



## Glossary

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**Topic:** Educational Lighting Site

**Electricity** - A term that indicates the physical phenomenon determined by charges with differing signs, both static (static electricity) and in motion (dynamic electricity) through conducting bodies, capable of producing an energy which man largely exploits to obtain power, light and heat.

**Voltage** - In electrical engineering, the difference of potential between two points. The intensity is measured in Volts (V).

**Volt** - (V) Unit of measurement of the electromotive force. From Alessandro Volta, the inventor of the battery.

**Watt** - (W) Unit of measurement of the intensity of electric current.

**Dimmer** - Device used to adjust the intensity of a light emitted by a light source. There are electromechanic, electronic or mechanic systems of adjustment, according to the kind of source to be regulated.

**Mixer** - Device used to summate a number of signals to obtain only one in exit. In lighting engineering the device that makes it possible to control a number of projector with only one signal.

**Lighting engineering** - Lighting technique developed thanks to the increasingly advanced and rational use of new light sources.

**Projector** - An electric device that projects a very intense beam of light with the aim of illuminating objects that can also be placed at a great distance.

**Scanner** - Term used to indicate a light projector equipped with a mirror that by moving shifts the light beam. The terms comes from the verb to scan, which indicates the action of "searching" typical, for instance, of the sentinel who has a specific area to keep under control.

**Moving Head** - Projector which is characterized by the fact that it does not have a mirror to shift the light beam (as in the scanner), but which to execute this action moves the whole group that generates the light beam.

**Analogue(al)** - In electronics, the system of physical quantities that vary with continuity thanks to the action of an operator or of a control system.

**Digital/Digital Signal** - Literally, the action of fingering. In electronics it indicates the building of a signal made of basic elements of Boolean algebra, the bits, information units

that can only assume a value comprised between 1 and 0 (on/off). A signal that is built in this way is characterized by a "steps" form, where the number of steps is the number of bits used for the building itself.

**Colour** - Visual sensation given by the stimuli that reflected light offers to the eye. The human eye perceives the colours comprised between red (low limit of the range) and violet (high limit): below the range we have infrared rays and above it ultraviolet rays. They are not visible but it is possible to perceive the energy that is transported by the light when it hits the epidermis. Light in physics is considered in its ondulatory component (as an electromagnetic wave). The two limits (red and violet) thus correspond to the wavelengths at the limit of the visible.

**Gobo** - A lens-screen device used to screen the exceeding light, which can thus be used to project images with projectors. There are gobos made of thin plates that transmit only full light or shadow; dichroic gobos, which transmit colours too; photographic dichroic gobos, which can reproduce also values of grey. They are made with very complex technologies which range from double-sided etching to laser technologies.

**Dichroic** - An optical phenomenon by which specific transparent minerals present two different colours whether they are looked at by reflection or transparency. In lighting engineering the term indicates special glasses, treated in vacuum chambers with "drugging" gases excited by laser light to obtain the deposit, on the surface, of the layer of the desired colouring. These glasses can resist to high temperatures and last for a very long time: this is the reason why they are used in professional projectors to colour the light beam.

**Colour temperature** - Physical parameter that indicates the temperature of the light beam. In general it is considered in reference to white (in physics it represents the sum of all available frequencies), its value is indicated in  $K^{\circ}$  (i.e. absolute temperature:  $0^{\circ} = -273,15^{\circ}K$ ). The colour temperature of the sun light is about  $6,200^{\circ}K$  and is continuous, that is the intensity at the source always remains the same.

**Lamp** - Device that generates artificial light for lighting purposes.

**Halogen lamp** - Lamp that uses an incandescent filament in a saturated environment of gases of chemical elements called "rare earths" to generate light. The quality of the emitted light depends on the frequency with which the discharges take place. The quality of the light projection greatly depends on the optical group that concentrates the emitted rays. Discharge lamps have a colour temperature that ranges from 2,000 to more than  $6,500^{\circ}K$  according to the type of lamp. Since the light is produced by discharges, the so called "flicker effect", i.e. an oscillation in the intensity of the emission, can be more or less evident. Discharge lamps generally have a strong emission of ultraviolet rays, which increases as the colour temperature increases.

