

Cutoff Classifications and LED Luminaires

There is some confusion in the outdoor lighting industry regarding the application of the obsolete metrics of "Full cutoff," "Cutoff," etc to LED based products. These old metrics are based on the candela (intensity) values at specific vertical angles (80 & 90 degrees) when expressed as a percentage of "rated lamp lumens." The problem surfaces as LED product photometry is published in absolute format, where there is no lamp lumen rating. Therefore, software programs use the "total luminaire lumens" when computing metrics that rely on a lamp lumen rating such as the old cutoff classification system.

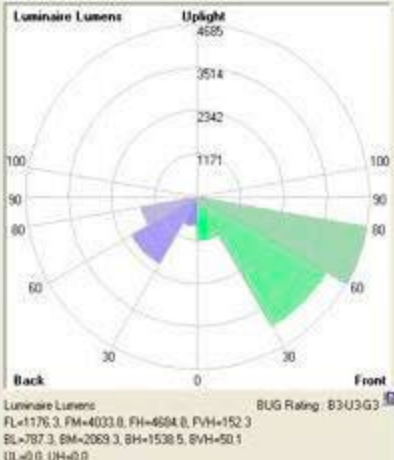
This can lead to problems when attempting to compare LED luminaires with HID luminaires (or other relative photometric reports).

Consider an example: Suppose we have an LED luminaire and an HID luminaire that both emit an intensity value of 600 candelas at 80 degrees above nadir. Suppose the HID luminaire has "rated lamp lumens" of 6500 and the LED luminaire has "total luminaire lumens" of 6000. Should they both have the same classification?

The Cutoff definition is shown in the left sidebar. Looking at the 80 degree limit of 100 candelas per 1000 lumens (10%) we find the HID luminaire to have 92.3 candelas, or 9.23% ($600 \text{ Cd} / 6.5 \text{ klumens} = 92.3$) at 80 degrees. This will meet the Cutoff classification. The LED luminaire calculation yields 100 candelas or 10% ($600 \text{ Cd} / 6.0 \text{ klumens} = 100$) at the same 80 degree angle. The LED luminaire fails to meet the Cutoff classification and falls into the next class of Semi-Cutoff!

The first question you may ask is, "Why were different lumen values used?" Good thinking; it is here that the answer lies. The old (obsolete) classification is dependent on the "rated lamp lumens" of the HID luminaire and the "total luminaire lumens" of the LED product. If they have been the same number, say 6000, they would have both been the same class. However, this would not typically happen in a competitive situation of LED versus HID. Why? The HID product will inevitably have a higher lamp lumen rating in order to produce comparable light output in terms of luminaire lumens. The HID luminaire is classified based on a lamp lumen rating, when its actual "total luminaire lumens" would be somewhat lower (maybe 30% if it is 70% efficient). The LED luminaire is forced to compete based on its only known lumen rating, the total luminaire lumen output.

LESSON: Be aware that the old (obsolete) classification system is not to be used to compare LED luminaires to competitive HID products. We all should be using the new BUG Rating system instead! Using BUG, both products compete on the level playing field of "total luminaire lumens".



LCS Graph with BUG Rating

The definition of "Cutoff" is shown below for reference.

Cutoff - Luminaire light distribution where the candela values per 1000 lumens do not exceed 25 (2.5%) at or above an angle of 90 degrees above nadir, and the candela values per 1000 lumens do not exceed 100 (10%) at or above 80 degrees above nadir.