

LIGHTING AND DAYLIGHTING GLOSSARY

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- Absorbtion:** The dissipation of light on a surface. The darker the surface, the more absorbtion and less reflectance.
- Accent Lighting:** directional lighting that is used to accent or highlight a particular object or surface
- Ambient Lighting:** general background lighting that usually lights up an entire space.
- ASHRAE 90.1:** One of two leading energy codes, first developed in response to the energy crisis of the 70's. New versions issued every 3 years.
- Average Rated Life:** an average rating, in hours, indicating when 50% of a group of lamps have failed when operated at nominal lamp voltage and current. Every lamp type has a mortality curve that depicts its average rated life. LED lights end of life is described as when it drops to 70% output.
- Ballast:** A device used to operate fluorescent and HID lamps. The ballast provides the necessary starting voltage, while limiting voltage during operation.
- Beam Angle:** The point where candlepower falls to 50 %, describes primary beam circle (ex..10, 20 , 45 degrees)
- Beam Spread:** a measure of the spread of light from a reflectorized light source, a special reflective coating inside the bulb to direct the light forward. The beam spread may be very, very wide (wide flood) something in between (narrow flood) or very tight and focused (narrow spot).
- Bulb Nomenclature:** The figure in numbers describing a "lightbulb" is it's diameter in 1/8's. For example, an MR16 is 16 1/8ths', or 2" diameter.
- Candela:** A measure of luminous intensity. Often used to measure center beam candlepower.
- Candlepower:** is a rating of light output at the source; using English measurements.
- Circadian Rhythm:** the hormonal oscillation in response to changes in environmental light and darkness that is hardwired into our bodies, night follows day in a 24 hours cycle. Think jet lag.
- Color Rendering Index (CRI):** a measure of a lamp's ability to render colors accurately in objects. The CRI is expressed on a scale of 0-100 (1=low pressure sodium, with poor color rendering, to 100=the sun), a CRI of 85 and above is considered very good. Limitations are that it uses a pastel palette, and is non linear in the red range.
- Color Temperature:** originally, a term used to describe the "whiteness" of incandescent lamp light. Color temperature is directly related to the physical temperature of the filament in incandescent lamps, so the Kelvin (K) (absolute) temperature scale is used to describe it. Although it may not seem sensible, a higher color temperature describes a visually cooler, bluer light source. The color

temperature has nothing to do with how hot the lamp will get or how much heat is given off. More recently, the term “chromaticity” has been used in place of color temperature.

Correlated Color Temperature (CCT): a term used for discharge lamps, where no hot filament is involved, to indicate that the light appears “as if” the discharge lamp is operating at a given color temperature. CCT generally measures the “warmth” or “coolness” of light source appearance using Kelvin temperature scale.

Color Quality Scale (CQS): A new color metric scale developed by the National Institute of Standards and Technology that attempts to overcome some of the limitations of CRI.

Compact Fluorescent Lamp (CFL): a fluorescent type bulb that has the ability to be utilized in an incandescent fixture, and still maintain the efficiency and qualities of a standard fluorescent bulb. These bulbs generally offer 75% savings in electricity while maintaining comparable light levels, and lasting 10,000 hours.

Contrast: the difference in brightness (or luminance) of an object and its background.

Daylight Compensation: A dimming system controlled by a photocell that reduces the output of lamps when daylight is present, saving energy.

Daylighting: is simply the act of illuminating rooms naturally, with control.

Diffuser: A translucent piece of glass or plastic sheet that shields the light source in a fixture, to reduce glare.

Dimmer: a device in an electrical circuit used for varying the brightness of lamps in a light installation. Dimming controls are ideal for almost any type of room because they can change the amount of lighting to suit each mood or activity and they can help you look good. The use of dimmers with incandescent, LED, xenon, and halogen light sources also increases the life of lamps and decreases the use of electrical energy.

Downlight: a small light fixture recessed into the ceiling that usually concentrates the light in a downward direction. Synonyms: recessed downlight, “can”, recessed can. Please use “Airtight” IC cans in all top floor applications.

Efficacy: a measure used to compare light output to energy consumption - efficiency of a light source expressed in lumens per watt (LPW or L/W). A 100 watt source producing 9000 lumens, then the efficacy is 90 lumens per watt.

EISA: Energy Independence and Security Act, set to start taking effect in 2012, which will ban the common incandescent lamp by 2014. Time to switch to halogen, fluorescent, or LED!