**Optics** - Field of physics that studies light and its correlated phenomena. The term is also used to indicate a set of elements (lens, mirrors, etc.) that comprise - for instance - the section that in a projector generates and concentrates the light.

**Halides** - Salt of an halide acid. Bromide, chloride, fluoride and iodide are halides.

**Dissipation** - The act and the effect of dissipating or being dissipated; dispersion, dissolution. Dissipation of electricity.

**Electrons** - Each elementary particle with a negative charge that rotates around the nucleus of the atom, which is charged with positive electricity.

**Electronics** - The science and technique that regards electrons in all their manifestations and applications.

**Photometrics** - Branch of optics that studies optical quantities from the point of view of their definition and measurement.

**Photons** - Elementary particles of radiating energy.

**Photopic** - In physiology it describes vision in conditions of good luminousness; daylight vision.

**Foveal** - Small depression in the centre of the macula lutea of the eye where the maximum visual sensibility is recorded.

**Kinetic** - The study of velocity, referred to gases and chemical reactions. It derives from KINETIC which describes movement. Kinetic energy, the energy derived from the velocity of a body such as falling water.

**Alternator** - Machine that transforms mechanic energy in alternating current electricity.

**Ballast** - Units connected to discharge lamps (often kept separate from projectors), which contain inductors and other starting devices to obtain the necessary circuit conditions (voltage, current and sinusoid). The inductor serves initially to develop a high potential to effect the discharge and then to limit the flux of current when the lamp is switched on. Electronic ballasts eliminate the "flicker" effect of lamps.

**Joule Effect** - Phenomenon by which electricity is transformed in thermal energy.

**Glare:** condition of vision which causes discomfort or the reduction of the visual capability, it is caused by an inadequate distribution or gradient of luminance or by an excessive contrast in space or time.

**Physiological glare:** type of glare that hinders the vision of objects without necessarily causing discomfort.

**Psychological glare:** type of glare that causes discomfort without necessarily inhibiting the vision of the objects.

**Igniter:** device employed for the ignition of a discharge lamp (in particular of a fluorescent lamp) which ensures the necessary pre-heating of the electrodes and/or which, combined with the serial feeder, causes an overvoltage.

**Adjustment:** focal adjustment of the eye, generally spontaneous, aimed at obtaining the maximum visual acuity at varied distances.

**Visual acuity:**

1) qualitatively: capability to perceive distinctly objects that are very close to each other;  
2) quantitatively: reciprocal of the value (expressed in arc minutes) of the minimum angle at which the eye perceives that two objects (points or lines) placed close to each other, are distinct and separate.

**Adjustment:** the process by which the status of the visual system changes according to the luminances or the coloured stimuli it perceives.

**Power supplier:** device used with discharge lamps to stabilize the current in the discharge tube, i.e. to adjust the power supply to very low voltage incandescent or discharge lamps to the characteristics of the mains supply.

**Height of installation:** distance between the reference (or working) plane and the plane where the devices are lying (which is generally coincident with the plane that is tangent with the emission plane).

**Luminous environment:** lighting taken into consideration in relation to its physiological and psychological effect.

**Tilt angle:** tilt angle calculated upwards in relation to the horizontal of a luminaire.

**Solid angle (O):** solid angle created in the centre of a sphere by drawing a line that goes from the dome of an area which is numerically equal to the square of the radius.

**Unit of measurement:** steradian, sr.

**Visual angle:** angle created by an object against the observation point; it is generally measured in arc minutes.

**Beam aperture:** the angle (on the plane containing the axis of the beam) beyond which light intensity falls below a percentage predetermined against its maximum intensity.

**Luminaire:** object/device that distributes, filters or transforms the light provided by one or more lamps, comprising all the components necessary to fix and protect the lamps and to connect them to the supply circuit.

