



WHITE PAPER

Background Lighting Explained



www.sealite.com

We believe technology improves navigation™

How Lantern range is stated on product datasheets

Lantern product datasheets often specify product output intensity in candelas (cd) and a corresponding visual range in Nautical Miles (NM) based on IALA recommendations. It is customary to use IALA results based upon 10NM atmospheric visibility (transmission factor, $T=0.74$) with no allowance for background lighting i.e. dark background behind the light.

What is background lighting?

In many built-up areas including major ports, tourist resorts and industrial areas there may be considerable background lighting. This can affect both the dark adjustment of the mariner's eye and the contrast between the brightness of the aid to navigation and surrounding light sources. Below is an example:



Bridge lights at dusk showing the effect of background lighting.

In the example above visual range of the red, yellow and green navigation lights on the bridge will be reduced by floodlighting, vehicle lights and reflections in the water.

In many cases background lighting is unavoidable and difficult to screen from the view of the mariner. If there is significant background lighting a modification to the standard IALA range calculation is needed to ensure lights still achieve the desired maximum viewing range.

How is background lighting defined?

IALA recommendation E-200 Marine Signal Lights, Part 2, Section 3.1 provides a definition of background lighting as follows:

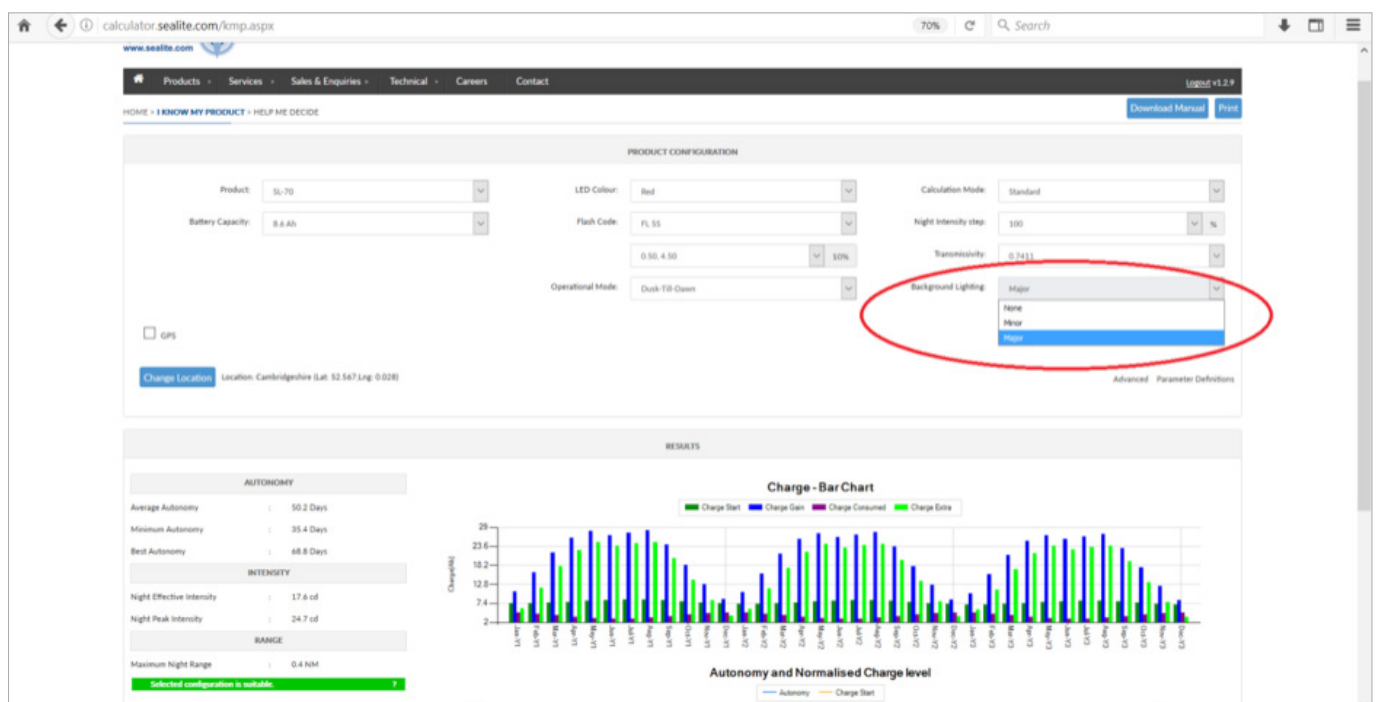
<u>Illumination (lux)</u>	<u>IALA Background Lighting</u>	<u>IALA Range of a typical 100cd light</u>
2 x 10 ⁻⁷	None	5.4 NM
2 x 10 ⁻⁶	Minor	2.6 NM
2 x 10 ⁻⁵	Major	1 NM

Illumination is the amount of lux required at the eye of the observer in order to provide enough contrast (5%) from the background to safely recognise the aid to navigation. For real world examples this can be very difficult to calculate precisely but fortunately the IALA categories of 'minor' and 'major' give a rule of thumb which is easy to apply based on observation. There is a simple factor of ten difference in the required illumination at the eye of the observer between each category of background lighting and having just two additional categories keeps things simple.

The above example shows that a product defined as an IALA 5NM light with no background lighting could only be seen from 1NM in the presence of Major background lighting – a very significant reduction which would need to be considered by the owner of the AtoN.

How can Sealite help with calculations?

Sealite's new online solar calculator was designed to include a unique option enabling the user to select the amount of background lighting when selecting a product:



This tool helps to enable user to ensure their lights are of sufficient brightness for each location before they are deployed, increasing safety while reducing the additional cost of further trial and error with different products. The Sealite solar calculator is free to access at sealite.com