Lecture-22

WINDOWS

UCE306: ARCHITECTURE DRAWING AND BUILDING CONSTRUCTION

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WINDOW

A WINDOW is also a vented barrier secured in a wall opening. The function of the window is to admit light and air to the building and to give a view to the outside.

WINDOW consists of two parts:-

1. Window frame
2. Window shutter

Window details

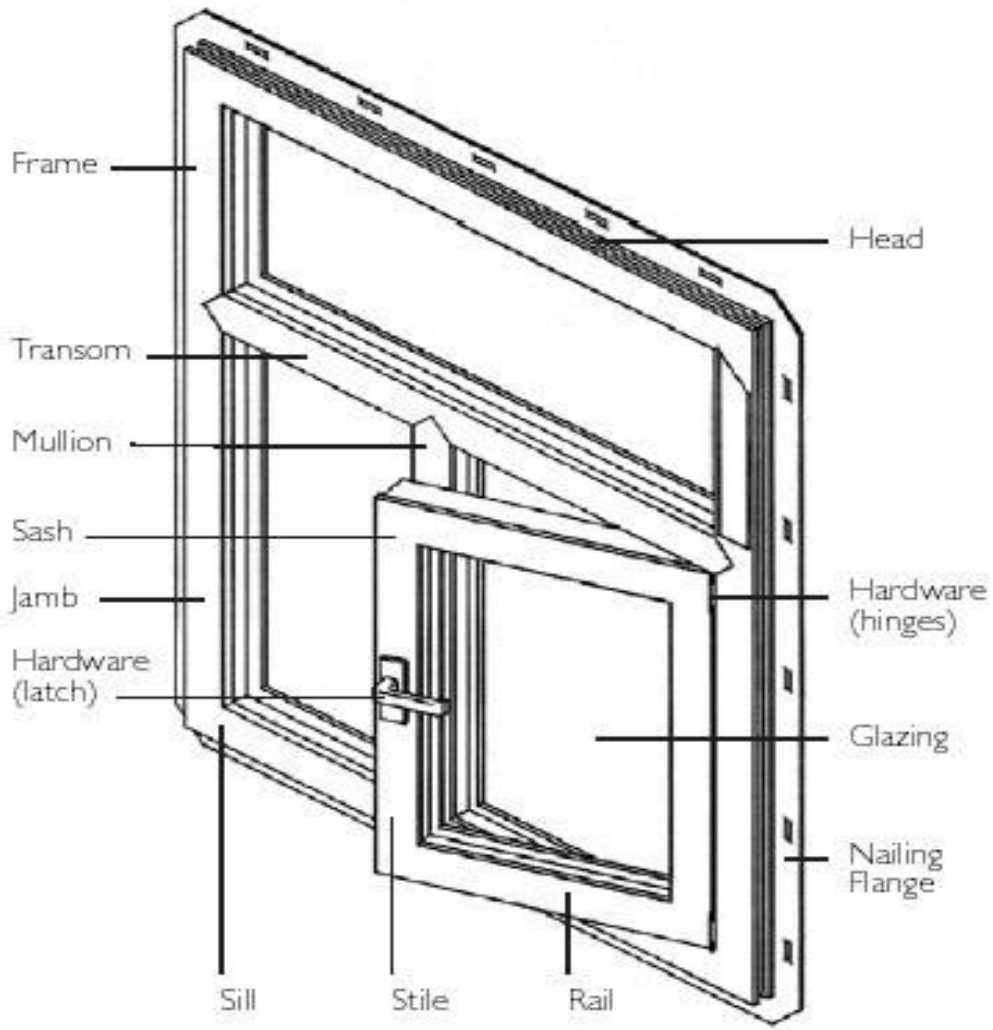


Figure 1 - Components of a window

A mullion is a vertical element that forms a division between units of a window or screen, or is used decoratively.

A transom is a transverse horizontal structural beam or bar, or a crosspiece separating a door/window from a **window** above it.

