. These are two aspects to this: one is the attraction that short wave length light (UV and Blue light) has to a range of insects; the other

is the presence of lit conditions.

Whilst we are very proud of the brightness and omnidirectionality of our standard product – we were keen to create an alternative for conservation areas so that Bats and other wildlife that may be affected, would not be disturbed. We re-engineered the standard product by adding a little hat to reduce the upwards light spillage by around 98% whilst remaining the same in profile, making the 'Bat Hat' a far friendlier option.

Perfect for conservation sensitive areas or dark sky reserves, our delineator won't give off unwanted light fields or interfere with our little nocturnal friends.

In addition to causing disturbance to bats in the roost, artificial lighting can also affect the feeding behaviour of bats. In most bat species there is an evening period of activity followed by another at dawn. These two flights correlate with the peak flight times of nocturnal insect prey. Insects are attracted to light particularly if it is a single light source in a dark area.

Artificial lighting can increase chances of predation. It is believed that *Plecotus* & *Myotis* species shun bright light as a predator avoidance strategy. Many avian hunters will hunt bats which may be one reason why bats avoid flying during the day.

Any upwards light spillage should be minimal to avoid light pollution. Light can be restricted to selected areas by fitting hoods which direct the light below the horizontal plane, preferably at an angle less than 70 degrees.

Our 'Bat Hat' reduces the upwards light spillage of our omnidirectional LED by around 98% while remaining the same in profile. This means that you will still be able to see it, but it won't bother the bats and insects as they fly overhead.

The Bat Conservation Trust have kindly agreed to help us evaluate the 'Bat Hat' in real situations with surveys showing there has been no disruption to the Bats by having these units installed near their colonies. We thank them for giving up their time to advise us with the development and testing and look forward to continually develop our conservation range.



# COMPRESSION TESTING OF THE SOLAREYE

## Introduction

The SolarEye 80 was tested embedded in a decking plank for compression testing, in order to determine its compressive strength. For the purpose of this compression test, the defined point of failure for the SolarEye 80 product as the point at which the light would no longer function.

## Compression testing -

Testing was undertaken on a Dennison 600kN tensile machine in order to determine the compressive strength. The SolarEye 80 product was loaded at increments of 20kN, between 20kN and 600kN, prior to being unloaded, checked and reloaded, in order to determine the point at which the light no longer functioned.



Figure 1 - Damage of SolarEye 80 product in decking following a compressive load of 600kN

At a load of 575kN it was found that the light in the SolarEye 80 product no longer worked continuously. The light instead flashed on and off rapidly. The load was then increased to the machine maximum of 600kN, however no further damage was observed. The damage sustained by the SolarEye 80 and the decking plank can be seen in figure 1 above.

## Conclusions

3.1 The compressive load sustained by the SolarEye 80 product in a decking plank prior to failure of the light was 575kN.

3.2 Even though the light failed to work continually, it

still gave a light signal which can be concluded that the SolarEye 80 continued to offer a guidance signal and could therefore not be deemed as failing at 575kN.

## GENERIC SPECIFICATION FOR SOLAR DELINEATOR

### Construction

Injection moulded high impact polycarbonate body, in-filled with an inert sealing compound. Textured upper surface to increase light capture from acute angles and also provide skidding resistance.

### Signal

Long life single LED providing 360° visibility. Steady or slow flash (1 second on/1 second off). Automatic on/off sensor. Upwards light spillage option for use in conservation areas frequented by flying mammals.

### Colours

White, Red, Blue, Yellow & Green.

### Battery

LFP Type battery. Full charge after 8 hours direct exposure to sunlight. Working temperature -20° to + 70°

### Working time after full charge

200 hours + steady signal 400 hours + flashing signal

### Dimensions

Installed diameter 100mm including 10mm locating lip. Installed height: 6 mm.

