

## Lighting Terminology

### **Accent Lighting**

Directional lighting to emphasize a particular object or to draw attention to a part of the field of view.

### **Absorption**

The dissipation of light within a surface or medium.

### **Accommodation**

The process by which the eye changes focus from one distance to another.

### **Adaptation**

The process by which the visual system becomes accustomed to more or less light than it was exposed to during an immediately preceding period. It results in a change in the sensitivity of the eye to light.

### **Alternating Current (AC)**

Flow of electricity which cycles or alternates direction many times per second. The number of cycles per second is referred to as frequency. Most common frequency used in this country is 60 Hertz (cycles per second).

### **Ambient Lighting**

Background or fill light in a space.

### **Amperes (amps or A)**

The unit of measurement of electric current.

### **Back Lighting**

The illumination provided for scenery in off-stage areas visible to the audience.

### **Baffle**

An opaque or translucent element that serves to shield a light source from direct view at certain angles, or serves to absorb unwanted light.

### **Ballast**

An auxiliary device consisting of induction windings wound around a metal core and sometimes includes a capacitor for power correction. It is used with fluorescent and HID lamps to provide the necessary starting voltage and to limit the current during operation.

### **"Batwing" Distribution**

Candlepower and distribution which serves to reduce glare and veiling reflections by having its maximum output in the 30° to 60° zone.

### **Candela**

The unit of measurement of luminous intensity of a light source in a given direction.

### **Candlepower**

Luminous intensity expressed in candelas.

### **Candlepower Distribution Curve**

A curve, generally polar, representing the variation of luminous intensity of a lamp or luminaire in a plane through the light center.

### **Cavity Ratio**

A number indicating cavity proportions calculated from length, width and height.

### **Class "P" Ballast**

Contains a thermal protective device which deactivates the ballast when the case reaches a certain critical temperature. The device resets automatically when the case temperature drops to a lower temperature.

### **Coefficient of Utilization (CU)**

The ratio of the luminous flux (lumens) from a luminaire calculated as received on the work-plane to the luminous flux emitted by the luminaires lamps alone.

### **Cold Cathode Lamp**

An electric-discharge lamp whose mode of operation is that of a flow discharge.

### **Colorimetry**

The measurement of color.

### Color Rendering Index (CRI)

Measure of the degree of color shift objects undergo when illuminated by the light source as compared with the color of those same objects when illuminated by a reference source of comparable color temperature.

### Color Temperature

The absolute temperature of a blackbody radiator having a chromaticity equal to that of the light source.

### Cone Reflector

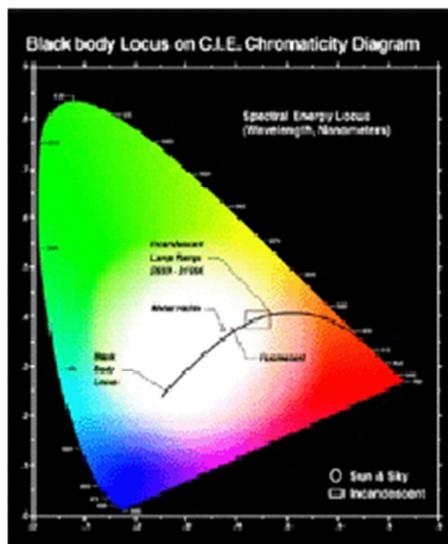
Parabolic reflector that directs light downward thereby eliminating brightness at high angles.

### Contrast

The difference in brightness (luminance) of an object and its background.

### Cool Beam Lamps

Incandescent PAR lamps that use a special coating (dichroic interference filter) on the reflectorized portion of the bulb to allow heat to pass out the back while reflecting only visible energy to the task, thereby providing a "cool beam" of light.



### Correlated Color Temperature

In calculating the color temperature of light sources, we actually use a theoretical model called a BLACK BODY RADIATOR, not a piece of iron. Note that the Black Body is a continuous spectrum source, with radiant power at all wavelengths. The chromaticity of the Black Body Radiator at various color temperatures is plotted on the diagram below.

Incandescent sources fall on the Black Body line, between approximately 2750-K and 3200-K. Because fluorescent and high intensity discharge lamps do not generate light by means of incandescing, they are not perfectly modeled by the Black Body and do not fall on its line. Therefore, they have a CORRELATED COLOR TEMPERATURE (CCT) indicating the nearest point on the back line as shown.