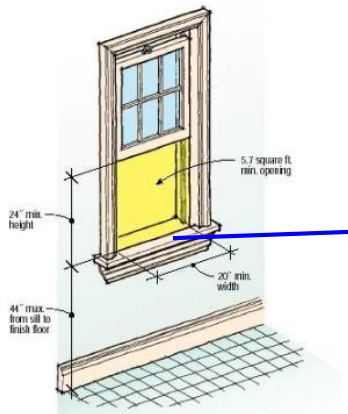
Jamb is the vertical up-right components that form the sides of window frames

Selection of size, shape, location and number of windows to be provided in a room depends on:

1. Size of room to be lighted.
2. Location of the room and its utility.
3. Architectural treatment is to be given to the building.
4. Direction of wind and its speed
5. Climatic consideration of the site such as humidity, temperature variation

General guidelines for provisions of windows in a room:

- Size and number of windows should be sufficient to provide adequate light and ventilation in the room.
- Windows should be located opposite to each other wherever possible. Windows provided on northern side permit maximum day light without glass.
- The window sill should be placed at 755 to 100 cm above the ground level. This is considered reasonable height for the inmates to have a convenient look outside.
- Top level of windows and doors should be at the same height.
- Building in the humid region need attention for adequate ventilation of the room. Window should be so located as to permit maximum ventilation of the apartment.


5.7 square ft.
min. opening
24" min.
height
20" min.
width
44" max.
from sill to
finish floor

General guidelines for provisions of windows in a room:

- The shutter of the windows in external wall should open outside. This checks entry of rain water inside the room.
- All the external windows, specially the one’s on ground floor, should be provided with mild steel round or square bars or steel grills to safe guard against theft.
- Windows with external wall should be provided with Chajja projections to prevent the entry of the rainwater in the room. Similarly, it is desirable to slope the window sill towards the external face of the wall.
- The sill should be preferably be weathered and throated to throw the rain-water off the face of wall.

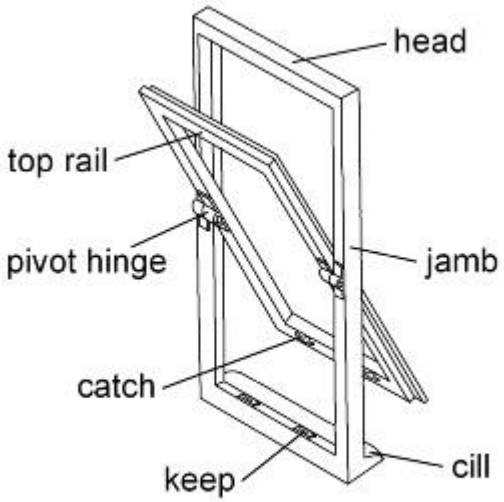
Fixed windows

- In this type, the glass panel is permanently fixed in the opening of the wall.
- The shutter can’t be opened or closed.
- The function is limited to allowing light vision in the room.
- No rebates are provided to the frame.
- The shutters are fully glazed.
- In homes they are generally decorative windows near doors, stairwells and high-places or are used in combination with other styles.

Fixed windows

Pivoted windows

- In this type of window, the shutter is capable of rotating about a pivot fixed to window frame.
- The frame has no rebate.
- The shutter can swing horizontally or vertically.