### Installation cut requirements

80mm diameter x 30mm depth. All dimensions nominal

### Certification

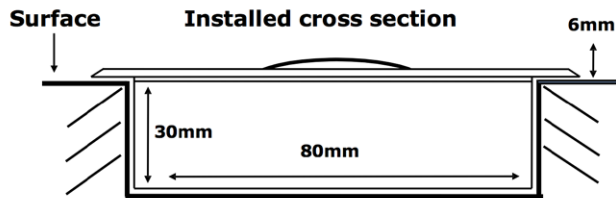
EN 60529:1991 + A1: 2000 (IP code 68) EN 61000-6-1 & 3

### Operational life expectancy

8 years +



# RECOMMENDED INSTALLATION GUIDE FOR PATHWAYS



In accordance with the site requirements place advance warning safety signage indicating the start and finish of the works area and if necessary use pedestrian barriers around the drilling operation.

Ensure that all personnel are equipped with safety gloves, helmets, protective eyewear and boots in accordance with H&S requirements.

Begin by marking out the installation points, carefully measuring the distance between each unit to ensure optimum appearance and accuracy.

If placed in areas of permanent shade, solar efficiency could be affected so please bear this in mind when deciding on positioning for the product or if possible trial the SolarEye in the actual position – before installing.

For use as edge line delineation if the pathway width permits, install at 300mm from the edge – thereby reducing potential maintenance caused by coverage of grass cutting operations or the accumulation of leaves/debris.

Experience has shown that placing the solareye in the middle of the pathway width optimises performance in relation to debris accumulations and possible resultant cleaning maintenance.

Once the site has been marked, use an 80mm rotary hammer miller/cutter to dry cut the hole to the required

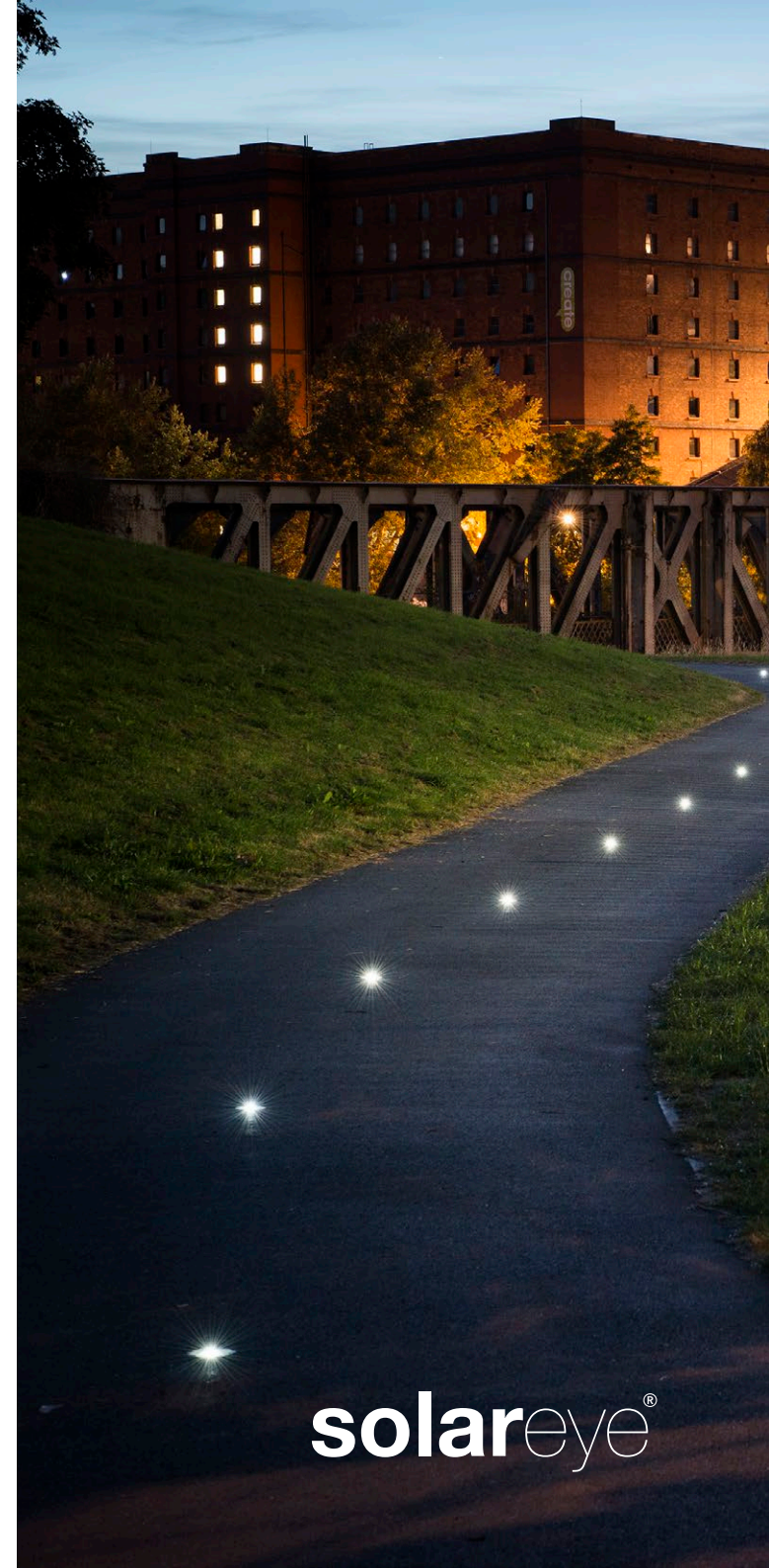
depth and remove the dust with either a blower or vacuum. Please be environmentally aware when removing any waste. After each cut, place a solareye into the hole to check for correct depth – ensuring that the rim sits onto the surface.

