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GLOSSARY OF LIGHTING TERMS

As with any technical or scientific discipline, lighting technology has its own special terms and concepts for defining the characteristics of lamps and Luminaires, and for standardising the units of measurement.

The most important of these are described in this publication.

Halogen

Halogen lamps, in addition to being gas filled, have a halogen compound added to the gas fill. The halogen compound (usually bromine) must be accurately controlled. Its purpose is to prevent any blackening of the bulb by returning evaporated tungsten back to the filament through a 'halogen cycle'. The higher molecular weight gas and higher fill pressure permits operation of the filament at even higher temperatures than regular gas filled lamps, so that for the same life halogen lamps have the highest efficiency.

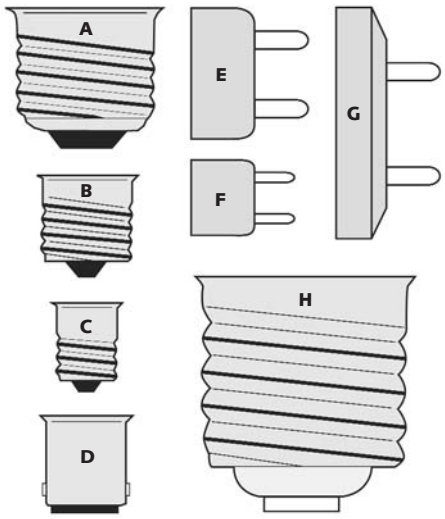
Vacuum

The incandescent tungsten filament must be protected from exposure to the atmosphere, this is achieved in a vacuum lamp by protecting the processing of the lamp so that the vacuum exists inside the glass envelope. Tungsten evaporation rates in vacuum lamps are generally much higher than in gas filled or halogen lamp types. As a consequence, normal bulb blackening causes an almost constant decrease in light output during the life of a lamp.

Gas Filled

Gas filled lamps use an inert gas to protect the filament during operation. The use of a fill gas reduces the net rate of tungsten evaporation by several orders of magnitude. Since the net evaporation rate in gas is far less than in a vacuum, the filament can be operated at a higher temperature, thus making the lamps more efficient than vacuum lamps.

Popular Base Sizes



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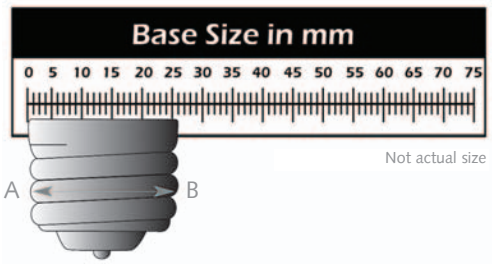
Base A: Medium
Base B: Intermediate
Base C: Candelabra
Base D: Bayonet Contact
Base E: (T8) Med. Bi-Pin
Base F: (T5) Miniature Bi-Pin
Base G: (T12) Med. Bi-Pin
Base H: Mogul

Measurement of Bases



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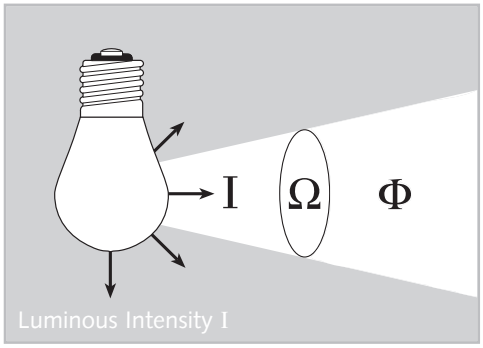
Luminous intensity I is a measure of the luminous flux Φ emitted in solid angle Ω.



Luminous Intensity I

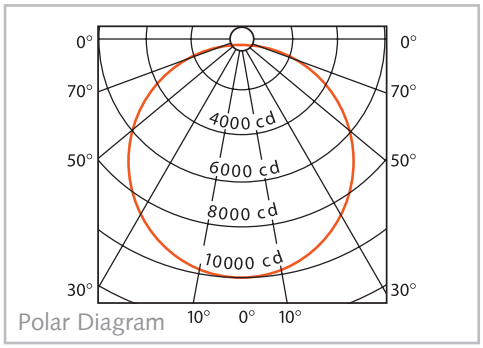
Light and Radiation

Light is taken to mean the electromagnetic radiation that the human eye perceives as brightness, in other words the part of the spectrum that can be seen. This is the radiation between 360 and 830 nm, a tiny fraction of the known spectrum of electromagnetic radiation.

Luminous Flux Φ

Unit of Measurement: lumen (lm)

Luminous Flux Φ is all the radiated power emitted by a light source and perceived by the eye and the photometric radiation equivalent K_m.



