ASSIST recommends...

A Method for Estimating Discomfort Glare from Exterior Lighting Systems

Because outdoor lighting is used at low light levels and outdoor sources are bright, discomfort glare can be an important problem. Some LED outdoor lighting systems, in particular, have received criticism for producing more glare than traditional light sources. To address these concerns, ASSIST has published a calculation method for predicting discomfort glare from outdoor lighting systems using any light source technology, based on an existing rating scale and a published discomfort glare model.

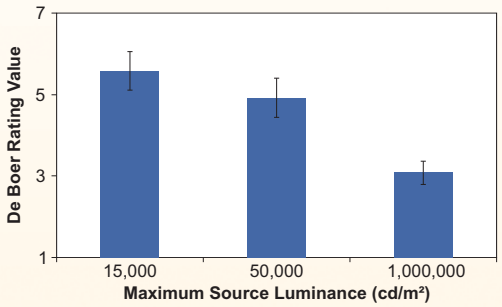
Discomfort Glare Mechanisms Not Well Understood

Discomfort glare is the annoying or even painful sensation from viewing a bright light, whereas disability glare is the reduction in visibility that a bright light might cause. Disability glare and its mechanisms have been understood for some time, but discomfort glare is less well known and no accurate method of measurement or prediction has existed. Current assessments typically use the De Boer rating scale, developed in the 1960s. In 2008 the LRC published a model of discomfort glare as part of its outdoor site-lighting performance (OSP) system for assessing the potential of an outdoor lighting installation to produce light pollution. This model uses the illuminance from a light source as a primary input parameter, although more recent LRC studies have demonstrated that a light source's maximum luminance also influences discomfort glare.

The LRC research measured responses to LED light sources with and without diffusers to create maximum luminances of 15,000 cd/m² (left), 50,000 cd/m² (center) and 1,000,000 cd/m² (right).

ASSIST Model Defined

The ASSIST calculation method is an extension of the OSP model that incorporates the source's maximum luminance, resulting in improved predictions of De Boer ratings for a given lighting system. The method is for use when the source subtends more than 0.3° at the eye.



Average De Boer ratings were correlated with the logarithm of the maximum source luminance, even though the sources produced the same illuminance at the eyes. Higher rating values correspond to less discomfort.

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The detailed calculation method and an explanation of the related literature are available at www.lrc.rpi.edu/programs/solidstate/assist/recommends/discomfortglare.asp.

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