

The lumen method (see section 3.8.3, Average illuminance (lumen method)) of design provides the average horizontal plane illuminance at the floor or working plane, and can be extended to give average illuminance values over the walls and ceiling. Examples of illuminance ratios between the task and the walls or ceiling are given in section 2.3.4, Luminance and illuminance ratios, for typical office workplace lighting. However, when lighting the architectural structure is the main design objective, these illuminance ratios need not apply. The average illuminance can be converted to average luminance values by applying the mean reflectance of the main room surfaces. This gives no detail of the luminance pattern in the field of view. Point by point computation methods (Calculations guide, see CD) with data on the reflectance characteristics of all relevant surfaces and objects can be used to predict the more detailed and complex luminance pattern. To interpret these results in terms of the visual appearance produced, account must be taken of the visual mechanism known as adaptation.

1.4.6 Adaptation

The subjective visual appearance will depend upon adaptation, which is governed by the luminances of the various elements within the field of view, the sizes of the areas involved, and their location with respect to the lines of sight of observers. Levels of adaptation continually change as the eyes move.

The eye can adapt to a wide range of lighting conditions. For example, headlines in a newspaper can be read under moonlight (which provides some 0.2 lux), or by daylight (where the illuminance may be of the order of 100 000 lux). However, the eye cannot adapt to the whole of this range at one time. At night the headlights of an oncoming car will dazzle a dark-adapted viewer, whereas on a sunny day these lights will be barely noticeable. Inside a room daylit by large windows, conditions might allow all objects and surfaces to be viewed comfortably; however, looking into the room from the outside (when adapted to the bright daylight conditions) the windows will appear black and no internal objects or surfaces will be visible.

Our eyes are drawn to the brightest part of a scene. Within work areas, therefore, higher luminance values usually occur at the task areas, but if this is taken to extremes, brightness constancy may break down. This can be avoided by providing adequate illuminance with good colour rendering and glare control. Sharp shadows, sudden large changes in luminance, and excessively bright and frequent highlights should be avoided.

With a uniform electric lighting system and medium to high reflectances of the main surfaces of an interior, the range of luminance will usually be satisfactory. Light ceilings and floors will ensure a high proportion of inter-reflected light and will avoid dark corners.

Reflectance of room surfaces strongly affects the perceived atmosphere in the room. In section 2.3.5, Room surfaces, typical ranges of reflectance are given for major room surfaces.

In comparison with electric lighting, the luminance range produced by sunlight and daylight in an interior will vary enormously. The ranges of luminance in an interior will remain relatively constant for overcast daylight conditions, despite