**High bay luminaire:** luminaire equipped with a string, chain, tube, by which it can be suspended from the ceiling or another support bearing.

**Built-in luminaire:** luminaire installed on the ceiling, on a wall or other surfaces, so that its visible part is limited to the emission surface and if necessary to the source and the optical system.

**Splash-protected luminaire:** luminaire built in order to prevent that it is damaged by direct splashes coming from any direction (the standard protection degree is IPX5).

**Water-resistant luminaire:** luminaire built in order to resist the penetration of rain and usually employed in exterior lighting (the standard protection degree is IPX2, 3, 4).

**Vapourproof luminaire:** luminaire built in order to resist the penetration of vapours or gases (the standard protection degree is IPX6).

**Immersiontight luminaire:** luminaire presenting an adequate level of sealing against the penetration of liquids in the conditions specified by the relevant regulation (the standard protection degree is IPX7).

**Axis of the beam:** the direction passing through the middle of the solid angle delimited by directions that have a light intensity equal to 90% of the maximum intensity of a device.

**Absorption:** conversion of radiant energy into a different form of energy caused by the interaction of matter.

**Rods:** photoreceptors of the retina containing light-sensitive pigments capable of starting vision in the dark. Rods are not believed to have any role in the discrimination of colour stimuli.

**Brilliance:** attribute of a visual sensation according to which a surface seems to emit more or less light.

**Note:** brilliancy, according to its definition, is also an attribute of colour. In British recommendations the term brilliancy is used only to describe the brilliancy of colours.

**Field of vision:** of the eye(s). Angle amplitude of space in which an object can be perceived when the observer looks at an object placed directly in front of him/her. The field can be either monocular or binocular.

**Glimmer:** attribute of a visual sensation by which a body seems to transmit or reflect in a diffused way a fraction of the cutting light radiation.

**Apparent colour:** common expression used to describe the impression of colour when we look at a light source.

**Perceived colour:** aspect of visual perception that enables an observer to distinguish the differences between two objects that have the same dimensions, form and structure, since these differences are of the same nature as those that can be provoked by a different spectrum composition of light (see also page 5).

**Perceived colour of an object:** perceived colour of an illuminating or luminous object.

**Cones:** photoreceptors of the retina containing light-sensitive pigments that are at the basis of the photopic vision process.

**Contrast:** subjective adjustment to the apparent difference between two parts of a field of vision (observed simultaneously or sequentially).

**Luminance contrast (C):** between two parts of a field of vision. Relative difference between the luminances of these parts, according to the ratio:

$$\frac{L1 - L2}{L2} = C$$

with

C = luminance contrast;

L1 = luminance of the smaller part (object);

L2 = luminance of the bigger part (background).

**Blackbody (Planck's radiator):** thermal radiator that completely absorbs all the cutting radiation, of any wavelength, from any cutting or bias direction. This radiator presents, with any wavelength, the maximum spectrum density of emissivity at any given temperature. The spectrum density of blackbody emissivity depends only on its temperature and is described by Planck's Law.

**Chromaticity:** attribute of the colour of a stimulus, it can be identified either through chromatic coordinates or through its main or complementary wavelength, and its purity.

**Visibility spectrum factor curve:** curve that provides the relative sensitivity (V) of the standard CIE photometric observer for monochromatic radiations depending of the wavelength:

a) for photopic vision, V curve (?);

b) for scotopic vision, V' curve (?).

**Luminance distribution curve:** curve representing the luminance of a luminaire on a

vertical plane depending on the zenith angle.

**Isoilluminance curve, isolux curve:** locus of the points belonging to a surface on which illuminance acquires the same value.

**Isointensity curve:** curve graphed on an imaginary sphere with a centre that is coincident with the source, and which links all the representative points of the directions in which light intensity acquires the same values. This curve is represented on a plane projection of the spherical surface.

**Isoluminance curve (diagram):** locus of the points belonging to a surface on which luminance acquires the same value according to specific positions of the observer and of the source with respect to the surface.