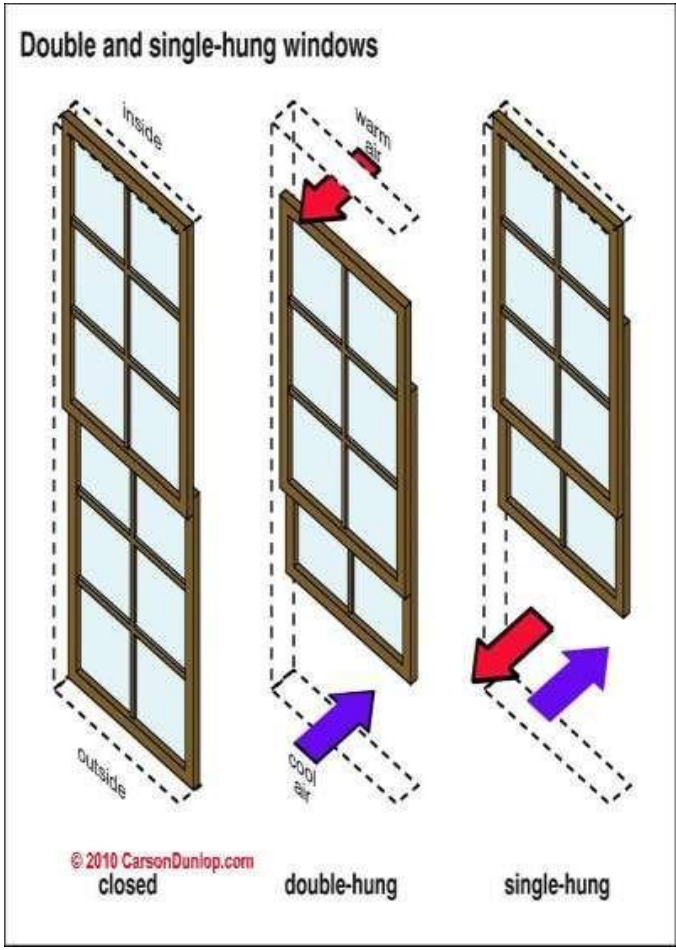
pivot window

Horizontal pivoted

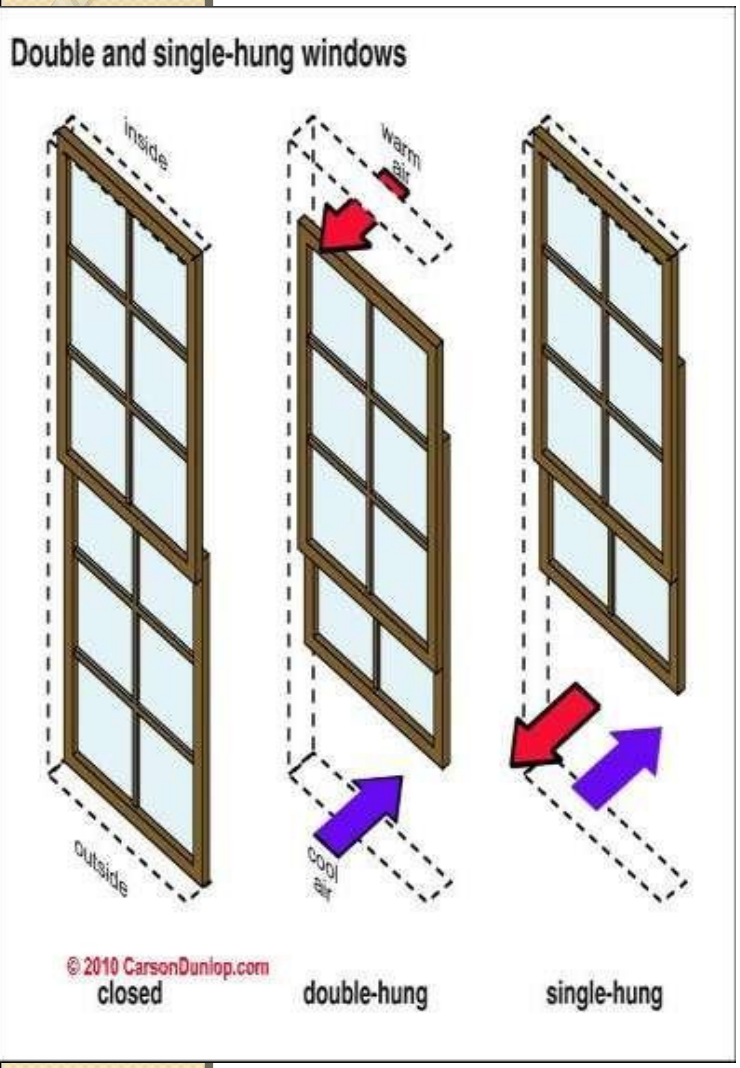
Vertical pivoted

Single-hung windows

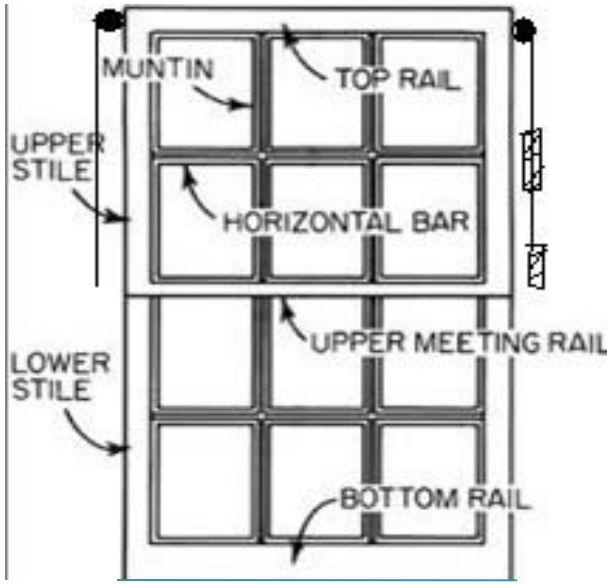
- Special frames called boxed or cased frame is used, which consists of two vertical members spaced apart to create a groove to slide the shutter.
- A parting bead is provided in the groove of the frame to keep the two shutters apart.
- In single-hung windows the top sash is fixed and can't be moved. Only the bottom sash slides upward in a **single-hung** window.



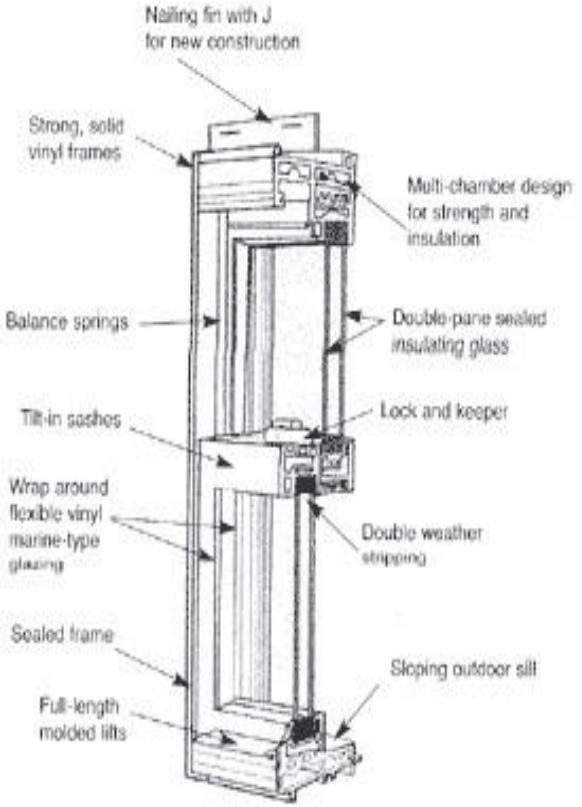
Double-hung windows

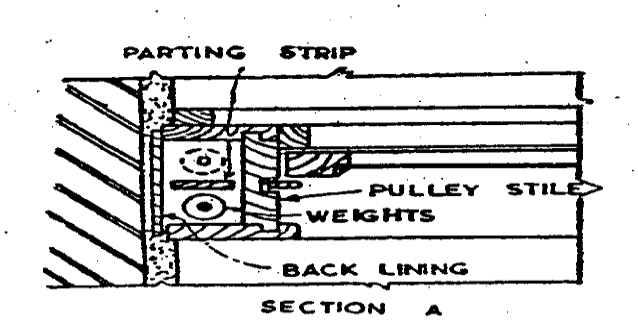


- It has two panels, top and bottom that slide up and down in tracks called stiles.
- The most common used windows today. When open, these windows allow air flow through half of its size.
- The two parts are not necessarily the same size.
- Traditionally, each shutter is provided with a pair of counterweights connected by cord or chain over pulleys.
- When the weights are pulled, the shutters open to required level.
- It is possible to have controlled ventilation.
- Nowadays, most new double-hung sash windows use spring balances to support the sashes.



