

### 3.9 DAYLIGHT DESIGN OF WINDOWS

**Daylighting is the practice of placing windows or other openings and reflective surfaces so that during the day natural light provides effective internal lighting.**

The particular attention is given to daylighting while designing a building. The aim is to maximize visual comfort or to reduce energy use.

Energy savings can be achieved from the reduced use of artificial (electric) lighting or from passive solar heating.

The amount of daylight received in an internal space can be analyzed by undertaking a daylight factor calculations.

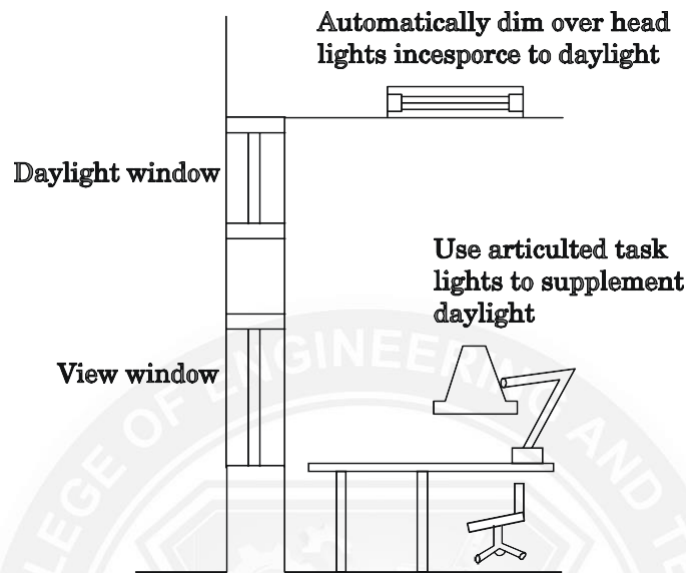
#### **Windows**

Windows is used for allowing light, heat and sound. Majority heat gain and heat loss occurs. Double layered window is used to reduce noise and even heat, cold and other environmental factors.

If window height is increased from floor, light entering the building will be reduced. And ceiling from the floor should be the height of 2.5 m - 3 m is important for better lighting.

Windows on multiple orientations must usually be combined to produce the right mix of light for the building depending on climate and latitude.

## Daylight window



*Fig. 3.9.1 Daylight window*

## Preferred Window-Wall Ratios (WWR)

For view and a positive connection out of doors, a minimum 20 percent to 30 percent ratio of window area in wall area is preferred.

Glazing the wall areas below desk height (0-30 inch above the floor) on benefits for day light.

## High windows

High continuous windows are more effective than individual or vertical windows, to distribute light deeper into the space.

Try to locate the top of windows close to ceiling line (for day lighting) but locate the bottom of windows no higher than 48 inches (for view).

Consider separating windows into two horizontal strips, one at eye level for view, and one above to maximize daylight penetration.

## **Light shelves**

Consider using interior or exterior light shelves between the daylight window and the view window. These are effective for achieving greater uniforming of day lighting, and for extending ambient levels of light onto the ceiling and deeper into the space.

Some expertise and analysis will be required to design an effective light shelf.

## **Window and office placement**

Daylighting is more cost effective if open plan workstations are located on the north and south side of the building. The open plan areas are more continuously occupied and achieve lower savings.

The open configuration also absorbs less light, and inter-reflections provide a more uniform distribution of light deep into the space.

The control of heat and glare on the east and west facades is difficult. The daylight and views are blocked in an effort to properly control the low sun angles.

By placing private offices on the east and west, occupants can individually control their blinds, and thereby control thermal discomfort and glare.

## **Interior sun control**

Similar to exterior sun control, horizontal blinds on the south windows and vertical blinds on the east and west are most effective.

In northern latitudes, low angles of sun can enter the north windows on summer mornings and afternoons.

Vertical blinds that retract fully for the middle of the day are recommended for these conditions. Perforated blinds and translucent shades may cause glare when hit by direct sunlight.