FT Opto Laboratories

Client	Test Report No	Date
Eflare Corporation Pty Ltd 222 St Kilda Rd St Kilda Vic Australia	051121	21 November 2005

Eflare Light Beam – Candela Measurement

The Eflare has light focused into a narrow beam from a small point source. The best way to describe the brightness of such a beam is with Candelas. A larger light source like a fluorescent strip light may be described more accurately by the number of lumens it generates. These concepts are discussed below:

Definitions:

Watts — Unit of measurement of the power of a light source

Photopic eye — To formalise the response of the human eye in day conditions, the CIE (Comite Internationale d' Eclairage) in 1931 developed a curve to convert light power in watts to perceived light power in lumens For wavelength 555 nm (yellow-green), 680lumens = 1 watt

Lumens — Unit of measurement of the perceived power of a light source using the CEI colour weighting.

Candelas — Measurement of the perceived intensity of a light beam, being the received lumens divided by the solid angle in steradians from the source to the detector.

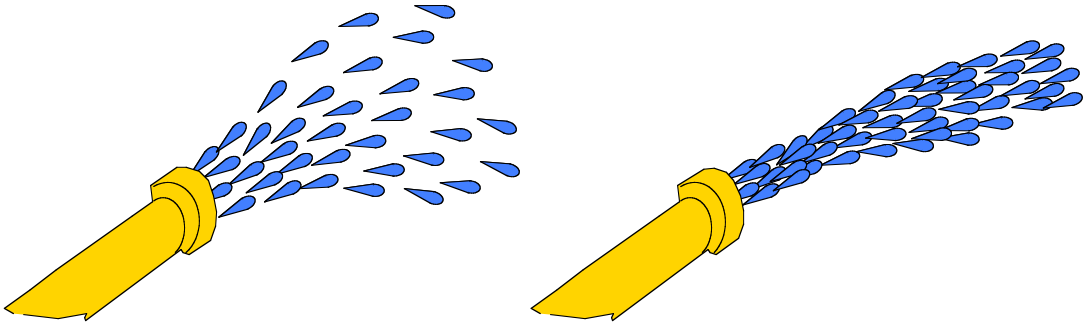
A candle has an output of around 10 lumens and a beam intensity of approximately one candela. In clear night conditions a 1 Cd light is visible from at least 1 km.

Lux — Measurement of the perceived intensity of light falling on a surface in lumens per square metre

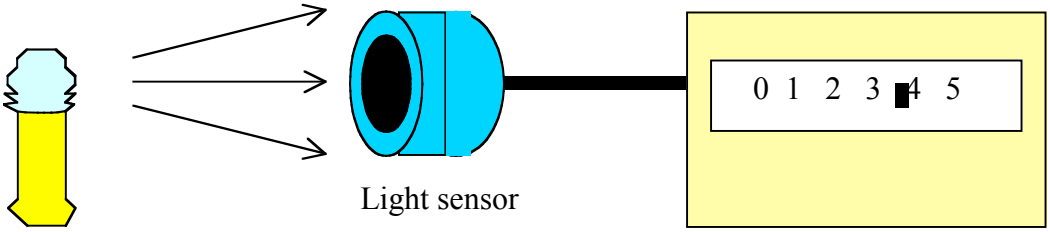
The Water Analogy for Lumens and Candela

Hose with broad spray covers wide area with a given quantity of water (Lumens) but with little water in a small designated area (Candela)

Hose with narrow jet with the same amount of water (Lumens) has a higher quantity of water in same small designated area (Candela) - hence more intense flow, ie higher Candela



The brightness of the Eflare is measured in Candelas. The method of measurement is shown below.