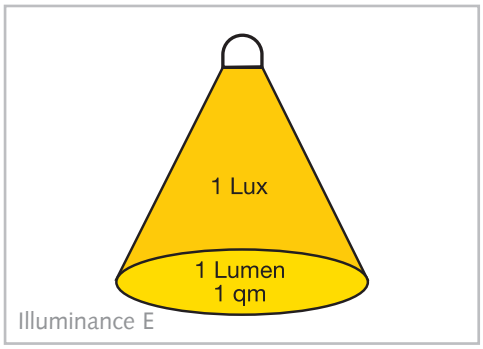
Polar Diagram

Luminous Intensity I

Unit of measurement: candela (cd)

In general, a light source emits its luminous flux Φ in different directions and at different intensities.

The visible radiant intensity in a particular direction is called luminous intensity I.



Illuminance E

Illuminance E

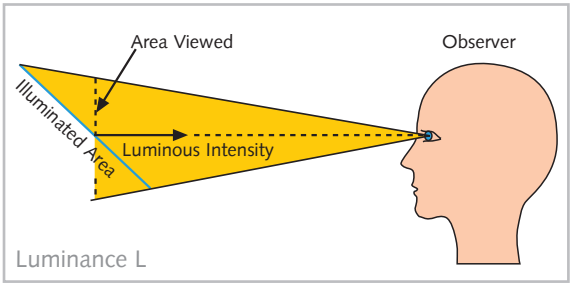
Unit of measurement : lux (lx)

Illuminance E is the ratio between the luminous flux and the area being illuminated.

An illuminance of 1 lx occurs when a luminous flux of 1 lm is evenly distributed over an area of 1 m².

Luminance L

Unit of measurement: candelas per square metre (cd/m²). The luminance L of a light source or an illuminated area is a measure of the brightness.



Luminance L

The most important photometric formulae:

Luminous intensity [cd] I	Luminous flux in solid angle / Solid angle Ω [sr]	Luminance [cd/m²] L	Luminous intensity [cd] / Viewed luminous area [m²]
Illuminance [lx] E	Luminous flux falling on area [lm] / Illuminated area [m²]	Luminous efficacy [lm/W] η	Generated luminous flux [lm] / Electrical power consumed [W]

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Luminous Efficacy η

Unit of measurement: lumens per watt (lm/w) Luminous efficiency η indicates the efficiency with which the electrical power consumed is converted into light.

Luminaire Efficiency

Luminaire efficiency (also known as light output ratio) is an important criterion in gauging the energy efficiency of a luminaire. This is the ratio between the luminous flux emitted by the luminaire and the luminous flux of the lamp (or lamps) installed in the luminaire.

Colour Appearance

The colour appearance of a lamp can be neatly defined in terms of colour temperature.There are three main categories:

- Warm White < 3300 K
- Cool White 3300 to 5000K
- Daylight > 5000 K

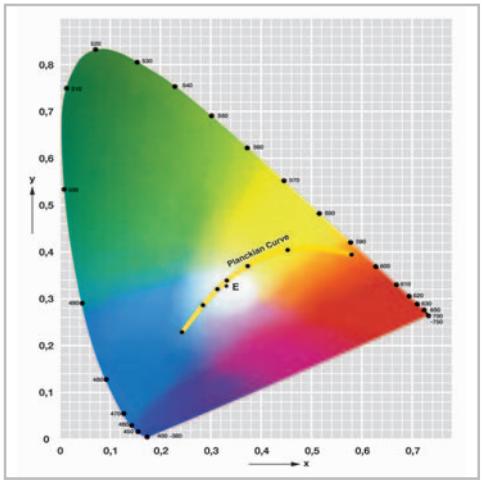
Despite having the same colour appearance, lamps may have very different colour rendering properties owing to the spectral composition of their light.

