

This article originally ran on page 54 in the April 2001 edition of LD+A. The correct illustrations were not included with the printed article. They are included with this version.

FULL CUTOFF LIGHTING: THE BENEFITS

Although the definitions for cutoff lighting have remained virtually unchanged for nearly 30 years, a new classification — full cutoff — has been introduced. Douglas Paulin details the finer points of this new terminology.

The term “Cutoff” first entered the lighting vocabulary in 1937, as a way to describe a “shielding reflector” for streetlighting. It has also been used to describe the angle of cutoff in recessed luminaires. For many years, it signified sharp glare control, but was not precisely quantified.

In 1972, the Roadway Lighting Com-

mittee Recommended Practice RP-8 defined “Cutoff Distribution” and “Semicutoff Distribution” with restriction on light intensities at vertical angles of 80 degrees and 90 degrees above nadir. This was the first time outdoor luminaires were affected by uplight control in an IESNA published document. The descriptions are:

Cutoff: A luminaire light distribution where the candela per 1000 lamp lumens does not numerically exceed 25 (2.5 percent) at an angle of 90 degrees above nadir, and 100 (10 percent) at a vertical angle of 80 degrees above nadir. This applies to all lateral angles around the luminaire.

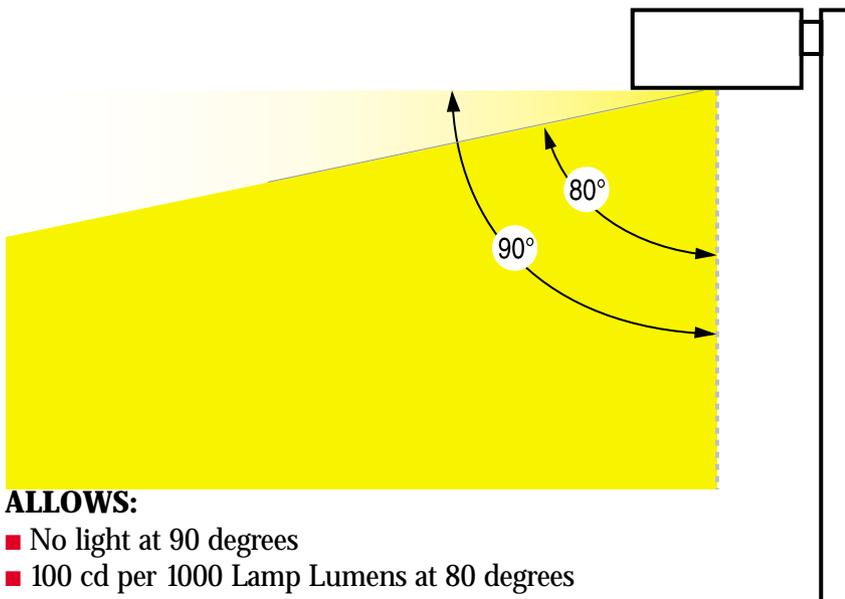
Semicutoff: A luminaire light distribution where the candela per 1000 lamp lumens does not numerically exceed 50 (five percent) at an angle of 90 degrees above nadir, and 200 (20 percent) at a vertical angle of 80 degrees above nadir. This applies to all lateral angles around the luminaire.

Noncutoff: A luminaire light distribution where there is no candela limitation in the zone above maximum candela.

Although the wording has changed slightly since 1972, these definitions of uplight control have not changed in any material way. A cutoff luminaire in 1972 is still a cutoff luminaire today. However, there are practical subtleties that need to be explained before we can fully appreciate the differences between these three, and to understand the new classification of Full Cutoff.

A luminaire with a Cutoff classification can (and often does) have some light above 90 degrees. The definition of Cutoff says nothing about amounts of light above 90 degrees, but it is generally agreed that the light should be no more than the value at 90 degrees, and should be decreasing as the angle increases. In fact, there could be some measurable light emitted at 180 degrees (Zenith). Uplight Control is what these definitions describe. Not absolute values, either, since the candela intensity is a proportion of the lumen package of the lamp.

Another generalization that can be made about a cutoff luminaire is that it is flirting with the limits of the classification at 80 degrees, not at 90 degrees, and this will usually occur in the horizontal



ALLOWS:

- No light at 90 degrees
- 100 cd per 1000 Lamp Lumens at 80 degrees

Full Cutoff

plane of the “MAX,” or in simple terms, the main beam.

