



Human Visions and Lighting

Glare: The discomfort or impairment of vision experienced when parts of the visual field are excessively bright in relation to the general surroundings.

Illuminance: The amount of light falling on an object or surface.

Indirect lighting: Illuminance produced by lighting fixtures distributing 90 to 100 percent of their emitted light onto a surface.

Local lighting: Lighting which provides illuminance for a small area or confined space without providing a significant contribution to the general illuminance of the space. (See also task lighting.)

Lumen: The International System of Units describing a quantity of light emitted by a source or received by a surface.

Luminaire: A complete lighting unit consisting of a lamp(s) together with the parts designed to distribute the light, to position and protect the lamp, and to connect the lamp to the power supply.

Luminance: The photometric brightness of an illuminated surface (or the amount of light emitted by, or reflected from, the surface).

Lux: a unit of illumination equal to the illumination produced by luminous flux of one lumen falling perpendicularly on a surface one meter square.

Low-level Red or White Illumination: Lighting provided to accommodate efficient low light vision in areas where visual tasks are performed during low light conditions. At sea this is typically lighting on a navigational bridge to help keeping a suitable lookout.



Task Lighting: Lighting provided to meet the illuminance requirements of a specific task. Task lighting refers to the lighting requirement that can be obtained by supplementary lighting provided in addition to the general illuminance.

Visual field: The location of objects or points in space that can be perceived when the head and eyes are kept fixed.

Visual performance: The assessment of performance of a visual task based on speed and accuracy.

Visual task: The details and objects that must be seen for the performance of a task.

DISCUSSION

Vision

When discussing lighting to enable optimum visual performance it is important to consider how vision works. On a basic level, the eye is like a camera. Light passes through the pupil, is refracted by the lens, and is brought to a focus on the retina. The retina receives the light stimulus and transmits an impulse to the brain through the optic nerve. The retina consists of two types of photoreceptors; rods and cones. Cones function at high levels of illumination, such as during daylight, and can differentiate between colors. Without cones we could not see any color at all. Rods function at low levels of illumination, such as at night, and can only differentiate between shades of black and white. Rods and cones are not evenly distributed over the surface of the retina. The cones are concentrated near the center of the retina (in the fovea, the center of vision) and the rods predominate in the periphery of the retina with the maximum density at about 10° to 20° from the fovea (Sanders and McCormick, 1993). Motion is detected in the periphery and detail/feature is detected in the fovea. Rods are approximately seven times more sensitive to light than cones (e.g. they function better in low levels of illumination). Also, only approximately five percent of all color receptors (cones) are in the blue spectrum, therefore the reason blue is not recommended as a presentation medium for information.