

REVIEW OF FUNDAMENTAL LIGHTING CONCEPTS

To summarize some of the key lighting concepts designers need to know in order to operate with greater understanding of lighting. We will look at eight terms. There are found in the definitions, but these are fundamentals every designer should be aware of.

- Luminous Flux
- Luminous Intensity
- Illuminance
- Illuminance level
- Color Temperature
- Measured brightness
- Diffuse
- Light loss factors

LUMINOUS FLUX

The quantity of light energy per unit of time arriving, leaving, or going through a surface. The lumen (lm) is the unit of luminous flux in both the International System (SI) of units and in the American System (AS) of units. If you think of light as particles (photons) moving through space, then the luminous flux of a light beam arriving at a surface is proportional to the number of particles hitting the surface during a time interval of 1 second. In general, Luminous Flux provides more accurate lighting in rendered images than Wattage and Efficacy.

LUMINOUS INTENSITY

The light energy per unit of time emitted by a point source in a particular direction. Luminous intensity is used to describe the directional distribution of a light source, that is, to specify how the luminous intensity of a light source varies as a function of the outgoing direction. The Candela (cd) is the unit of luminous intensity.

ILLUMINANCE

The luminous flux incident on a surface of unit area. Illuminance measures how much energy has fallen on a surface. This quantity is useful for describing the level of illumination incident on a surface without making the measurement dependent on the size of the surface itself. The lux (lx) is the International System (SI) unit of illuminance. The American System (AS) unit for illuminance is the footcandle (fc), equivalent to 1 lumen per square foot.

LIGHT LOSS FACTORS

When light leaves the luminaire and travels through an environment there are a number of factors that affect the amount of light leaving and arriving. The amount of illuminance that falls on a surface is different depending on light loss factors (LLF). Non-recoverable losses are experienced from lamp, ballast, fixture temperature, supply voltage, optical factors, and fixture surface. Recoverable losses can be prevented and include lamp burnouts and depreciation from lamp lumen, fixture dirt, and room surface dirt.

ILLUMINATION LEVEL

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MEASURED BRIGHTNESS

Luminous intensity of a surface or object, often referred to as *luminance*. Objectively measured light (cd/ft^2 or fL) reflected from or transmitted through an object. To convert fL to cd/ft^2 , multiply by 0.32. (p. 394)

DIFFUSE

Having the property of scattering incident light over a wide range of angles (e.g. materials such as plaster, wood brick have diffuse surfaces). See also *matte*. (p. 389)