Information on the use of this technique is split into the following sections:

— Utilisation factors

— Room index

— Effective reflectance

— Maximum spacing-to-height ratio

— Calculation procedure.

3.8.3.1 Utilisation factors

The utilisation factor UF_S of an installation is the ratio of the total flux received by the reference surface S to the total lamp flux of the installation. The average illuminance E_S over the reference surface S can therefore be calculated from the 'lumen method' formula:

$$E_S = (F \times n \times N \times MF \times UF_S)/A_S$$

where F is the initial bare lamp luminous flux (lumens); n is the number of lamps per luminaire; N is the number of luminaires; MF is the maintenance factor (see section 3.8.2, Maintained illuminance); UF_S is the utilisation factor for the reference surface S; A_S is the area of the reference surface S (in m^2).

The formula can be re-arranged to permit the calculation of the number of luminaires required to achieve a chosen illuminance (see section 3.8.3.5, Calculation procedure).

Utilisation factors can be determined for any surface or layout of luminaires, but in practice are only calculated for general lighting systems with regular arrays of luminaires and for the three main room surfaces – the ceiling cavity, the walls, and the floor cavity or horizontal reference plane (see Figure 3.15). Utilisation factors for these surfaces are designated UF_C, UF_W and UF_F, respectively. The method for calculating utilisation factors for these surfaces is given in CIBSE *TM5*.

Although utilisation factors can be calculated by the lighting designer, most manufacturers publish utilisation factors for standard conditions for their luminaires. CIBSE *TM5* defines a standard method of presentation, and states the assumptions on which the tabulated values are based. Table 3.2 is an example of the standard presentation (see also section 3.8.3.4, Maximum spacing-to-height ratio (SHR_{max})). It should be noted that the calculation of UF as described above assumes an empty room; absorption of light by room contents such as furniture and equipment may reduce the achieved illuminance on the working plane.
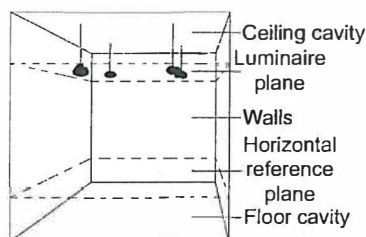

Figure 3.15   Room surfaces