**V' curve (?):** curve of the visibility spectrum factor for scotopic vision.

**V curve (?):** curve of the visibility spectrum factor for photopic vision.

**Color scale:** plane scale in which the points, defined by their respective three-color coordinates, represent the chromaticity of color stimuli.

**Uniform color scale (UCS):** color scale in which the coordinates' scales are chosen so that, in all the parts of the scale, equal intervals represent, as far as possible, equal variations in the discrimination of colors having the same luminance (see also page 6).

**Zone light flux diagram:** graphic representation of the distribution of the light flux of a luminaire or lamp, in which the light flux emitted from inside a cone is expressed according to the half angle of the cone opening.

**Light intensity diagram:** light intensities represented in the form of a diagram or table, in terms of candles per 1000 lumen of lamp flux. The diagram based on the distribution of non-symmetrical light provides the distribution of light of a luminaire on two different planes:

- 1) a vertical plane passing through the longitudinal axis of the device;
- 2) a perpendicular plane to the above-mentioned axis.

**Note:** the light intensity diagram can be used:

- a) to provide an approximate idea of the light distribution of the device;
- b) to calculate the illuminance values of a point;
- c) to calculate the luminance distribution of a device.

**Chromaticity diagram:** bidimensional diagram that shows the result of color mixings whose chromaticity can be univocally represented by an individual point of the diagram.

**Isointensity diagram:** configuration of isointensity curves.

**Diffusion:** phenomenon by which the spatial distribution of a ray beam changes when the beam is deflected towards multiple directions, from a surface or from a medium, without changing the monochrome components of the frequency.

**Diffuser:** device used to vary and control the spatial distribution of radiations by employing exclusively the diffusion phenomenon.

**Dispersion:**

- 1) speed variation of the propagation of monochrome radiations in a medium, according to the frequency of such radiations;
- 2) property of a medium that triggers this phenomenon.

**Start device:** electric device that creates the necessary conditions to start a discharge.

**Catenary configuration:** configuration of street lighting devices that are suspended so as to the axis of the projector forms a right angle with the street axis.

**Symmetrical light intensity distribution:** of a source. Light intensity distribution having at least one axis or plane of symmetry.

**Spectrum distribution:**

a) of a photometric quantity: spectrum distribution of the photometric quantity according to the wavelength;

b) of a radiometric quantity (ray flux/radiant flux, ray intensity ...): spectrum distribution of the radiometric quantity depending on the wavelength.

**Energy spectrum distribution:** of a radiation. It represents the spectrum characteristics of a radiation through the relative spectrum distribution of an energy quantity (energy flux ...).

**Beam efficiency:** ratio between the flux emitted inside the solid angle created by the beam aperture and the flux of the naked lamp.

**Light efficiency (?):** of a source. Ratio between emitted light flux and absorbed electrical power.

**Unit of measurement:** lumen/watt, lm/W.

**Radiant energy ( $Q_e$ ,  $Q$ ):** emitted energy, transferred or received as radiation.

**Unit of measurement:** joule.  $J = W \cdot s$ .

**Absorption factor:** ratio between the radiant or luminous flux and the cutting light flux in specific conditions.

**Luminance factor ( $b$ ):** on the surface element of a body (which is not a source of radiations), towards a given direction, and in specific lighting conditions. Ratio between the luminance of the surface element and that of a perfectly reflecting or transmitting (Lambert) diffuser in the same lighting conditions.

**Maintenance factor:** ratio between the average illuminance on the working plane after a specific duration of use of the installation and the average illuminance obtained in the same conditions with a new installation.

**Note:** it is better to avoid using the expression “depreciation factor” as a synonym of “maintenance factor”.

**Power factor:** in an electrical circuit. Ratio between the power expressed in watts and the product of the efficient voltage values and current levels. In terms of sinusoidal waveforms, it coincides with the cosine of the angle that expresses the phase difference between voltage and current.

**Reflection factor ( $r$ ):** (of an incident radiation with a spectrum composition, polarization and given geometric distribution). Ratio between the energy or light flux and the cutting flux in the given conditions.

