

Prototype for Measuring Blue Light Protection in Sunglasses

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Abstract : Exposure to high-energy blue light has been strongly linked to the development of some eye diseases, such as age-related macular degeneration. Over the past few years, people have become more and more concerned about eye damage from blue light and how it can be prevented. We developed a prototype that allows users to self-check the blue light protection of their sunglasses and determines if the protection is adequate. Weighting functions approximating those defined in ISO 12312-1 were used to measure the luminous transmittance and blue light transmittance of sunglasses. The blue light transmittance value must be less than 1.2 times the luminous transmittance to be considered adequate. The prototype consists of a Golden Dragon Ultra White LED from OSRAM and a TCS3472 photodetector from AMS TAOS. Together, they provide four transmittance values weighted with different functions. These four transmittance values were then linearly combined to produce transmittance values with weighting functions close to those defined in ISO 12312-1 for luminous transmittance and for blue light transmittance. To evaluate our prototype, we used a VARIAN Cary 5000 spectrophotometer, a gold standard in the field, to measure the luminous transmittance and the blue light transmittance of 60 sunglasses lenses. (and Bland-Altman analysis was performed) Bland-Altman analysis was performed and showed non-significant bias and narrow 95% limits of agreement within predefined tolerances for both luminous transmittance and blue light transmittance. The results show that the prototype is a viable means of providing blue light protection information to the general public and a quick and easy way for industry and retailers to test their products. In addition, our prototype plays an important role in educating the public about a feature to look for in sunglasses before purchasing.

Keywords : blue light, sunglasses, eye protective devices, transmittance measurement, standards, ISO 12312-1

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