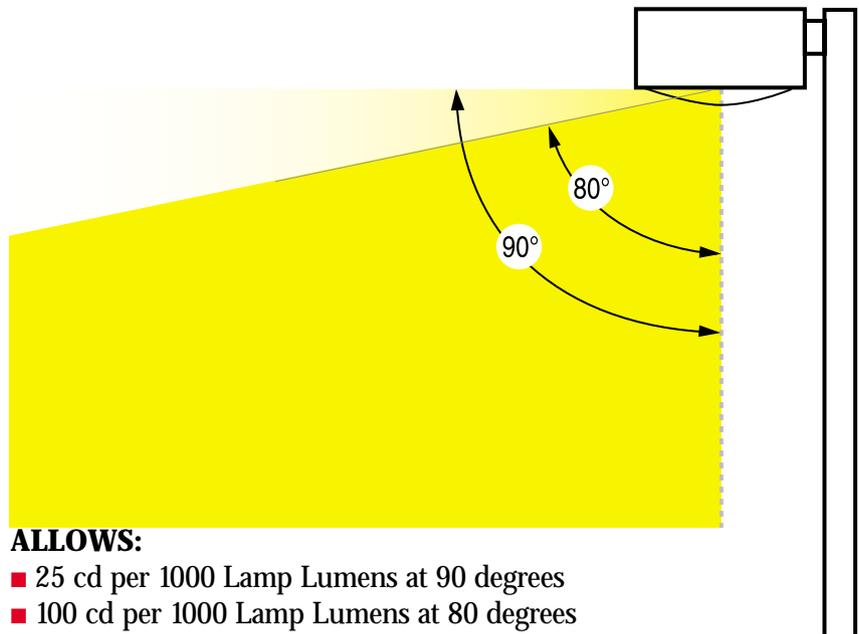
A luminaire with a Semicutoff classification can be something that “just missed” being cutoff, but the manufacturer determined that the performance as measured on the work surfaces was

However,
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more important than achieving Cutoff. This is a trade-off involving glare-control vs spacing-to-mounting height, and it is not uncommon in the late 1990s. Some of the most popular parking lot luminaires are actually semicutoff, when the actual photometric report is viewed. It also follows the earlier discussion on light above 90 degrees that a luminaire classified as semicutoff produces even more light above 90 degrees than a cutoff luminaire is allowed.

A luminaire with a Noncutoff classification can also be something that “just missed” being Semicutoff, or...a “glare-bomb” that puts equal amounts of light into the heavens as on the ground.

One last issue to understand before leaving the Cutoff and Semicutoff classifications: “Sagged glass” or any formed lens which drops down below the bottom of the luminaire housing. The presence of a “non-flat” lens does not mean the luminaire is not Cutoff. Sagged glass is a good bet that the luminaire is not



ALLOWS:

- 25 cd per 1000 Lamp Lumens at 90 degrees
- 100 cd per 1000 Lamp Lumens at 80 degrees

Cutoff

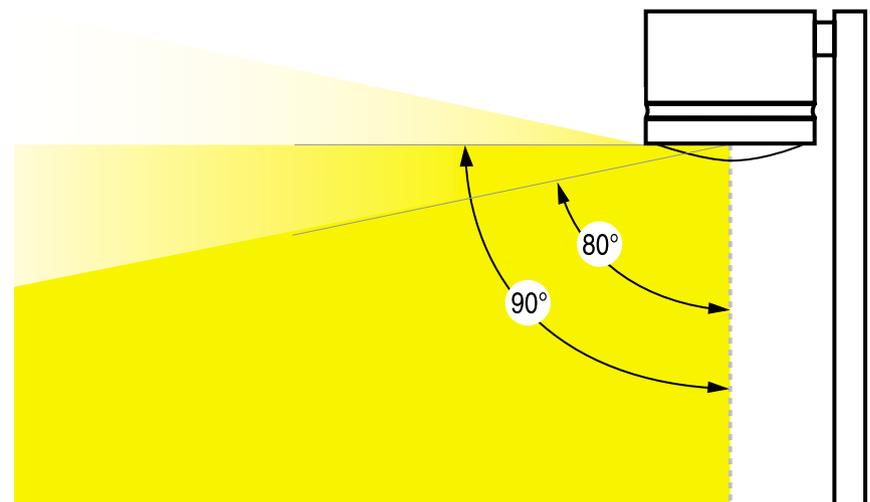
Full Cutoff. It should raise suspicions about a Cutoff classification, but it is possible to produce a luminaire with a sagged lens, drop lens or even drop prismatic lens well within the limits of the Cutoff classification.