**Transmission factor:** (of an incident radiation with a spectrum composition, polarization and given geometric distribution). Ratio between the transmitted energy or light flux and

the cutting flux in the given conditions.

**Illuminance uniformity factor:** on a specific plane. Measurement of the illuminance variation on the considered plane, expressed as:

- 1) ratio between minimum and maximum illuminance;
- 2) ratio between minimum and average illuminance.

**Utilization factor (U):** ratio between usable light flux and the light flux coming out of the device.

**Note:** it is better to avoid the expression “utilization coefficient”.

**Lamp utilization factor:** ratio between the usable light flux and the light flux emitted by lamps.

**Correct specular factor (S1):** factor representing the degree of specular reflection of a wet road surface.

**Fluorescence:** photoluminescence that persists for a very short time after excitation.

**Direct flux:** on a surface. The light flux received by a surface directly from the devices present in a lighting system.

**Energy flux (power) (Fe, F):** power emitted, transferred or received as radiation.

**Unit of measurement:** watt, W.

**Light flux (Fv, F):** size derived from the radiant energy flux by assessing the radiation on the basis of a selective detector, whose spectrum sensitivity is defined by the normalized visibility spectrum factors (CIE photometric observer of reference).

**Unit of measurement:** lumen, lm.

**Usable flux:** light flux received by one side of the reference surface taken into consideration.

**Phosphorescence:** luminescence persisting for an appreciable time after excitation.

**Photoluminescence:** luminescence caused by an absorption of optic radiation.

**Photometry:** measure of the sizes that refer to the radiation assessed according to a given visibility spectrum factor, for instance V (l).

**Photoperiod:** natural or artificial cycle of the alternation of light and darkness to which living beings may be exposed.

**Goniophotometer:** photometer used to measure the angle distribution of a light size emitted by a light source, by a luminaire, by a medium or a surface.

**Illuminance (E):** on a point of a surface. Ratio between a dF light flux cutting the surface element containing the point and the dA area of the element itself.

**Unit of measurement:** lux, lx.

**Maintained illuminance:** average illuminance on a reference surface measured at the end of a maintenance cycle.



**Average illuminance (E?):** in relation to a surface. Illuminance average value in relation to a specific surface.

Cylindrical, semicylindrical, semispherical, spherical average illuminance:(see chapter 1.1).

**Emergency lighting:** lighting envisaged to be used when there is a power failure in the main system.

**Safety lighting:** part of the emergency lighting system designed to guarantee people's safety.

**Service lighting:** that part of the emergency lighting system designed to ensure that it is possible to efficiently identify and use a way out in the case of non-functioning of the normal lighting system.

**Ambient light:** lighting in which the light on the working plane or on an object does not originate from any particular direction.

**Direct lighting:** lighting with devices having such an intensity distribution that 90 , 100% of the emitted light flux reaches the working plane directly; assuming that this plane is not infinite.

**Directional lighting:** lighting in which the light on the working plane or on an object mainly originates from a particular direction.

**General lighting:** substantially uniform lighting of an area or a volume that does not take into consideration particular local needs.

**Localized lighting:** lighting designed to illuminate an area with a higher illuminance in specific positions, for instance the one used as a working plane.

**Replacement lighting:** part of the emergency lighting system that allows to continue normal activity without relevant changes.

**Incandescence:** emission of light radiation depending on the process of thermal emission.

**Glare control index:** pure number that denotes the degree with which the discomfort caused by glare is controlled.

**Room index (K):** index that is characteristic of the geometry of a room, used to calculate the lamp or luminaire utilization factor.

**Note:** unless differently indicated, the room index is given by the following formula:

$$\frac{A \times b}{h \times (a \div b)} = K$$

with

a = length of the room

b = width

h = height of an installation in relation to the centre distance plane.

**Colour efficiency index (Rp):** quantitative assessment of the degree of compatibility between the psycho-physical colour of an object illuminated by the test lighting fixture and that of the object itself illuminated by the lighting fixture of reference, having taken into consideration the status of chromatic adaptation.

