

# Use of Spectral Weighting Functions for Compliance with IES Recommendations

Lighting has historically held that electro-magnetic radiation becomes "light" when it stimulates human retinas. Numerical conversion from radiation to light has been made using the photopic visual sensitivity function, which produces the unit known as the lumen, and subsequently all other luminous units such as the candela.

Recent developments have indicated that the radiation that produces human visual sensation may be usefully evaluated using other weighting functions, such as the scotopic visual sensitivity function. This has led to research into possible alternatives to the historical definition of light in photopic lumens. This in turn has led to confusion about the weighting of radiation which is appropriate for compliance with IES published criteria.

This document is intended to clarify this confusion.

Research into the suitability of using weighting functions other than the photopic sensitivity function is ongoing. At present the research is not considered sufficient to support the application of any alternative to photopic visual sensitivity function.

Accordingly, it is the policy of the IES that for compliance with all IES recommendations, luminous values shall be calculated using the photopic visual sensitivity function ( $v_{\lambda}$ ) as defined in the IES Lighting Handbook, unless specifically stated in the IES document that contains the recommendations. This policy applies to all luminous units, such as lux or candela per square meter, and all standards, existing and future.

Whenever recommendations are to be based on an alternative visual sensitivity function, that alternative shall be included with the specific recommendations as they are generated, reviewed and approved by IES. For compliance with IES recommendations, no revision or substitution of the specified visual sensitivity function shall be made after IES publication.

The IES recognizes the scotopic luminous efficiency function as a valid and recognized luminous efficiency function. However, the use of "scotopic lumens", "scotopic footcandles" or other similar "scotopic" metrics are not valid metrics to be compared to any IES published recommendation unless the publication specifies that the units are scotopic units. Unless specified otherwise, IES units are always based on the photopic luminous efficiency function and are thus photopic.

The IES maintains that the photopic illuminance levels prescribed in the ninth edition of the IES Lighting Handbook apply; that is, as long as the photopic illuminances used in practice are consistent with IES recommendations, the methods by which these are achieved are not specific to spectrum and the IES neither advocates nor precludes the use of spectrum in lighting calculations.

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## About the Illuminating Engineering Society (IES)

The IES is a collegial community dedicated to improving the lighted environment. The IES is composed of a diverse membership, all with an interest in and a dedication to good lighting. 25% of the membership is involved in manufacturing (lamps, sources, luminaires, accessories); another 25% is composed of lighting designers and architects. The remaining 50% is composed of consultants, electrical and building contractors, distributors, and wholesalers, individuals working in affiliated lighting fields, those working for utilities and energy services, and people in government and education. Over one thousand of these individuals serve on committees, most serving on the Society's document development committees; these committees develop standards, design guides, technical memoranda, lighting energy management materials, guidelines and lighting measurement, testing and calculation guides.

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