### Cove Lighting

Lighting comprising sources shielded by a ledge or horizontal recess, and distributing light over the ceiling and upper wall.

### Cutoff Luminaires

Outdoor luminaires that restrict all light output to below 85° from vertical.

### Digital Addressable Lighting Interface (DALI)

An open communications protocol used by multiple control and ballast manufacturers for digital control.

### Dimming Ballast

Special fluorescent lamp ballast, which when used with a dimmer control, permits varying light output.

### Direct Current (DC)

Flow of electricity continuously in one direction from positive to negative.

### Direct Lighting

Lighting involving luminaires that distribute 90 to 100% of emitted light in the general direction of the surface to be illuminated. The term usually refers to light emitted in a downward direction.

### Direct Glare

Glare resulting from high luminances or insufficiently shielded light sources in the field of view. It usually is associated with bright areas, such as luminaires, ceilings and windows which are outside the visual tasks or region being viewed.

**Discharge Lamp**

A lamp in which light (or radiant energy near the visible spectrum) is produced by the passage of an electric current through a vapor or a gas.

**Discomfort Glare**

Glare producing discomfort. It does not necessarily interfere with visual performance or visibility.

**Emergency Lighting**

Lighting system designed to provide minimum illumination required for safety, during power failures.

**Efficacy**

See Lamp Efficacy.

**Efficiency**

See Luminaire Efficiency.

**Equivalent Sphere Illumination (ESI)**

The level of sphere illumination which would produce task visibility equivalent to that produced by a specific lighting environment.

**"ER" (Elliptical Reflector)**

Lamp whose reflector focuses the light about 2" ahead of the bulb, reducing light loss when used in deep baffle downlights.

**Extended Life Lamps**

Incandescent lamps that have an average rated life of 2500 or more hours and reduced light output compared to standard general service lamps of the same wattage.

**Fill Light**

Illumination added to reduce shadows or contrast range.

**Floodlighting**

A system designed for lighting a scene or object to a luminance greater than its surroundings. It may be for utility, advertising or decorative purposes.

**Fluorescent Lamp**

A low-pressure mercury electric-discharge lamp in which a phosphor coating transforms some of the ultraviolet energy generated by the discharge into light.

**Footcandle (fc)**

The unit of illuminance when the foot is taken as the unit of length. It is the illuminance on a surface one square foot in area on which there is a uniformly distributed flux of one lumen.

**Foot Lambert (fl)**

A unit of luminance of perfectly diffusing surface emitting or reflecting light at the rate of one lumen per square foot.

**Footlights**

A set of striplights at the front edge of the stage platform used to soften face shadows cast by overhead luminaires and to add general toning lighting from below.

**General Lighting**

See Ambient Lighting.

**General Service Lamps**

"A" or "PS" incandescent lamps.

**Glare**

The sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted to cause annoyance, discomfort, or loss in visual performance and visibility.

**Ground Relamping**

Relamping of a group of luminaires at one time or reduce relamping labor costs..

**High Intensity Discharge (HID) Lamp**

A discharge lamp in which the light producing arc is stabilized by wall temperature, and the arc tube has a bulb wall loading in excess of three watts per square centimeter. HID lamps include groups of lamps known as mercury, metal halide, and high pressure sodium.

**High Output Fluorescent Lamp**

Operates at 800 or more milliamperes for higher light output than standard fluorescent lamp (430MA).

**High Pressure Sodium (HPS) Lamp**

High intensity discharge (HID) lamp in which light is produced by radiation from sodium vapor. Includes clear and diffuse-coated lamps.

**Incandescence**

The self-emission of radiant energy in the visible spectrum due to the thermal excitation of atoms or molecules.

**Incandescent Lamp**

A lamp in which light is produced by a filament heated to incandescence by an electric current.

**Instant Start Fluorescent Lamp**

A fluorescent lamp designed for starting by a high voltage without preheating of the electrodes.

**Inverse Square Law**

The law stating that the illuminance at a point on a surface varies directly with the intensity of a point source, and inversely as the square of the distance between the source and the point. If the surface at the point is normal to the direction of the incident light, the law is expressed by  $E_c = E_p / d^2$ .

**Kelvin**

Unit of measurement for color temperature. The Kelvin scale starts from absolute zero, which is  $-273^\circ$  Celsius.

**Kilowatt-Hour (KWH)**

Unit of electrical power consumed over a period of time.  $KWH = \text{watts} / 1000 \times \text{hours used}$ .

**Lamp**

An artificial source of light (also portable luminaire equipped with a cord and plug).

