Technical report: LEDs change laboratory measurements of light

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LED-based light source developed in PhotoLED project. The LED chips have been selected to produce a spectrum of light resembling the new reference spectrum CIE L41. Credit: Tuomas Poikonen / VTT

The International Commission on Illumination (CIE) has published Technical Report CIE 251:2023 LED Reference Spectrum for Photometer Calibration, related to laboratory measurements of LED lighting.

Dr. Tuomas Poikonen from VTT MIKES chaired the technical committee TC 2-90 that produced the report as a collaboration of 29

members from 16 countries. The work was initiated 10 years ago by Professor Erkki Ikonen from Aalto University when it became evident that significant improvements on measurements of LED lighting can be achieved, if the old reference spectrum of incandescent lamp calibrations is complemented with a new reference spectrum of white LEDs.

Poikonen says that "the technical report CIE 251:2023 will serve industry as a guideline for laboratory measurements. The new reference spectrum will be used for calibration of photometers that are needed for measurements of LED lighting."

"Better tests and measurements finally improve the quality of luminaires sold to consumers. We demonstrated that white LED reference spectrum in calibration of photometers produces lower uncertainty in lighting measurements of LED luminaires. In addition, we observed that the same reference spectrum works well also in measurements of day light and fluorescent lamps," he says.

A photometer is a measurement device to quantify the amount of light observed by a standardized human eye. Measurement of photometric characteristics of luminaires and lighting systems is an important stage in all product development.

"Consumers have already changed incandescent lamps to LED lamps. After global adoption of the LED reference spectrum, measurement equipment manufacturers can start producing dedicated LED light sources for calibration laboratories", Professor Ikonen adds.

"Photometers will be calibrated in the future using LED light sources also in our laboratory at Aalto University. It is important for the reliability of measurements that a smooth transition is ensured for customer photometer calibrations when changing from incandescent

based reference spectrum to LED based reference spectrum," he says.

An international research group led by Poikonen studied 1500 different types of LED lamps to reach statistically meaningful results for the definition of the reference spectrum.

More information: Led Reference Spectrum for Photometer Calibration: cie.co.at/publications/led-ref … otometer-calibration

Provided by Aalto University