A lightmeter allows the intensity of the Eflare beam to be measured

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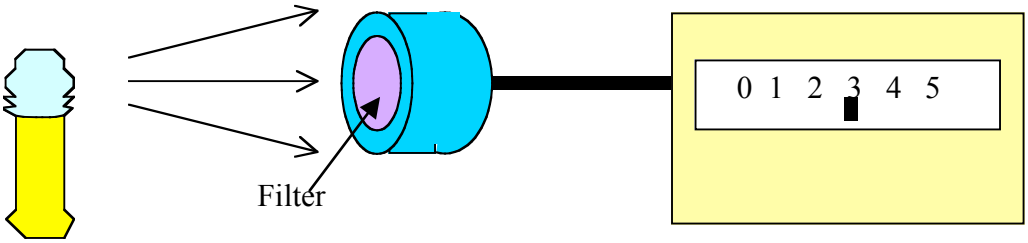
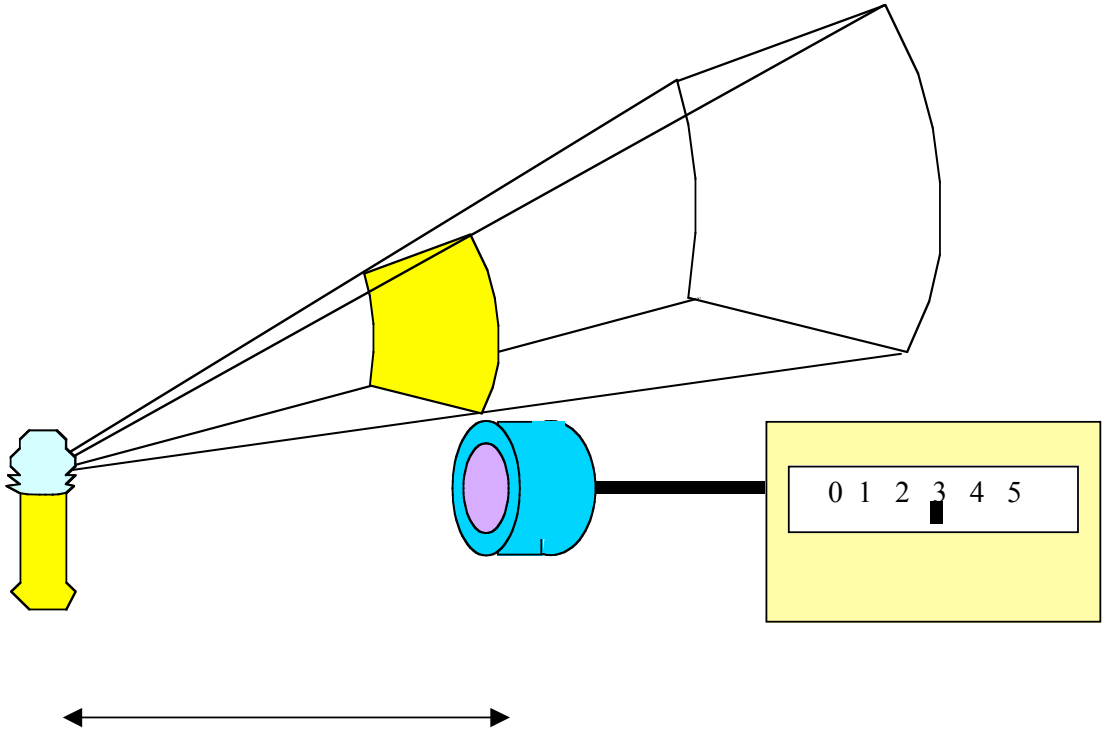


However, the human eye perceives certain colours (yellow, green) more strongly than others (red, blue).
A filter on the lightmeter which emulates the eye response allows the perceived light from the Eflare beam to be measured in **lumens.**
By allowing for the sensor area the received perceived light intensity in **lux** (lumens per square metre) can be calculated



However, because the Eflare beam diverges (spreads out with distance), the response from the lightmeter depends on the distance to the sensor. The measurement must be made at a known distance.