**Lamp Efficacy**

The ratio of lumens produced by a lamp to the watts consumed. Expressed as lumens per watt (LPW).

**Lamp Lumen Depreciation (LLD)**

Multiplier factor in illumination calculations for reduction in the light output of a lamp over a period of time.

**Light**

Radiant energy that is capable of exciting the retina and producing a visual sensation. The visible portion of the electromagnetic spectrum extends from about 380 to 770 nm.

**Lens**

Used in luminaires to redirect light into useful zones.

**Local Lighting**

Lighting designed to provide illuminance over a relatively small area or confined space without providing any significant general surrounding lighting.

**Louver**

A series of baffles used to shield a source from view at certain angles or to absorb unwanted light. The baffles usually are arranged in a geometric pattern.

**Long Life Lamps**

See Extended Life Lamps.

**Low Pressure Sodium Lamp**

A discharge lamp in which light is produced by radiation of sodium vapor at low pressure producing a single wavelength of visible energy, i.e. yellow.

**Low Voltage Lamps**

Incandescent lamps that operate at 6 to 12 volts.

**Lumen**

The unit of luminous flux. It is the luminous flux emitted within a unit solid angle (one steradian) by a point source having a uniform luminous intensity of one candela.

**Luminaire**

A complete lighting unit consisting of a lamp or lamps together with the parts designed to distribute the light, to position and protect the lamps and to connect the lamps to the power supply.

**Luminaire Direct Depreciation (LDD)**

The multiplier to be used in illuminance provided by clean, new luminaires to the reduced illuminance that they will provide due to direct collection on the luminaires at the time at which it is anticipated that cleaning procedures will be instituted.

**Luminaire Efficiency**

The ratio of luminous flux (lumens) emitted by a luminaire to that emitted by the lamp or lamps used.

**Luminance**

The amount of light reflected or transmitted by an object.

**Lux**

The metric unit of illuminance. One lux is one lumen per square meter (lm/m<sup>2</sup>).

**Maintenance Factor (MF)**

A factor used in calculating illuminance after a given period of time and under given conditions. It takes into account temperature and voltage variations, dirt accumulation on luminaire and room surfaces, lamp depreciation, maintenance procedures and atmosphere conditions.

**Mercury Lamp**

A high intensity discharge (HID) lamp in which the major portion of the light is produced by radiation from mercury. Includes, clear, phosphor-coated and self-ballasted lamps.

**Metal Halide Lamp**

A high intensity discharge (HID) lamp in which the major portion of the light is produced by radiation of metal halides and their products of dissociation-possible in combination with metallic vapors such as mercury. Includes clear and phosphor coated lamps.

**Nadir**

Vertically downward directly below the luminaire or lamp; designated as 0°.

**Overall Length (OAL)**

Maximum overall length of a light fixture.

**"PAR" Lamps**

Parabolic aluminized reflector lamps which offer excellent beam control, come in a variety of beam patterns from very narrow spot to wide flood and can be used outdoors unprotected because they are made of "hard" glass that can withstand adverse weather.

**Parabolic Louvers**

A grid of baffles which redirect light downward and provide very low luminaire brightness.

**Photometry**

The measurement of light quantities.

**Point Method Lighting Calculation**

A lighting design procedure for predetermining the illuminance at various locations in lighting installations, by use of luminaire photometric data.

**Polarization**

The process by which the transverse vibrations of light waves are oriented in a specific plane. Polarization may be obtained by using either transmitting or reflecting media.

**Power Factor**

Ratio of: Watts (volts x amperes) Power factor in lighting is primarily applicable to ballasts. Since volts and watts are usually fixed, amperes (or current) will go up as power factor goes down. This necessitates the use of larger wire sizes to carry the increased amount of current needed with Low Power Factor (L.P.F) ballasts. The addition of a capacitor to an L.P.F. ballast converts it to a H.P.F. ballast.

**Preheat Fluorescent Lamp**

A fluorescent lamp designed for operation in a circuit requiring a manual or automatic starting switch to preheat the electrode in order to start the arc.

### "R" Lamps

Reflectorized lamps available in spot (clear face) and flood (frosted face).

### Rapid Start Fluorescent Lamp

A fluorescent lamp designed for operation with a ballast that provides a low-voltage winding for preheating the electrodes and initiating the arc without a starting switch or the application of high voltage.

### Raw Footcandles

See Footcandles.

