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### **SIMPLIFIED METHOD TO DETERMINE THE SPECTRAL MISMATCH CORRECTION OF COMERCIAL ILLUMINANCE METERS**

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Illuminance meters are calibrated using incandescent lamps operated at 2856K (Illuminant A). When the illuminance meter is to be used for measurements with other light sources without correcting the response, an error occurs due to the spectral mismatch to the  $V(\lambda)$  function. According to the CIE, this error is corrected by a spectral mismatch correction factor,  $ccf$ , given by

$$ccf(S_t(\lambda)) = \frac{\int_{\lambda} S_A(\lambda) s_{rel}(\lambda) d\lambda \int_{\lambda} S_t(\lambda) V(\lambda) d\lambda}{\int_{\lambda} S_A(\lambda) V(\lambda) d\lambda \int_{\lambda} S_t(\lambda) s_{rel}(\lambda) d\lambda} \quad [1]$$

where  $S_t(\lambda)$  is the spectral power distribution of the test lamp,  $S_A(\lambda)$  is the spectral data of the CIE Illuminant A, and  $s_{rel}(\lambda)$  is the relative spectral responsivity of the illuminance meter. In order to quantify or correct for this error, the spectral power distribution of the test lamp, as well as the relative spectral responsivity of the illuminance meter must be known.

It is possible to find bibliography where typical spectral power distribution of the different light sources used in lighting is provided, but the relative spectral responsivity of the particular illuminance meter must be measured in order to determine the corresponding  $ccf$  factor. Then determination of the spectral mismatch correction factor is limited to a suitably equipped laboratory.

This work presents a simplified method, whereby knowledge of the relative spectral responsivity of the illuminance meter to be calibrated is not necessary. Therefore it can be used by partially equipped laboratories for the calibration of meters designed for field use (class B and C illuminance meters).

In this method, the illuminance of any light source, measured by the test illuminance meter is directly compared with the illuminance, under the same light source, obtained with a standard photometer. The relative spectral responsivity of the standard photometer must be known, as well as the corresponding  $ccf$  factor for each particular light source. Then the corresponding  $ccf$  factor is calculated as the ratio of the measured illuminances.

The method has been applied to different light sources, whose relative spectral distribution has been measured in our installations: fluorescent lamps, high and low pressure sodium lamps, metal halide lamps, and high and low pressure mercury lamps; and to different illuminance meters with different degree of spectral mismatch from the  $V(\lambda)$  function (class A, B and C photometers). Differences, with respect to the recommended method, lower than 1.3 % have been obtained in all cases.