COUNTER WEIGHT





Sliding Window or Slider:

- Has two or more sashes that overlap slightly but slide horizontally within the frame.
- Suitable openings or grooves are left in the frame or wall to accommodate the shutters when are shutters are opened.

Casement windows are hinged at the sides. When fully opened, offer the maximum amount of ventilation.

Operates like a hinged door, except that it opens and closes with a lever inside the window.

The shutter consists of styles, top rail, bottom rail and intermediate rail.

Depending upon the design, the frame can have additional vertical and horizontal members i.e. mullion and transom respectively.

The panels may be either glazed, unglazed or partly glazed and are fixed in the grooves made in rails and styles.

Glazed window

This is a type of casement window where panels are fully glazed.

The frame has styles, top rail and a bottom rail.

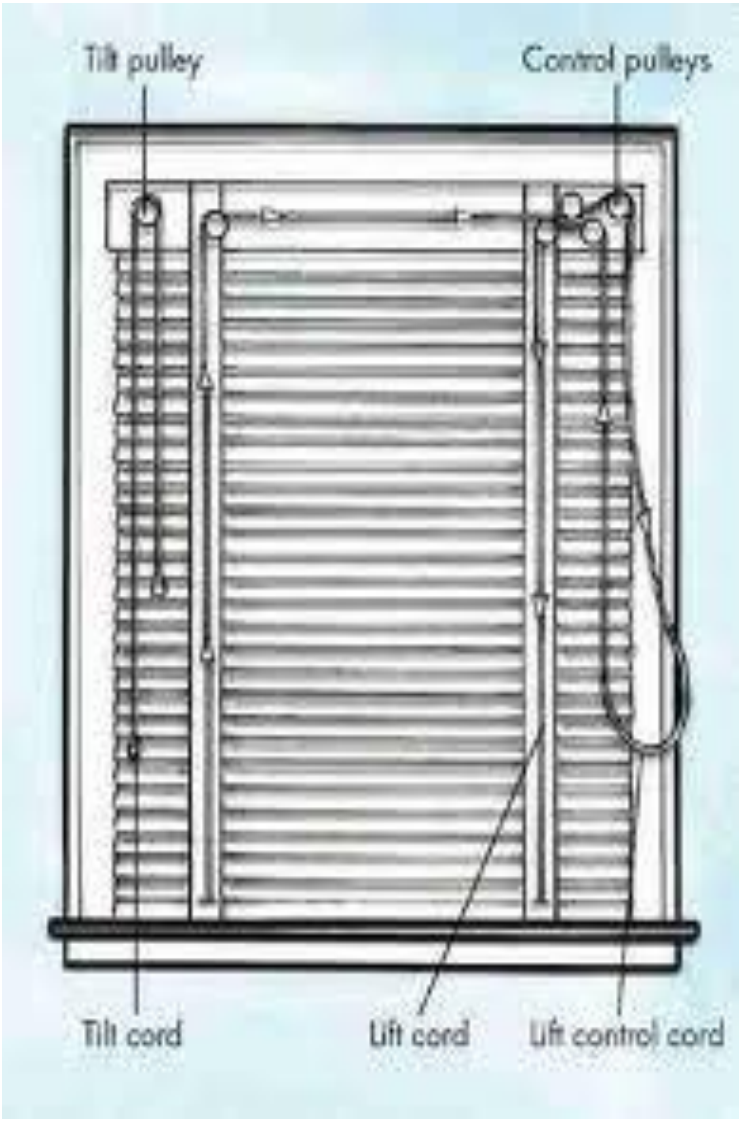
The space between top and bottom rail is divided into number of panels with small timber members called, sash bars or glazing bars.