At this point, we can establish a definition for the Full Cutoff classification: A luminaire light distribution where zero candela intensity occurs at an angle of 90 degrees above nadir, and at all greater angles from nadir.

Additionally, the candela per 1000

lamp lumens does not exceed 100 (10 percent) at a vertical angle of 80 degrees above nadir. This applies to all lateral angles around the luminaire.

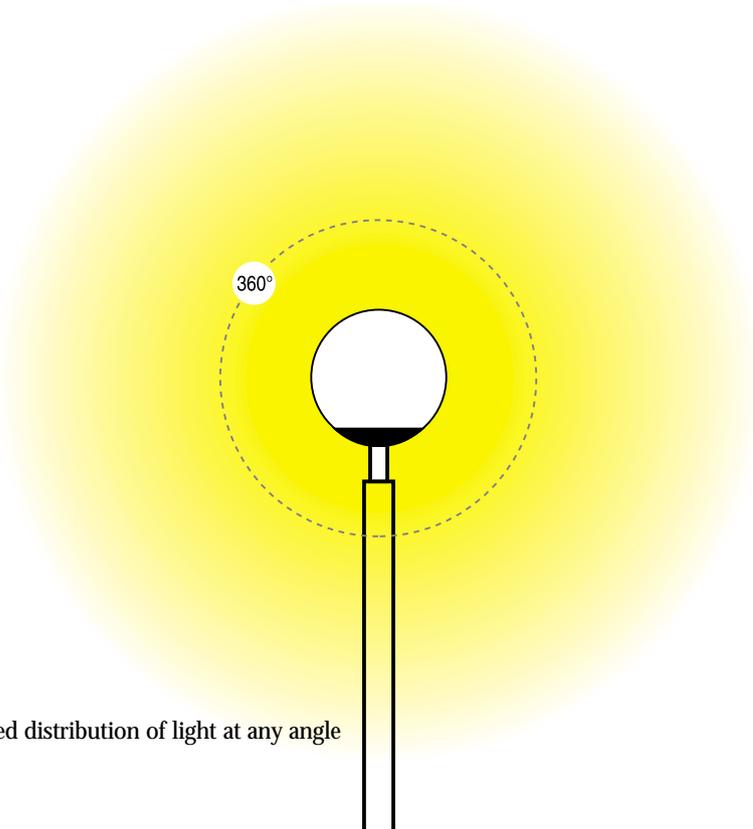
This term is found in print in *RP-33* (Exterior Environments), the Ninth Edition of the *IESNA Handbook* and recently in *RP-8* (Roadway), which is the first time it is an ANSI-approved document. Full Cutoff is the most extreme classification for uplight control. It allows no light above 90 degrees, and in fact not one candela at 90 degrees. Now, just below 90



ALLOWS:

- 50 cd per 1000 Lamp Lumens at 90 degrees
- 200 cd per 1000 Lamp Lumens at 80 degrees

Semi-Cutoff



ALLOWS:

- Unrestricted distribution of light at any angle

Non-Cutoff

degrees? Of course, there will be light just below 90 degrees. The closest angle a photometer will probably report on is 87.5 degrees, although 85 degrees would be more customary. It is difficult to conceive of a luminaire being classified Full Cutoff if it has anything but a flat lens which is parallel to the ground.

The other criterion Full Cutoff regulates is at the 80 degree angle, which is identical to the Cutoff classification. There is no guarantee that glare experienced in the parking area or roadway will be better with a Full Cutoff luminaire than with a Cutoff luminaire. You must obtain the photometric report to determine real differences.

One final issue on Cutoff classifications: they are only viable if the luminaire is not uptilted. All Cutoff classifications are null and void if the luminaire is installed with an uptilt.

- A Full Cutoff luminaire is effectively a Cutoff luminaire if it is tilted up but one degree.
- Many Cutoff luminaires will actually give you a Semicutoff distribution (or Noncutoff)
- Depending on the angle of uptilt, a Full Cutoff luminaire can effectively give you a Noncutoff distribution.

How does one guarantee the distribution described in the photometric report is provided? Don't allow them to be mounted with an adjustable knuckle or slipfitter. A rigid mounting arm with no built-in uptilt and no adjustment feature is the best guarantee. This will almost certainly increase the number of poles and luminaires, compared to products that are uptilted. However, this should be a trade-off that is in the hands of the lighting professional, not anyone else.



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