

WHITE PAPER

By Pozeen Lighting University



LIGHT DISTRIBUTION

Introducing light distribution patterns and glare for
outdoor area lighting

LED luminaires use different optics than MH or HPS lamps because each LED is, in effect, an individual point source. Effective luminaire design exploiting the directional nature of LED light emission can translate to lower optical losses, higher luminaire efficacy, more precise cutoff of backlight and uplight, and more uniform distribution of light across the target area. Better surface illuminance uniformity and higher levels of vertical illuminance are possible with LEDs and close-coupled optics, compared to HID luminaires.

Polar plots given in photometric reports depict the pattern of light emitted through the 90° (horizontal) plane and 0° (vertical) plane. In general, look for a reduction in luminous intensity in the 70° to 90° vertical angles to avoid glare and light trespass; zero to little intensity emitted between 90° and 100°, the angles which contribute most seriously to skyglow; and much reduced light between 100° and 180° (zenith) which also contribute to skyglow.

Figures 1 and 2 illustrate the forward light and uplight angles referenced in the Luminaire Classification System (LCS). Luminaires for outdoor area lighting are classified in terms of the light patterns they provide on the ground plane.

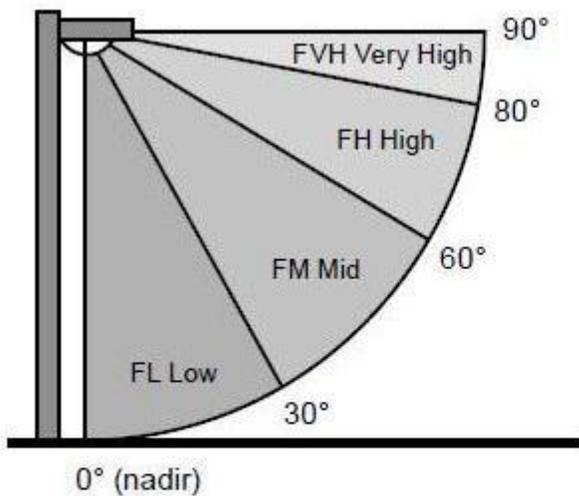


Figure 1. Section view for forward (F) solid angle. Light emitted at high and very high angles can cause discomfort and disability glare for roadway users.

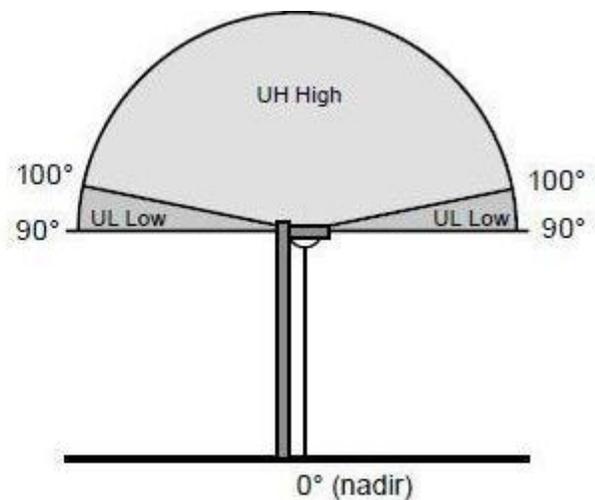


Figure 2. Section view for uplight (U) solid angle. Uplight contributes to light trespass and skyglow.

Figure 3 shows IESNA outdoor fixture types classifying the distributions for spacing luminaires.

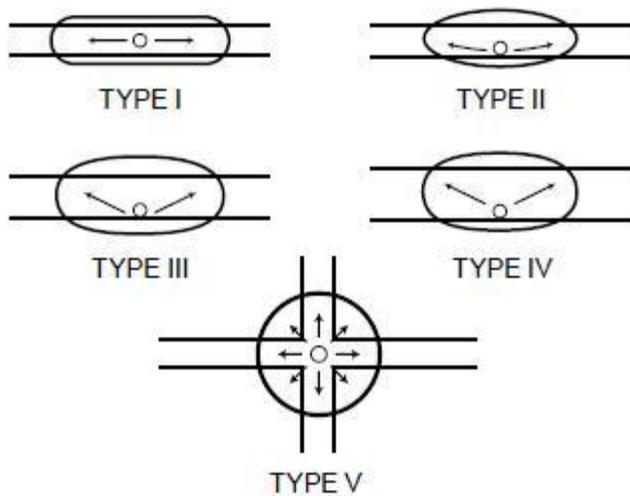


Figure 3. IESNA Outdoor lighting distribution types I - V.

Pozeen's products conform to IESNA requirements for designing roadway and parking lot lighting rather than just designing for average illuminance on the paving surface. Illuminance alone does not consider the disabling glare that reduces visibility for the driver. For example, although an IES Type I or Type II distribution may provide the most uniform spread of illuminance with the widest pole spacing along a roadway, the angles of light that allow the very wide spacing are often the angles that subject the driver and pedestrian to disability and discomfort glare.