The glass panels are cut 1.5-3.0 mm smaller in size than the panel size to permit movement of sash bars.

Glass panes are fixed to sash bars by putty or by timber beads.

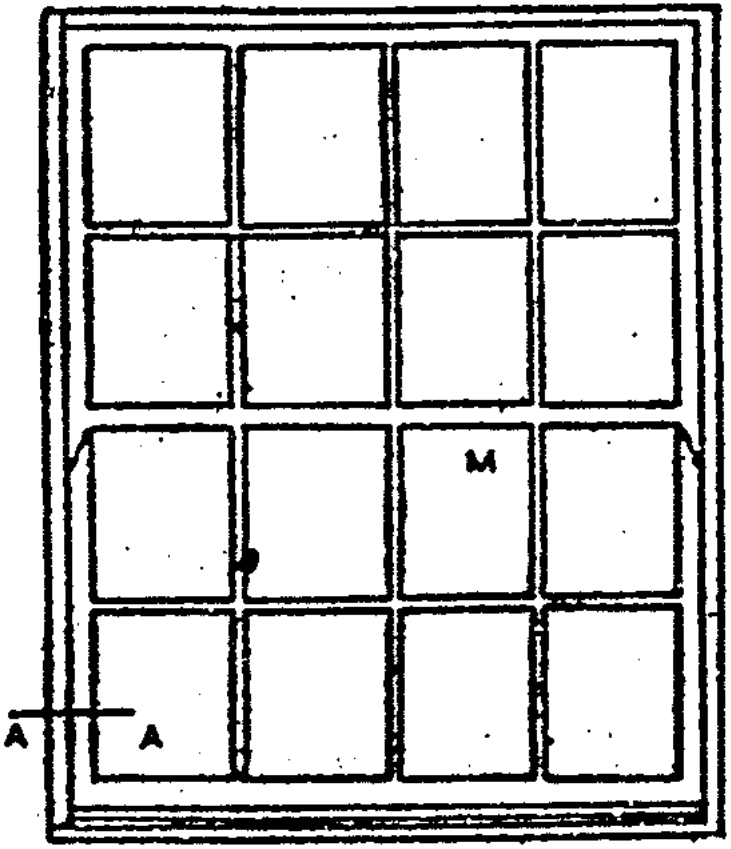
Louvered window

- They are provided for the sole function of ventilation and not for the vision outside.
- The styles are grooved to receive a series of louvers which may be of glass or wood slates.
- The louvers are usually fixed at 45^0 inclination sloping downward to the outside to run-off the rain water.
- The windows provide light and ventilation even if closed.
- Such windows are recommended for bath, WC, workshops etc., where privacy is more important.
- Venetian shutters uses louvers which can be opened or closed. The louvers are pivoted at both ends in the frame and in addition each blade is connected to a vertical batten by hinge.


Tilt pulley
Control pulleys
Tilt cord
Lift cord
Lift control cord

Metal Windows:

- These are very popular in public buildings and can be made up of mild steel, stainless steel, aluminium, bronze etc.
- Mils steel being cheapest of all, they are widely used. The windows can be fabricated for the required size using light rolled steel sections.
- They can be fixed directly to the wall opening in a wooden frame or in the steel frame.
- While fixing, care has to be taken that the members of the frame are not subjected to any structural loads to prevent damage.
- Thus, the size of the window opening is kept slightly more than the frame size so as to allow some clearance between the two.
- The window is fixed into the opening only after masonry and lintel work is over and fully set.