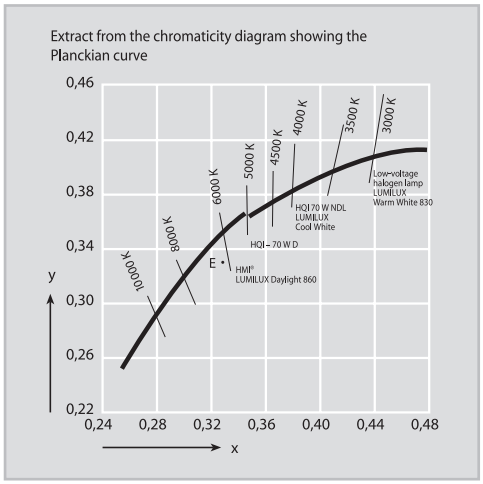
Colour Rendering

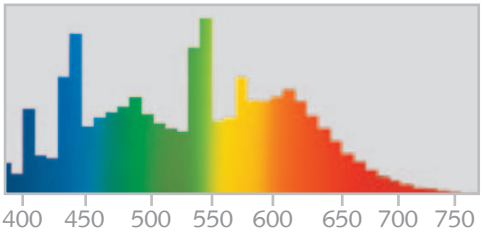
As a rule, artificial light should enable the human eye to perceive colours correctly, as it would in natural daylight. Obviously this depends to some extent on the location and purpose for which light is required. The criterion here is the colour rendering property of a light source. This is expressed as a 'general colour rendering index' (R_a). The colour rendering index is a measure of the correspondence between the colour of an object (its self luminous colour) and its appearance under a reference light source. To determine the R_a values eight test colours are illuminated with the reference light source and the light source under test. The smaller the discrepancy the better the colour rendering property of the lamp being tested. A light source with an R_a value of 100 displays all colours exactly as they appear under the reference light source. The lower the R_a value, the worse the colours are rendered.

Service Life

This is a measure of the economical life of a lamp. It is the number of hours of operation, after which the system luminous flux is around 80% of the initial value.







Daylight spectrum of a Biolux® fluorescent lamp. The radiation is very evenly distributed over the entire visible range.

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Voltage

The voltage of a circuit is the electrical pressure it gives. In an incandescent lamp 'voltage' designates the supply voltage to which the lamp should be connected. In other lamps it may refer to the 'operating voltage' of a lighted arc discharge lamp.

Wattage

Unit used to measure power consumption of lamp.

Candle Power

A term used for the luminous intensity of a light source.

Average Rated Life

The statistical average of lamp life under controlled laboratory conditions. The actual life may vary depending upon the environmental conditions, such as shock, vibration, temperature and voltage fluctuations of the application.

Colour Temperature

Measured in Kelvins, it is the measure of the colour of light , not actual temperature.

Light

The term generally applied to the visible energy from a source. Light is usually measured in lumens or candlepower.

Light Centre length

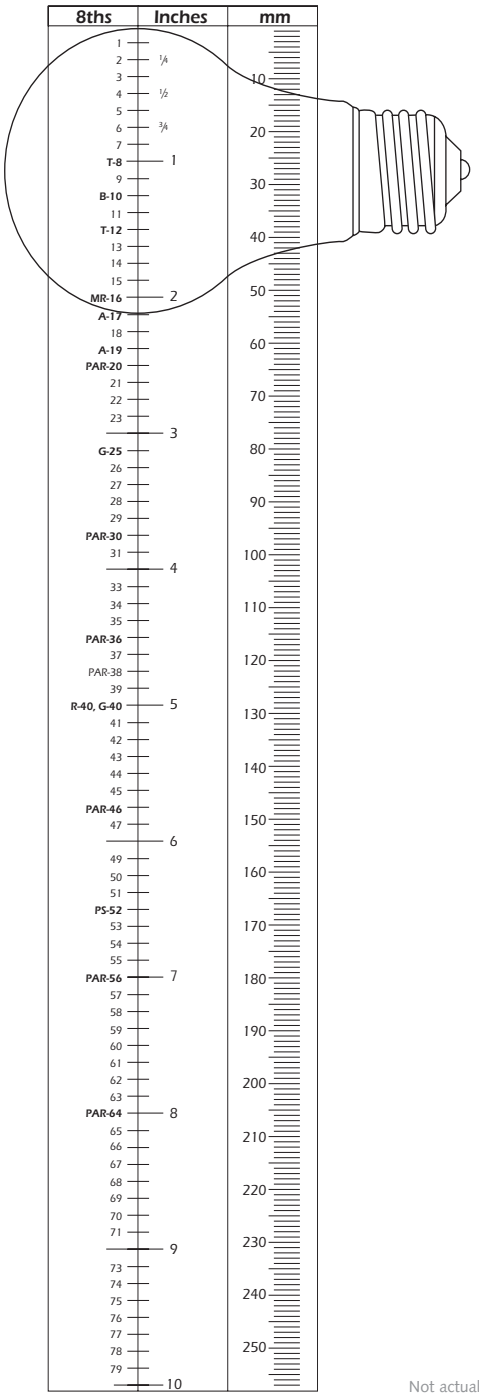
The distance from a reference point on the lamp base to the centre of the light source.

Lumens

The amount of light emitted by a bulb. This can be converted to spherical candlepower by dividing by 12.57.

Luminance or Brightness

The light emitted, transmitted or reflected from a unit area of the source of surface is its brightness.



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