Energy: a measure of work done by an electrical system over a given period of time, often expressed in kilowatt-hours (kWh).

Fiber Optics: fine plastic or glass cable that transmits light (or data) by total internal reflection (TIR)

Fluorescent Lamp: a low-pressure mercury electric-discharge lamp (light bulb) in which phosphor coating on the inside of the glass tubing transforms some of the ultraviolet energy created inside the lamp into visible light.

Foot Candle: the amount of light falling onto a surface. The common U.S. unit of lighting level (illumination) is the foot-candle (fc). The international unit of measurement of illumination is the

lux (lx), which is about 10 times the footcandle metric (one fc = 10.764 lux). One footcandle is equal to 1 lumen per square foot.

Full Spectrum: a bulb that attempts to reproduce the full color spectrum of natural outdoor light.

Glare: excessive brightness that may be caused by either direct or indirect viewing of a light source. Causes annoyance, discomfort, or loss of visual performance.

Halogen Lamp: a short name for a tungsten-halogen lamp. Halogen lamps are high pressure incandescent lamps containing halogen gases such as iodine or bromine which allow the filaments to be operated at higher temperatures and higher efficacies

High Pressure Sodium: these HID bulbs contain a sodium gas and produce a yellow/orange light, used for streetlights and security spots. They are very bright and last up to 24,000 hours.

IECC: International Energy Conservation Code, first issued in 1998, developed by the International Code Council. This code references ASHRAE 90.1 as an alternate compliance path.

IESNA: International Illuminating Engineering Society North America.

Illuminance: A photometric term that quantifies light incident on a surface, also called light level. It is expressed in lumens per sq. foot (fc) or lumens per square meter (lux)

Incandescent: incandescent light bulbs are perhaps the most commonly found bulb in your home. The incandescent bulb contains a carbon or tungsten filament, which glows to an incandescent level when electricity flows into the bulb, popularized by Thomas Edison in 1879.

Inverse Square Law: a law that states that the illuminance (E) at a point on a plane perpendicular to the line joining the point and a source is inversely proportional to the square of the distance (d) between the plane, $E=I/d^2$.

Kelvin Color Temperature Scale: (see color temperature)

2800 incandescent light bulb

4100 moon light, cool white lamps

5770 sunlight (Note! as sun sets, color temperature lowers)

6500 daylight

Lamp: the term used to refer to the complete light source package including the inner parts as well as the outer bulb or tube. Incandescent lamps are very inefficient, with less than 3% of the input energy turned into visible light.

LED: Light emitting Diode. AKA solid state lighting. The future of lighting.

LEED: (Leadership in Energy and Environmental Design) is an internationally recognized certification system, providing third-party verification that a building or community was designed with strategies aimed at improving performance across all the metrics that matter most.

Light: electromagnetic radiation energy that is capable of exciting the retina and producing a visual sensation. The visible portion of the electromagnetic spectrum is from about 380 to 770 nanometers.

- Lighting Power Density:** Maximum allowable per unit area of building, expressed as watts per square foot. Codes and LEED dictate targets.
- Louver:** a type of “screen” made of translucent or opaque material and geometrically designed to prevent lamps from being viewed directly within a given angle. Louvers are intended to minimize direct or indirect glare.
- Low e:** Low emissivity; the quality of a surface that emits low levels of radiant energy. On glass, low e coatings are added using metal oxide coatings, that keep radiant heat on the same side of the glass it originated, while letting visible light through. Neat trick!
- Low Voltage:** although “low voltage” is generally defined as anything below 30 volts, low usually operate on 12 volts and sometimes 24 volts. It is important to note that a low voltage transformer (electronic or magnetic) to transform the “incoming” voltage (usually 120 volts) because that’s the voltage needed by the light bulbs in that lighting system.
- Lumens:** are a metric term. Measures the total light output of a lamp at lamp.
- Luminaire:** a complete lighting unit consisting of lamp, parts designed to hold the lamps and to distribute the light, and connect to a power source.
- Mesopic Vision:** vision under intermediate light levels. (related: photopic and scotopic)
- MR16 Lamp:** a halogen mirrored reflector lamp that measures 1 7/8 inches in diameter and which directs a sharp, well-defined beam of light. Originally incandescent, now available in LED.
- Occupancy Sensor:** Control device that turns lights on, then off after a preset period after a room has become unoccupied. An energy saver.
- OLED:** Organic light emitting diode. The next generation lighting, still quite expensive.
- PAR Lamp:** PAR is an acronym for a parabolic aluminized reflector. A PAR lamp, which may use an incandescent filament, a halogen filament tube, or an HID arc tube is a precision press glass reflector lamp that reflects light coming from the filament using a parabolic reflector. Par lamps are generally waterproof. Common sizes for homes: 50 w Par 20 or 75w Par 30.
- Pendant:** pendant lights can provide both task and general lighting. Equipped with shade globes to avoid glare, they are suspended from the ceiling over dinette tables, game tables, kitchen counters, or other work areas. When used over end tables or night tables, they free up the space occupied by table lamps. In general, pendants should be hung about 30 inches above the tabletop and be about 12 inches narrower than the table on all sides.
- Photocell:** A light sensing device used to control luminaires in response to detected light levels, usually turning on outside spots at night.
- Photometric Report:** Data describing the light distribution, efficiency, and zonal lumen output of a lamp or luminaire, from lab testing.
- Photopic Vision:** Light under high light levels, maximum visual acuity.
- Photosensitive Ganglia Cells:** discovered in 2002, photoreceptive cells in the retina that work independently of the vision system and have significant impact on our endocrine (hormone) system. Sends signals to the SCN, which regulates hormones in the body.