M
A
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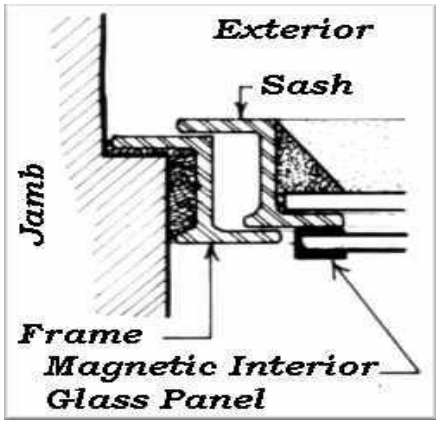
ELEVATION


Exterior
Sash
Jamb
Frame
Magnetic Interior
Glass Panel

Advantages of metal windows:

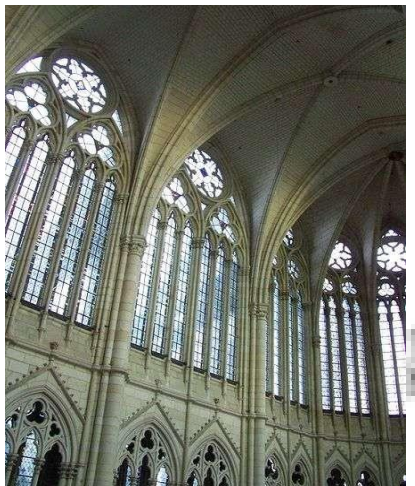
1. They are more stronger and durable as compared to wooden windows.
2. They are not subjected to expansion and contraction of joints.
3. They are rot-proof, termite proof.
4. Highly fire resistant.
5. Presents better elegance and smooth finishing.
6. Provide more area for light and ventilation.
7. The cost of maintenance is negligible and thus proves economical.

Bay window

- The window projecting outward from the external walls .
- Wide and decoratively impressive allow for 180° view.
- A multi-panel window, with at least three panels set at different angles to create an extension from the wall line.
- it is commonly used in cold country where snow often falls.
- They may be triangular, circular, rectangular or polygonal in plan.

Clerestory window

- These are provided to permit light and ventilation to a room having more height than the adjoining rooms or when the ventilation is restricted.
- Generally provided near the top of main roof and they open above the slab of adjoining rooms.
- The shutters are generally pivoted at centre.
- The shutter can be opened or closed by means of two chords, each attached to the rails of the shutter.
- The shutter must swing in such a way that the upper part opens inside the room and lower part opens outside, to exclude rain water.

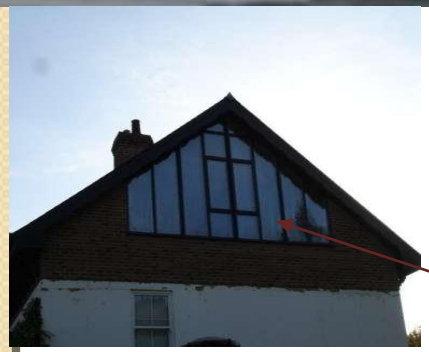


Corner window

- These are provided at the corner of the room.
- Light and air is admitted from two directions.
- The jamb post at the corner is made of heavy section.

Dormer window and Gable window

The windows provided at the dormer end and gable end of the sloping roof to provide light and ventilation to the enclosed space below the roof.

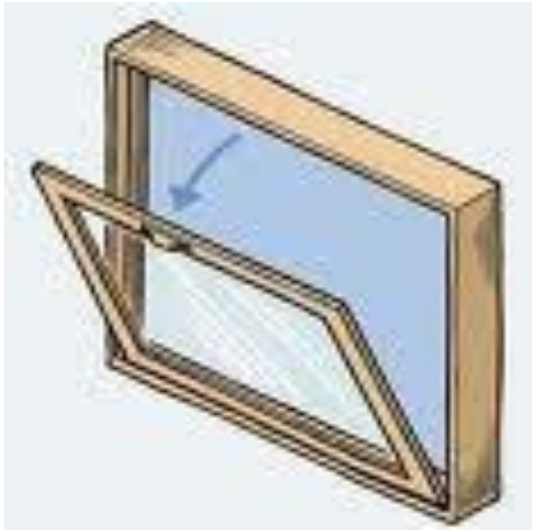


Gable window

Awning windows are hinged at the top and open outward. They are designed to provide ventilation without letting in rain, etc.

- Awning windows can be used alone or in vertical or horizontal groups in combination with additional awning windows, other types of windows, or above doors.

