

Lighting Terminology

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

- **Light Spectrum**
Light waves of a specific energy level will emit a particular colour. Sir Isaac Newton recognised the visible light spectrum in 1666, and he identified seven colours: red, orange, yellow, green, blue, indigo and violet. Newton's colours are arbitrary segments of the continuous spectrum of colour. When all of the spectral colours travel together, they combine to make white light.
- **Speed of Light**
Transparent materials cause light to refract, or bend its path, because light travels at different speeds in different mediums, like water or glass. The speed depends on the composition and density of the medium how many atoms are getting in the way. The reduction in speed causes light to bend upon entry into that medium. Since different wavelengths of light bend at different angles, certain materials can act as prisms, causing white light to visibly split apart into its spectrum.
- **Properties of Light**
Light can also reflect or bounce off objects. This is what causes us to see. Light rays emitted from a light source reflect off objects in all directions and transmit the image of that object to your eye. Objects with very smooth surfaces, like mirrors, reflect light so well that they redirect it in a single direction.
- **Light and Radiation**
Light is taken to mean the electromagnetic radiation that the human eye perceives as brightness, in other words that part of the spectrum that can be seen. This is the radiation between 360 and 830nm, a tiny fraction of the known spectrum of electromagnetic radiation.
- **Luminous Flux ϕ**
Unit of measurement: lumen [lm]
All the radiated power emitted by a light source and perceived by the eye is called luminous flux ϕ .
- **Luminous Intensity I**
Unit of measurement: candela [cd]
Generally speaking, 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**
 Unit of measurement: lux [lx]
 Illuminance E is the ratio between the luminous flux and the area to be illuminated. An illuminance of 1 lx occurs when a luminous flux of 1 lm is evenly distributed over an area of 1 square metre.
- Luminance L**
 Unit of measurement: candelas per metre² [cd/m²]
 The luminance L of a light source or an illuminated area is a measure of how great an impression of brightness is created in the brain.
- Luminous Efficacy η**
 Unit of measurement: lumens per watt [lm/W]
 Luminous η indicates the efficiency with which the electrical power consumed is converted into light.
- Colour Temperature**
 Unit of measurement: Kelvin [K]
 The colour temperature of a light source is defined in comparison with a "Black Body Radiator" and plotted on what is known as the "Planckian Curve". The higher the temperature of this "Black Body Radiator" the greater the blue component in the spectrum and the smaller the red component. An incandescent lamp with a warm white light, for example, has a colour temperature of 2700K, whereas a daylight fluorescent lamp has a colour temperature of 6000K.
- Light Colour**
 The light colour of a lamp can be neatly defined in terms of colour temperature. There are three main categories here:
 Warm < 3300 K
 Intermediate 3300 to 5000 K
 Daylight > 5000 K
 Despite having the same light colour, 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" (CRI).

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 CRI values, eight test colours defined in accordance with DIN 6169 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 a CRI value of 100 displays all colours exactly as they appear under the reference light source. The lower the CRI value, the worse the colours are rendered.

- **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.
- **Average Life**
The average life of a lamp is an average of the lives of individual lamps operated under standard conditions. (50% failure = average life).
- **Service Life**
Service life is a simple practical measure of the economical life of a lamp. It is the number of hours of operation after which the system luminous flux (i.e. the product of the relative luminous flux and the relative proportion of lamps still in operation) is still around 80% or the initial value.
- **ANSI Code**
These are 3 letter codes assigned by the American National Standards Institute. They provide a system of assuring mechanical and electrical interchange-ability among similarly coded lamps from various manufacturers.
- **LIF Code**
These are assigned by the Lighting Federation of London (UK). They ensure electrical and mechanical interchange-ability of similarly coded lamps. LIF codes are divided into groups according to primary applications.
- **Volts**
Lamp data is based on operation at rated voltage.
- **Watts**
Energy used. To find actual energy used (kWh) multiply power (watts shown) x hours of use divided by 1000.
- **Leading Lamp Manufactures**
GE
Osram
Philips
Sylvania