

As seen on previous articles, a sector light is a luminous aid to navigation that displays different colors and/or rhythms over designated arcs over the horizontal plane. The colour of the light provides directional information to the mariner.



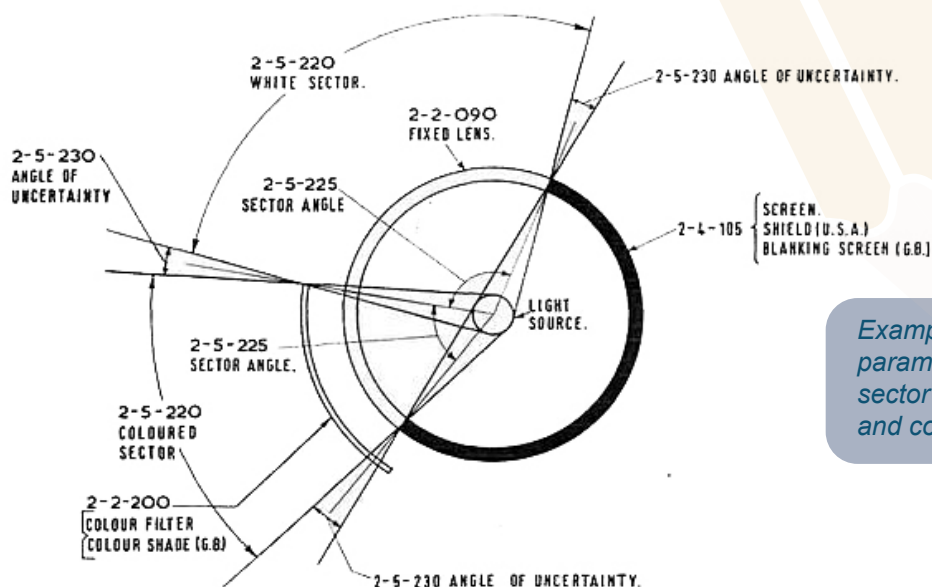
MEL500L

“The MSM high end sector light model MEL500L, is a good example of a high resolution LED sector leading light”

In this article we will show and explain some of the key parameters and concepts that should be considered when establishing sector lights specifications:

SECTOR WIDTH (OR SECTOR ANGLE)

Is the horizontal angle within which a light of a given character is visible. It is usually defined in degrees, and its boundaries should mark a relevant boundary or position to be considered by the seafarers.



Example showing some key parameters on a traditional sector light (single light source and color filters).

IALA GUIDELINE G1041



Colour

As stated on the IALA dictionary, colour is the perceived colour aspect of visual perception by which an observer may distinguish differences between two fields of view of the same size, shape and structure, such as may be caused by differences in the spectral composition of the radiation concerned in the observation.

Colours should be measured and defined in accordance with “IALA Recommendation R0201 (E200-1) Marine Signal Lights – Colours”.

Intensity

Also known as the luminous intensity (I) is a measure of the wavelength-weighted power emitted by a light source. Is measured in Candelas (Cd). Particular attention must be paid to the parameter definition, as multiple measuring criteria can be encountered (estacionary intensity, effective intensity, etc).

Flash character

The flash character, rhythmic character or flash rhythm is an inherent characteristic of rhythmic lights. A rhythmic light is described as a light showing intermittently with a regular periodicity. The rhythmic character of such a light is the sequence of different appearances presented by the light during a period.

All rhythm characteristics and specifications should be established in accordance with IALA Guideline 1116 – on Selection of Rhythmic Characters and Synchronisation of Lights for Aids to Navigation and IALA Recommendation E-110 Rhythmic Characters of Lights on Aids to Navigation.



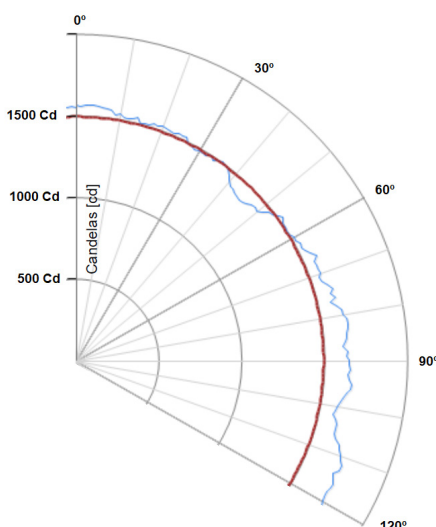
Ejemplo de ritmo intermitente:

