Chapter 20: Lighting performance verification

20.1 The need for performance verification

Verifying the performance of a lighting installation is desirable for three reasons. First, anyone who has paid for a new lighting installation should be interested to know if they have got what they paid for. Second, anyone who has designed a lighting installation and has seen it installed should be concerned with how well the actual installation matches what was expected from the design. Discrepancies between the design and reality can indicate problems with the design process or with the data used in the design. Third, lighting installations change as they age (see Chapter 21). Light sources tend to produce less light with increasing hours of use. Luminaires emit less light and can change their light distribution as they get dirty. The amount of inter-reflected light can change as surface reflectances change. For applications where minimum standards of lighting are specified, being able to measure the current performance of a lighting installation is desirable to schedule maintenance correctly.

The verification of the performance of a lighting installation requires a field survey. Such a survey requires decisions about the relevant operating conditions, the use of photometric instruments and the selection of an appropriate measurement procedure.

20.2 Relevant operating conditions

It is essential when making field measurements to keep a complete and accurate record of the state of the lighting installation and the interior in general at the time the measurements are made. Particular attention should be given to the lamp type and age, the level and stability of the supply voltage, the state of maintenance of the lamps and luminaires, the surface reflectances, the degree of obstruction and any other factors that could influence the measurement. Photographs of the interior are a valuable supplement to a written record.

Before carrying out a field survey, it is necessary to decide on the lighting conditions that are of interest. For example, is daylight to be admitted and, if it is, what type of control is to be used? Are the measurements to be concerned with average values over the whole interior or only over individual workplaces? Should the measurements around the workplace be taken with the people present, etc? It is also necessary to identify the appropriate measurement plane; horizontal and vertical and at what height or orientation.

Before starting to take measurements it is first necessary to ensure that the lamps have been burnt for at least 100 hours. If this has been done, then the first step in measurement is to stabilise the performance of the lamps, luminaires and instrumentation. The time required to stabilise the light output of an installation depends on the type of light source and luminaire. Installations using discharge lamps, including tubular fluorescent, require at least 20 min, and ideally one hour, to stabilise before measurements are made.

To stabilise the reading of some instruments the photocell should be exposed to the approximate illuminances to be measured for about 5 min before making the first measurement.

Daylight is rarely stable and hence the illuminance and luminance it produces can rapidly vary over a very large range. For this reason when measurements of the electric lighting installation alone are required, daylight must be excluded from the interior or the measurements must be made after dark.