THE IMPORTANCE OF LIGHT MEASUREMENT AND CHOICE OF EQUIPMENT

Measuring LED technology in the field is set to become a hot topic. Measurements are crucial in the development, assessment and implementation of energy efficient light sources and installations.

Hand held photometers or lux meters are used widely to assess lighting levels. They measure the illuminance falling onto a surface from all light sources within the environment and give a readout in lux. Photometers are broad band detectors, which should have a spectral response matched to the standardised response of the human eye (the CIE V, curve).

Making a correct measurement is more difficult than it may seem. Poor practice and incorrect results are relatively common. There are many sources of error that can be overlooked, even in something which appears as simple as an illuminance measurement with a lux meter.

However, with appropriate care, traceable calibration* and the correct meter, it is possible to make a measurement that is both accurate and reliable (within an acceptable level of accuracy).

The following table represents a real life experiment with 5 separate photometers;

A RAYLUX RL200-AI-50 (LED source) was positioned at 2m (tripod) and readings were taken at 25m on both the horizontal and the vertical plane (300mm above ground level to simulate a crawling subject).

Model	Horizontal	Vertical
Minolta (CL200-A)	2.5	13
Tenmars	3.2	11.8
RS (RS-01)	1.25	12.27
Gold (Maplin N76CC)	0.8	8.4
INSDX (DX-200)	2.5	10.5

The results show that certain photometers are not suitable for measurement of monochromatic light or narrowband emitters, e.g. white LEDs. Measurement errors can be significant and correction factors may not be possible or more importantly traceable.

The Minolta CL200-A was subjected to comparison tests in a UKAS accredited laboratory and was judged to provide the most accurate measurement, this instrument is corrected to read white light LED sources. However even calibrated equipment of this type is likely to have a 5-10% error margin.

The conclusion is that photometers can produce noticeably different results under real-life practicle conditions (in the example above up to 4x discrepancy in low lux situations).

Correct technique, traceable calibration and repeatability of instrument measurements are essential to obtaining a valid result.

*Traceable measurements are those which are undertaken against a recognised physical standard (rather than to a recognised standard method). A measurement which is traceable to the national primary standard, is made against a physical standard which is itself linked in an unbroken chain back to the national primary standard, which is usually derived from first principles.

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