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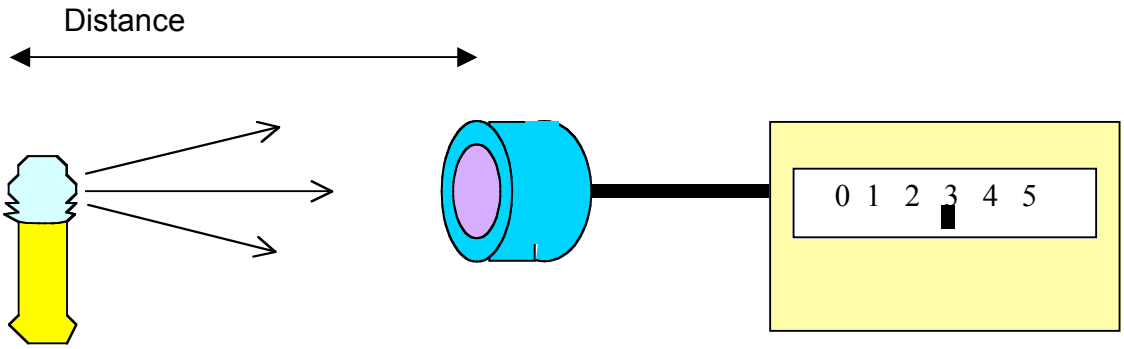

To measure the intensity of the beam, the following calculation can be used to allow for the effect of measurement distance and different sensors:

(Sensor signal/lumen)/[(area of sensor)/(Distance*Distance)]

The result can be expressed in Candelas (lumens per steradian)

A measurement distance of 0.75m, with a sensor area of $1cm^2$ is typical.

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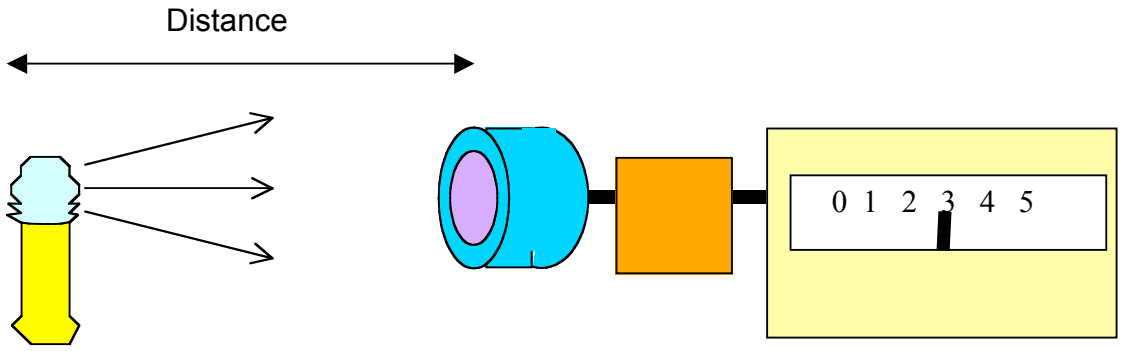
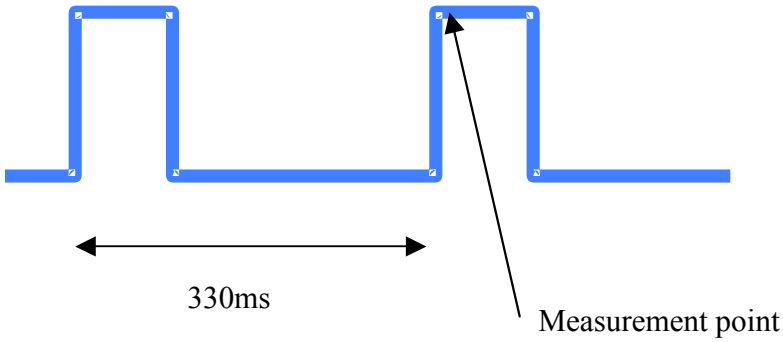


Because the Eflare may be flashing, a control module is used to ensure that the measurement is made during the flash.

Cycle of typical Eflare in flashing mode



The candela values as recorded in the Product Specification Chart for each beacon were obtained using the above method.

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