

November 30, 2012

California Energy Commission
Dockets Unit
1516 Ninth Street
Sacramento, CA 95814

California Energy Commission

DOCKETED
12-BSTD-03

TN # 68898

DEC 03 2012

**Re: Application for Designation of Confidential Records on Docket Number 12-BSTD-03-
"California Quality Light Emitting Diode (LED) Lamp Specification"**

Philips appreciates the opportunity to provide additional comments on the proposed voluntary California Quality Light Emitting Diode (LED) Lamp Specification. Philips believes the following technical paper on different color rendering metrics (CRI, CQS, n-CRI, etc) will provide useful information concerning metrics for color rendering.

Optics Express. 2011 Apr 25; 19(9):8151-66.

Correlation between color quality metric predictions and visual appreciation of light sources.

Smet K, Ryckaert WR, Pointer MR, Deconinck G, Hanselaer P.

Source: Light and Lighting Laboratory, Catholic University College Ghent, Belgium.
kevin.smet@kahosl.be

Abstract

Over the past years there has been increasing evidence that the CIE color rendering index $R(a)$ fails to correspond to the perceived color quality of many light sources, especially some Light-Emitting-Diodes. Several proposals to update, complement or even replace the CIE $R(a)$ have therefore been made. The performance of thirteen color quality metrics was evaluated by calculating the average correlation of the metric predictions with the visual scaling of the perceived color quality obtained in several psychophysical studies. Two aspects of perceived color quality were investigated, appreciation (preference or attractiveness) and naturalness. The memory color quality metric ($S(a)$) of Smet et al. was found to correlate highly with perceived appreciation ($r = 0.88$). It was found to be statistically better ($p < 0.0001$) at it than all other metrics. The CIE $R(a)$ performed the worst. A metric that combines the gamut area index (GAI) and the CIE $R(a)$ using an arithmetic mean correlated highly with the perceived naturalness of a light source ($r = 0.85$). It was found to be statistically better at predicting naturalness than all other metrics ($p < 0.0001$). A negative correlation was found, between the capabilities of a light source's ability to predict appreciation and naturalness, indicating that a complete description of the color quality of a light source probably requires more than one metric.

Thank you for your consideration of this material. Please feel free to contact me at (781) 418-9292, if you have any questions.

Sincerely,

A handwritten signature in blue ink, reading "Jim Gaines". The signature is fluid and cursive, with the first name "Jim" being more prominent and the last name "Gaines" following in a similar style.

Jim Gaines
Senior Principal Engineer