### Reflection

Light bouncing off a surface. In specular reflection the light strikes and leaves a surface at the same angle. Diffuse reflected light leaves a surface in all directions.

### Reflectance

Sometimes called reflectance factor. The ratio of reflected light to incident light (light falling on a surface). Reflectance is generally expressed in percent.

### Reflected Glare

Glare resulting from specular reflections of high luminances in polished or glossy surfaces in the field of view. It usually is associated with reflections from within a visual task or areas in close proximity to the region being viewed.

### Reflector

A device used to redirect the light flow from a source by bouncing it off the surface.

### Refraction

The process by which the direction of a ray of light changes as it passes obliquely from one medium to another in which its speed is different.

### Room Cavity Ratio (RCR)

A number indicating room cavity proportions calculated from length, width and height.

### Rough Service Lamps

Incandescent lamps designed with extra filament supports to withstand bumps, shocks and vibrations with some loss in lumen output.

### Self-ballasted Mercury Lamps

Any mercury lamp of which the current-limiting device is an integral part.

### Silver Bowl Lamps

Incandescent "A" lamps with a silver finish inside the bowl or portion of the bulb. Used for indirect lighting.

### Spacing Ratio

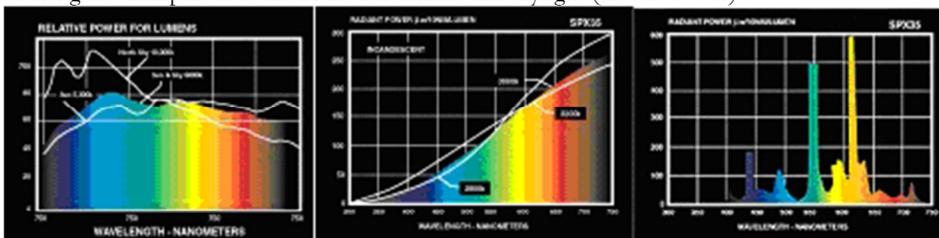
Ratio of the distance between luminaire centers to the mounting height above the work-plane for uniform illumination.

### Spectral Energy Distribution (SED) Curves

A plot of the level of energy at each wavelength of a light source.

### Spectral Power Distribution

The color composition of any light source can be drawn by plotting the amount of radiant power at each wavelength. This is known as a Spectral Power Distribution Curve. Each light source can be precisely described by its SPD curve. The higher the curve at any point, the more power there is in the light source at that wavelength. The curve shown for noon sunlight is relatively balanced, with power at all wavelengths. Compare it to the SPDs for sunrise and skylight (no direct sun)



*It is common to speak of "natural" light. But, as the curves show, there is no one natural light. It changes by the hour (and season and geographic location).*



## **Sphere Illumination**

The illumination on a task from a source providing equal luminance in all directions about that task, such as an illuminated sphere with the task located at the center.

## **Surface Mounted Luminaire**

A luminaire that is mounted directly on a ceiling.

## **Suspended (Pendant) Luminaire**

A luminaire that is hung from a ceiling by supports.

## **Task Lighting**

Lighting directed to a specific surface or area that provides illumination for visual tasks.

## **Three-Way Lamps**

Incandescent lamps that have two separately switched filaments permitting a choice of three levels of light such as 30/70/100, 50/100/150 or 100/200/300 watts. They can only be used in a base down position.

## **Transformer**

A device to raise or lower electric voltage.

## **Transmission**

The passage of light through a material.

## **Tungsten-Halogen Lamp**

A gas filled tungsten incandescent lamp containing a certain proportion of halogens.

## **Veiling Reflections**

Regular reflections superimposed upon diffuse reflections from an object that partially or totally obscure the details to be seen by reducing the contrast. This is sometimes called reflected glare.

## **Vibration Service Lamps**

See Rough Service Lamps.

## **Visual Comfort Probability (VCP)**

The rating of a lighting system expressed as a percent of people who, when viewing from the specified location and in a specified direction, will be expected to find it acceptable in terms of discomfort glare.

## **Visual Edge**

The line on a isolux chart which has a value equal to 10% of the maximum illumination.

## **Visual Field**

The field of view that can be perceived when the head and eyes are kept fixed.

## **Wall Wash Lighting**

A smooth even distribution of light over a wall.

## **Zonal Cavity Method Lighting Calculation**

A lighting design procedure used for predetermining the relation between the number and types of lamps or luminaires, the room characteristics, and the average illuminance on the work-plane. It takes into account both direct and reflected flux.