

Photometry

What are photometric units and quantities ?

Luminous flux : symbol Φ

The amount of light emitted in one second by a luminous source.

- Unit : lumen (lm).

(See luminous flux charts page 58).

- Luminous Intensity : symbol I

The quantity of luminous flux propagated in a given direction.

- Unit : Candela (cd). Values on photometric curves are given in candela.

Illuminance : symbol E

The quantity of light falling on a unit area.

- Unit : lux (lx) = 1 lm/m²

Luminance : symbol L

The value characterising the luminous aspect of an area lit by a lighting source or device, in a given direction.

- Unit : Candela per square metre (cd/m²).

Efficiency : It is the ratio of light emitted by a luminaire to light emitted by a lamp.

Luminous Efficiency :

Qualifies the efficacy of a luminous source.

It is a quotient of flux propagated over the power consumed.

- Unit : lumen per Watt (lm/W).

Colour retention index : symbol CRI

The degree to which the coloured aspect of an object lit by a given light source corresponds to the aspect under a controlled luminous source. The CRI is a number between 0 and 100 (on this scale, 50 it is a

mediocre colour retention level, while 80/90 is a good retention level).

- Unit : Ra

Colour temperature : Complex idea of cold and hot light, linked to the chromatic properties of light and to vision of the human eye.

- Unit : Kelvin (K).

Example : 2700 K for hot-light incandescent lamps, 8000 K for metal halide discharge lamps (a colder type of light).

What is a depreciation correction factor ?

In order to compensate for the decrease in the luminous flux, due to the ageing of the lamps and to the accumulation of dust in the area. The level of lighting (E) should be increased by multiplying it by the depreciation coefficient (d).

Example of a value for d :

Dust accumulation :

- low 1,25

- medium 1,35

- high 1,50

What is a photometric curve ?

The photometric curve shows the luminous intensity distribution of a lighting device.

Values are given in candelas (cd).

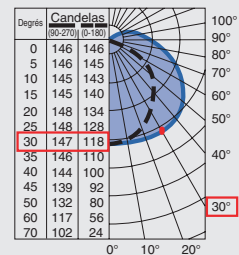
In order to make a comparison between the different types of lighting devices, this curve is drawn for a 1000 lumen flux.

Example : for a point placed at 30° from the luminaire's vertical axis, the luminous intensity is 147 cd in the lamps transverse

direction and 118 cd in the lamps longitudinal direction.

Note : the curve «integrates» the efficiency, it is therefore not necessary to make corrections after having read the intensity.

However, it is necessary to multiply it by the coefficient to obtain the actual flux of the chosen source.



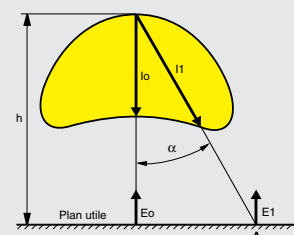
Polar photometric curve, for a lighting fixture with wide beam

Relationship between luminous intensity and luminance

In order to determine the luminance at a given point - A , the following formula can be used :

$$E = \frac{I \times \cos^3 \alpha}{h^2}$$

luminous intensity (cd) → I
 opening angle in relation to the vertical axis of the luminaire → α
 height between the luminaire and the working plane (m) → h
 luminance (Lux) → E



Working plane : Conventionally, for interior lighting, the working plane is 0.85 m from ground level.