**Specific luminaire index (SLI):** size index of a luminaire glare control fitness.

**Light intensity (I):** of a source in a given direction. Ratio between the light flux emitted at the source in an element belonging to a solid angle containing the given direction and the element of the solid angle.

**Unit of measurement:** candle, cd.

**Note:** the light intensity of luminaires is generally represented in a diagram of the light intensity or in a candela diagram.

**Interdistance:** distance between two successive light centres in a system.

**Irradiation or irradiance:** in a point comprised on a surface. Ratio between the cutting radiating flux on an element of a surface comprising the point, and the area of the element itself.

**Unit of measurement:** W/m<sup>2</sup>

**Cold cathode lamp:** discharge lamp designed to switch on without the pre-heating of the electrodes.

**Mixed light lamp:** lamp containing, in the same bulb, a high pressure mercury vapour discharge tube and a filament of an incandescent lamp with series connection. It can either be a diffuser bulb or a bulb covered with a fluorescent material.

**Discharge lamp:** lamp in which light is produced, directly or indirectly, by an electric discharge passing through a gas, a metal vapour, or an amalgam of different gases or vapours.

**Vapour halogen lamp:** discharge lamp in which light is produced by the radiation of a metal mixed vapours (e.g. mercury) and the products of the dissociation of halogens (e.g. thallium, indium or sodium).

**High pressure mercury vapour lamp:** mercury vapour lamp, with or without phosphor covering, in which the partial pressure of the vapour during operation equals 105 Pa.

**Low pressure mercury vapour lamp:** mercury vapour lamp, with or without phosphor covering, in which the partial pressure of the vapour during operation equals 100 Pa.

**Low pressure sodium vapour lamp:** sodium vapour lamp in which the partial pressure of vapour during operation equals 5 Pa (e.g. a SOX lamp).

**High pressure sodium vapour lamp:** sodium vapour lamp in which the partial pressure of vapour during operation equals 104 Pa (e.g. a SOX lamp).

**Halogen lamp:** lamp containing a tungsten filament and a small quantity of one or more halogen gases that have the use of cyclically regenerate the filament.

**Incandescent lamp:** lamp which produces light by using an element, which is made incandescent by the passage of electricity, that emits visible radiations.

**Lamp with hot start:** lamp with hot cathode that requires the pre-heating of the electrodes that start the unit.

**Lamp with built-in reflector:** lamp in which part of the bulb is covered with reflecting, diffusing or specular material.

**Fluorescent lamp:** low pressure mercury-type discharge lamp in which most of the light is emitted by a layer of fluorescent material excited by the ultraviolet radiation created by the discharge.

**Mercury fluorescent lamp:** a high pressure mercury lamp in which the light is partly produced by mercury vapours and by a layer of fluorescent material covering the most internal surface of the external bulb, excited by the ultraviolet radiation created by the discharge.

**Inverse-square of the distance law:** law according to which the illuminance in a point situated on a plane is proportional to the cosine of the angle of incidence (angle between the direction of the incident light and the one perpendicular to the plane), and inversely proportional to the square of the distance between the source and the point.

l

$$E = \frac{l}{D^2} \cos \theta$$

**Luminance (L):** (towards the given direction of a real or fictitious surface). Luminance is given by the ratio between the the I emitted light intensity, either reflected or transmitted by the S surface towards the given direction, and the apparent area of the surface itself (the apparent area is the projection of the S surface on the normal plane towards the direction of I intensity):

$$L = I / S \cos \alpha$$

**Unit of measurement:** cd ? m<sup>-2</sup>.

**Equivalent adaptation luminance:** the value of uniform luminance (referred to an observer) that would result on the same perceptibility scale with the real distribution of non-uniform luminance.

**Equivalent veil luminance:** luminance that must be added, with a superimposition, to the luminance of the background adaptation and of the object in order to create the same threshold of luminance difference that would exist without physiological glare.

