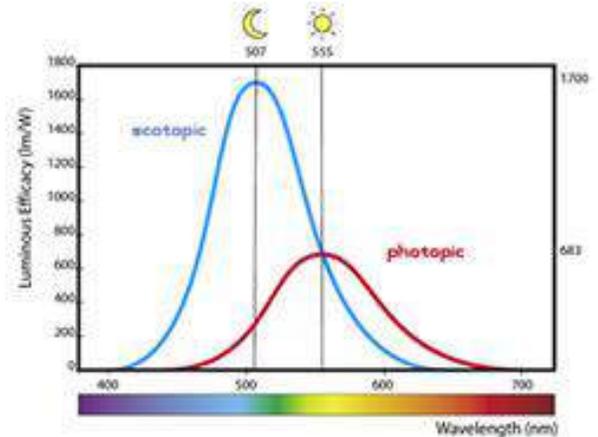


Photopic Lumens Vs Scotopic Lumens

Vision itself, is affected by several factors that include light intensity, distribution, color, contrast, reflection, glare, and more. The human eye is made up of numerous parts that account for these factors and enable us to see in both bright and low light conditions.

The retina contains 6 million cone cells that provide color vision and fine detail (photopic vision) in day light and 125 million rod cells that take over in dim or night lighting (scotopic vision). These cells also respond to different frequencies or colors/wavelengths of light in different ways and were historically thought to work in opposite conditions.

Light meters however, are calibrated to solely measure cone activated (photopic) vision using the CIE Color Space Standard developed in 1951. They assumed, and practice in error, that the more sensitive rods only functioned at dim light levels. Recent studies however now confirm that scotopic vision and pupil size, is more involved in interior lighting than traditionally thought.



Visually effective lumens, sometimes called pupil lumens, are the measure of lumens factored to account for visual acuity. Metered foot candle readings only tell half the story measuring the intensity of illumination without regard for the contribution of the eye's rods in color recognition, and how the human eye processes the light in order to see. Simply stated, light meters have not evolved with advancing lighting technologies and do not accurately measure the visual effect of many types of light found on the market today.

Experiments prove that the eye is much more sensitive to blue wavelengths, such as those used by induction lamps, than the measurement curve of the light meter. Blue light, acting on human night vision (scotopic vision) is largely responsible for "visual acuity" or sharpness of vision.

The Illuminating Engineering Society of North America (IESNA) –which currently uses photopic measurement criteria for evaluating street lights—is currently reviewing the photopic versus scotopic measurement issue, and revised street light standards are expected to be issued from in the near future. In the meantime, consumers are urged to evaluate light output using both photopic and scotopic measurements as technologies such as Induction that primarily utilize blue wavelengths, can provide adequate lighting while using much less wattage and energy.