Using a moisture tolerant, structural 2 component adhesive, liberally apply around the entire top edge of the hole, ensuring it flows down the side walls of the hole. On particularly textured surfaces it may be necessary to apply adhesive around the rim. Do this when the solareye is in the inverted position – before placement.

Push the solareye firmly in to place ensuring that the rim rests on the pathway surface and adhesive exudes around the rim edge. Check that the entire rim edge of the solareye is sealed - if not apply further adhesive.

At an ambient temperature of 25°, the adhesive should set within 30 minutes with full cure within 24 hrs. The setting time will be increased at lower temperatures, whilst higher temperatures will speed up the reaction. Use traffic cones to cover the installed products until the adhesive is set.

Installation rates will vary depending on equipment and substrate. We have found that typically a 2 man team can install 15/20 pcs per hour into asphaltic substrates.



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## GUIDANCE NOTES ON CHARGING

Full operational night time performance (200+ hours non-stop signal - without further exposure to daylight) will not be achieved until it has been completely charged outdoors.

At this time with ongoing outdoor exposure, the large storage capacity then enables the solareye to operate throughout each night 365 days per year.

The solareye will start to charge from its first exposure to sunlight. During the summer in full direct sunlight, this can take up to 8 hours. Partial sunlight/shaded areas will extend the charging period.

For installations during winter months and in cloudy conditions the charging time will be extended. At these times, expect a slow build up to full performance as the solareye charges. During this period, full operational performance will not be achieved - but the solareye will operate satisfactorily with a shorter non-stop performance until fully charged.

Ensure installation within 6 months of purchase - or keep charged outdoors until installation prolonged periods in a discharged state may damage the battery and reduce performance.

Please take this in to consideration: all solar powered products need exposure outdoors to direct sunlight to function correctly so be sure to take this into account when selecting the positioning for the product.

Charging indoors on a windowsill may appear to be a good place to position the solareye but certain types of coated glass may block out most of the daylight.

## INFORMATION FOR CONSERVATION AREAS

The solareye is a delineator designed specifically for cycle paths & pedestrian areas that has been developed with a unique omni-directional LED giving a 360° visibility.

During the marketing of this product we often heard people mentioning upwards light spillage and the effect it has on flying mammals - mainly Bats.

To provide a solution for areas with Bat colonies and other conservation sensitivities we have designed a version that we call, the 'Bat Hat'.

We have re-engineered the standard unit slightly and added an opaque lens to reduce the upwards light spillage by over 95% making it a friendlier option for Nocturnal Mammals/Insects.

Within Dark Sky areas, the solareye is an excellent choice if your cycle path/walkway still needs to be visible without hindering star gazers.

This powerful delineator will not cause unwanted light fields - it will simply pave the way for the route you require.

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