**Luminescence:** phenomenon of light radiation emission (from atoms, molecules or ions) whose intensity with specific wavelengths or spectrum bands is higher than the thermal radiation that characterises the same material at the same temperature.

**Wavelength (?):** distance between two successive points, on the direction of propagation of a periodic wave, on which the oscillation presents the same phase (it occurs at the same time).

**Unit of measurement:** metre, m.

**Blackbody locus (Planckian locus):** the line on a chromatic diagram representing a blackbody chromaticity at different temperatures.

**Spectrum locus:** locus of the points, belonging to a chromaticity diagram or to a three-fold stimulus space, that represent the monochromatic stimuli.

**Opaque medium:** medium that does not transmit radiations in the spectrum field of

interest.

**CIE photometric reference observer:** ideal observer whose spectrum sensitivity curve corresponds to the  $V(\lambda)$  function for photopic vision or to the  $V'(\lambda)$  for scotopic vision, and that is consistent with the additive law implied in the definition of light flux.

**Working plane:** reference surface defined as the plane on which a task is usually carried out.

**Intensity peak:** light intensity of a luminaire on the direction of the beam axes.

**Visual performance:** degree of efficacy of the visual system measured for instance through the speed and precision with which a visual task is carried out.

**Projector:** luminaire that employs the principles of reflection and/or refraction to increase light intensity on a limited solid angle.

**Planck radiator:** thermal radiator that completely absorbs all incident radiations, regardless of their wavelength, direction of incidence or polarization. Such radiator presents, on each wavelength and at a given temperature, the maximum density of spectrum power.

**Radiation:** emission or energy conveyance in the form of electromagnetic waves or particles.

**Infrared radiation:** optical radiation with wavelengths exceeding those of visible radiations.

**Monochromatic radiation:** radiation characterized by only one wavelength. In other words, radiation characterized by a very limited band of wavelengths, so that it can be defined by the indication of only one wavelength.

**Optical radiation:** electromagnetic radiation having a wavelength comprised between the transition area of X-rays ( $\lambda = 1 \text{ nm}$ ) and the transition area of radio waves ( $\lambda = 1 \text{ mm}$ ).

**Thermal radiation:** emission process in which the radiating energy is created by the thermal agitation in the particles comprising the matter (atoms, molecules, ions).

**Ultraviolet radiation:** optical radiation with wavelengths that are lower than those of the visible radiation. In the range between 100 and 400 nm the ultraviolet radiation is generally indicated using the symbols UVA between 315 and 400 nm, UVB between 280 and 315 nm and UVC between 100 and 280 nm.

**Direct ratio:** of an indoor lighting system. The ratio between the direct flux on the working plane and the total flux directed downwards.

**Efficiency:** of a device. Ratio between the total light flux emitted by the unit and the sum of the fluxes emitted by the individual lamps it comprises. The flux of the lamps is measured on the exterior of the device, in particular conditions.

**Energy efficiency ( $\eta_e$ ):** of a radiation source. Ratio between the emitted radiating flux (power) and the power used.

**Inferior normal efficiency:** ratio between the flux directed downwards of a luminaire, measured in specific conditions, with its own lamps and equipments, and the sum of the light fluxes emitted by those lamps when they operate outside the devices and operate with the same equipments in the same specified conditions.

**Optical efficiency:** of a luminaire. Ratio between the total flux emitted by the luminaire, as measured in specified conditions, and the light flux emitted by the lamp(s) that operate without the device in the same specified conditions.

**Note:** with luminaires employing only incandescent lamps optical efficiency and normal efficiency coincide.

**Color efficiency:** effect of a lighting device on the chromatic aspect of illuminated objects, aspect which is consciously or unconsciously compared to that of the same objects illuminated by a reference lighting device.

**Retina:** membrane located behind the eye, that is sensitive to light stimuli and which contains photoreceptors (cones and rods) and neuronal cells that transmit a stimulus to the optic nerve.

**Reflection:** transmission of a radiation from a surface, without any wavelength variation, of the monochromatic radiations comprising the radiation.