$I = luz = 3\ s$

$d = oscuridad = 1\ s$

$p = periodo = 4\ s$

Uniformity of intensity across the sector



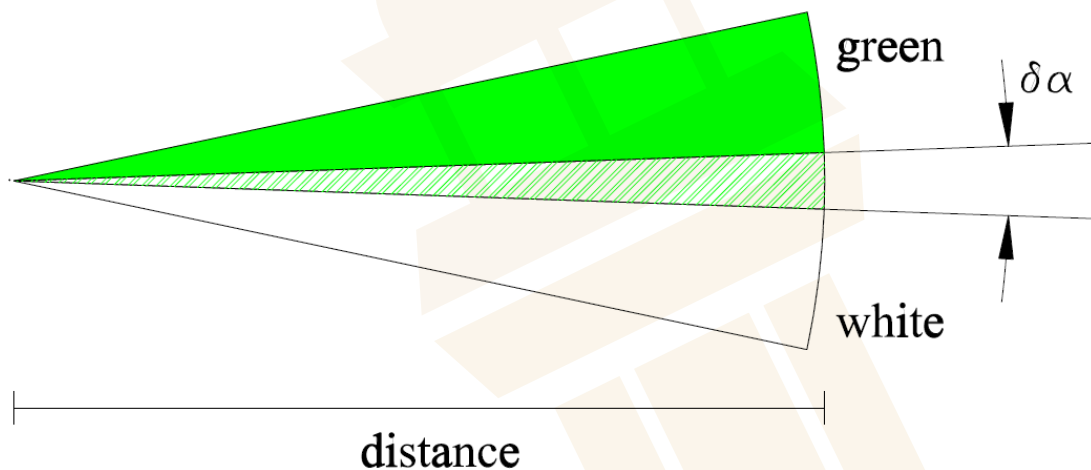
The uniformity of intensity across the sector should be defined in a way that the Aid to Navigation complies with established minimum and maximum light range across all the sectors. Establishing specification for uniformity, and maximum and minimum values (in Candelas) and adding quality tests in optical laboratories as a specification requirement are useful tools to define and control this parameter.

Example of MSM Laboratory test, performed as a part of the quality control on our testing facilities (uniformity reduced with didactic purposes).

Angle of uncertainty between adjacent sectors

The angle of uncertainty is the region where the color and/or the flash rhythm change between sector. The mariner typically sees a mixture of the two sector characters, and this causes an uncertainty where the mariner is unable to distinguish between the two sectors. The understanding of this aspect is very important for the design of a sector light.

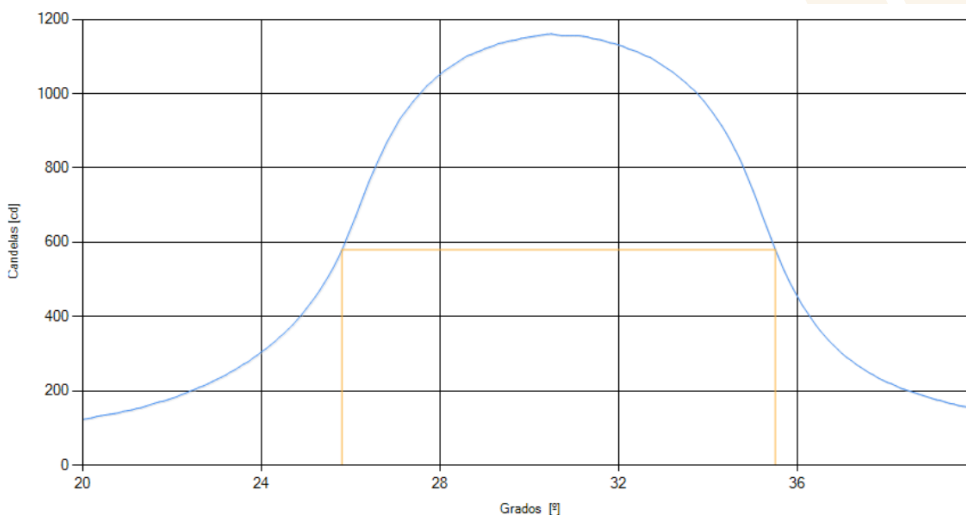
In most cases the angle of uncertainty should be as small as possible or defined by the navigational requirement.



Vertical divergence

The vertical divergence is the angle of the light beam between points where the intensity has fallen to a fraction of the maximum intensity within the beam. The vertical divergence is typically specified between the first points where the intensity falls to 50% of the maximum.

This parameter should be defined accordingly to the minimum and maximum range.



Example of MSM Laboratory test, performed as a part of the quality control on our testing. Intensity is shown in blue, divergence in yellow.