Radio Frequency Interference (RFI): interference to the radio frequency band caused by equipment or devices in the immediate area. Fluorescent lighting systems and AC electronics generate RFI.

Recessed Downlight: a small light fixture recessed into the ceiling that usually concentrates the light in a downward direction. Synonyms: downlight, can, recessed can.

Reflectance: The ratio of light reflected from a surface to the light incident to the surface. Dark carpet has a reflectance of 20%, while a white wall might be 60%. Color of the space dramatically affects lighting design.

R Lamp: an incandescent, cone-shaped, light bulb that has a reflecting surface on the inside envelope. Variations of this lamp type are the bulged reflector lamp (BR), the ellipsoidal reflector lamp (ER) the small reflector lamp (R). Since mid-2008 BR and ER light bulbs greater than 65 watts, used mostly in commercial retail applications, have been banned from being manufactured. These banned lights have been replaced with more efficient halogen PAR light bulbs.

Reflector Lamp: an incandescent, compact fluorescent or HD lamp with a built-in reflecting surface. Incandescent and HD versions are made from a single piece of blow-molded soft or hard glass. CFL versions may be one piece or may be designed so that the inner lamp can be replaced.

SAD: seasonal affective disorder, a debilitating condition caused by lack of sufficient winter daylight.

Sconce: an ornamental light fixture attached to a wall. Not to be confused with scones.

Scotopic Vision: vision under low light conditions, uses rod cells exclusively.

Shading Coefficient: describes a window's ability to transmit solar heat gain. The lower the number, the better. Has been largely supplanted by the "Solar Heat Gain Coefficient", which gives the fraction of incident energy that enters the space, with a value between 0 and 1.

Square Law (Inverse Square Law): luminous flux density decreases on a line away from the source, and falls in inverse proportion to the relative distance. For ex: an illumination measurement 2 feet away from a source will be $\frac{1}{4}$ the measurement at 1 foot away)

T8 Lamp: An energy efficient fluorescent tube that is 8 1/8ths, or 1". Replaced the industry standard T12 lamp (12 1/8ths's or 1 1/2" diameter)

Task Lighting: lighting that is specifically installed to light an area where a task is **performed**.

U Value: A measure of the thermal conductivity of a window. The lower the U value, the better the insulator. Double pane glass with a low e coating generally have a U value of .32, while triple glazed units can drop to .20.

UV Radiation: is NOT visible to the naked human eye and is generally considered to be the radiation which has a wavelength of less than 400 nanometers (nm) and greater than 100

Visual Comfort Probability: the rating of a lighting system expressed as a percentage of people who will be expected to find it acceptable in terms of discomfort glare.

Visible Transmittance: is the percentage of light striking the glass that penetrates to the interior, expressed as...

Work Plane: The level at which work is being done, and for which illuminance is specified. Typically, desk or table height of 30" above the floor. In a typical room with an 8 foot ceiling, the distance from

luminaire to work plane is 96"-30", or 66". Check photometric charts for lumens at that distance to help layout fixtures.

Xenon Lamp: a type of incandescent lamp that contains xenon gas in the glass envelope. The primary reason that this is done is to lengthen the average rated life of the lamp, generally 10,000 hours vs. 2,000 hours for a halogen bulb, and 750 hours for a standard incandescent A lamp.