**Diffused reflection:** diffusion by reflection depending on Lambert Law and in which, on a macroscopic scale, any kind of regular reflection is absent.

**Mutual reflection:** result of multiple reflections of one radiation on between manifold reflecting surfaces.

**Specular or regular reflection:** reflection, without diffusion, depending on the laws of geometrical optics, usable for mirrors.

**Reflector:** device used to cause the reflection phenomenon in order to alter the spatial distribution of the light flux coming from a source.

**Specular reflector:** part of a luminaire designed to reflect the light flux of lamps towards the required direction, through specular reflection.

**Refractor:** device used to create the refraction phenomenon in order to alter the spatial distribution of the light flux coming from a source.

**Refraction:** change of the direction of propagation of a radiation, determined by speed variations of propagation of an optically non-homogeneous medium, or in passing from one medium to another.

**Saturation:** attribute of visual sensation that allows to assess the proportion of chromatically pure colour contained in the total sensation.

**Glow discharge:** electric discharge in which the secondary emission from the cathode is much bigger than the thermoelectronic emission.

**Arc discharge (in a gas or vapour):** electric discharge characterized by a cathode fall.

**Electric discharge:** in a gas. The passage of an electric current through gas vapours with the production and movement of charges under the influence of an electric field.

**Screen:** part of a luminaire made up of translucent or opaque elements, geometrically arranged in order to hide the lamps from the observer from specific angles.

**Bladed screen:** screen whose shielding elements are blades made of opaque or translucent material.

**Reflective screen:** screen in which the shielding depends essentially on the refraction phenomenon.

**Visual contrast threshold:** minimum perceived value of the the contrast in a given condition of eye adaptation.

**Threshold increment (TI):** number indicating the degree of control of physiological glare.

**Luminance threshold:** the lowest luminance able to induce a perceptible stimulus.

**Note:** such value depends on the field of observation, the time of adaptation and the conditions of observation.

**Colour space:** Geometrical representation of colours in space. It is generally tridimensional.

**Spill light:** flux that is dispersed because of the scattering phenomenon.

**Steradian (sr):** SI unit derivative of a solid angle: a solid angle that, by having its apex in the centre of a sphere, cuts an area of the spheric surface that equals the area of a square having the radius of the sphere as its side.

**Reference surface:** surface on which the illuminance is specified or measured.

**Nominal mortality rate:** number of hours run that pass before a certain percentage of lamps cease to function.

**Colour temperature:** blackbody (Planck's body) temperature that emits a radiation with the same chromaticity as the radiation taken into consideration.

**Unit of measurement:** Kelvin, K.

**Proximal colour temperature:** temperature of Planck's radiator whose perceived apparent colour is the most similar to that of a source referred to having the same luminance and under specific sight conditions.

**Unit of measurement:** Kelvin, K.

**Tint:** attribute of a visual sensation according to which a surface appears to be similar to one of the perceived colours (red, yellow, green and blue, or a combination of two of them).

**Transmission:** passage of a radiation through a medium, without variations of frequency of the monochromatic radiations that comprise it.

**Total uniformity ( $U_0$ ):** ratio between the minimum and average luminance value of the area taken into consideration.

**Longitudinal uniformity ( $U_l$ ):** ratio between minimum and maximum luminance as measured along a line that is parallel to the main axis with respect to the observer's position.

**Dimmer:** device inserted inside the electric circuit in order to vary the light flux of the lamps functioning in a lighting system.

**Speed of perception:** reciprocal of the minimum exposition time that an object requires to

be perceived.

**Photopic vision:** vision experienced when the eye adapts to luminance levels that exceed 3-4 candles per square metre. The cones are considered the main active elements of vision in these conditions.

**Mesopic vision:** intermediate vision between photopic and scotopic vision.

**Scotopic vision:** vision experienced when the eye adapts to luminance levels that are below, by a few hundredths, a candle: the rods are considered the main active elements of vision in these conditions. The spectrum appears non-coloured.

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