Awning windows

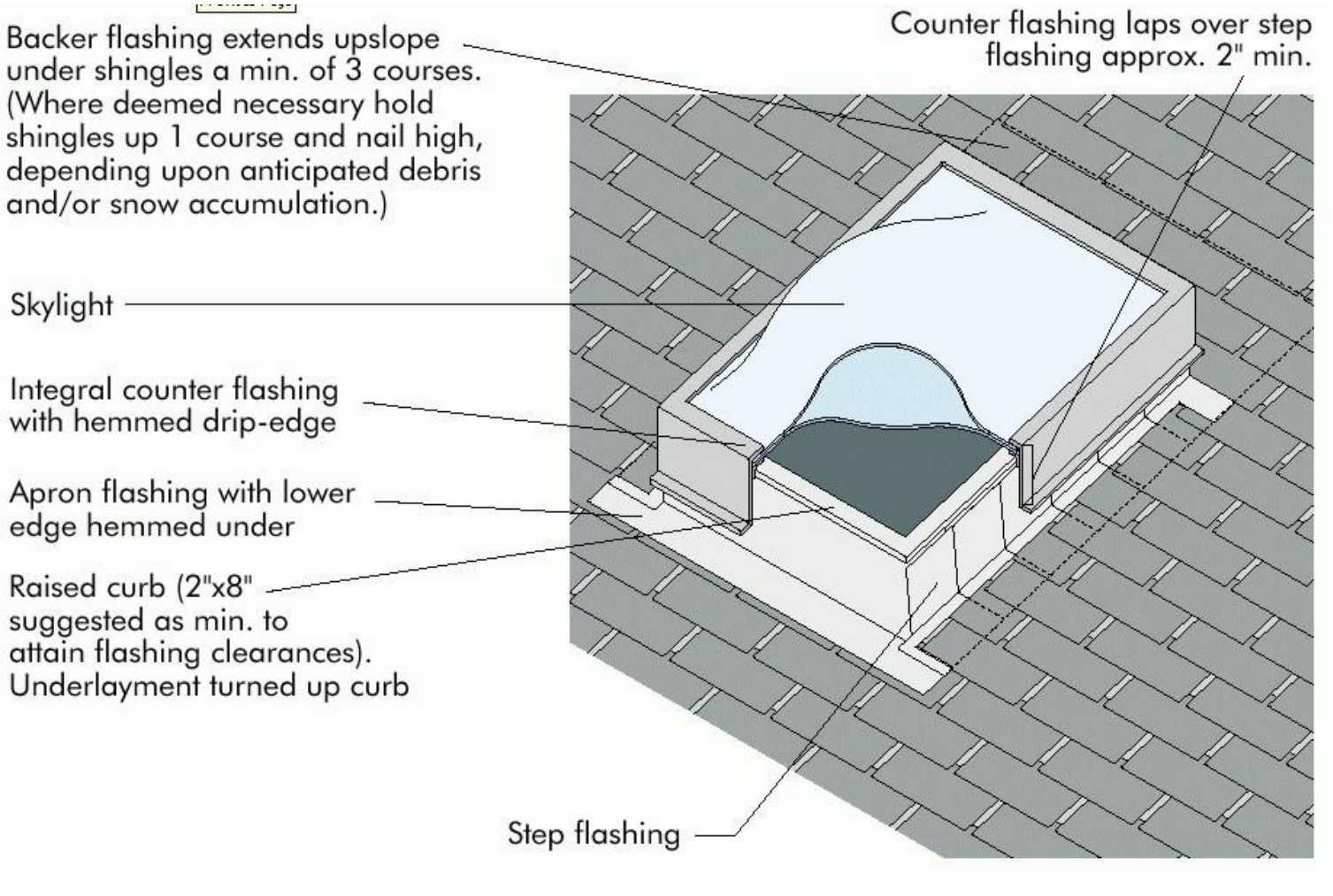


Hopper windows

Skylight windows

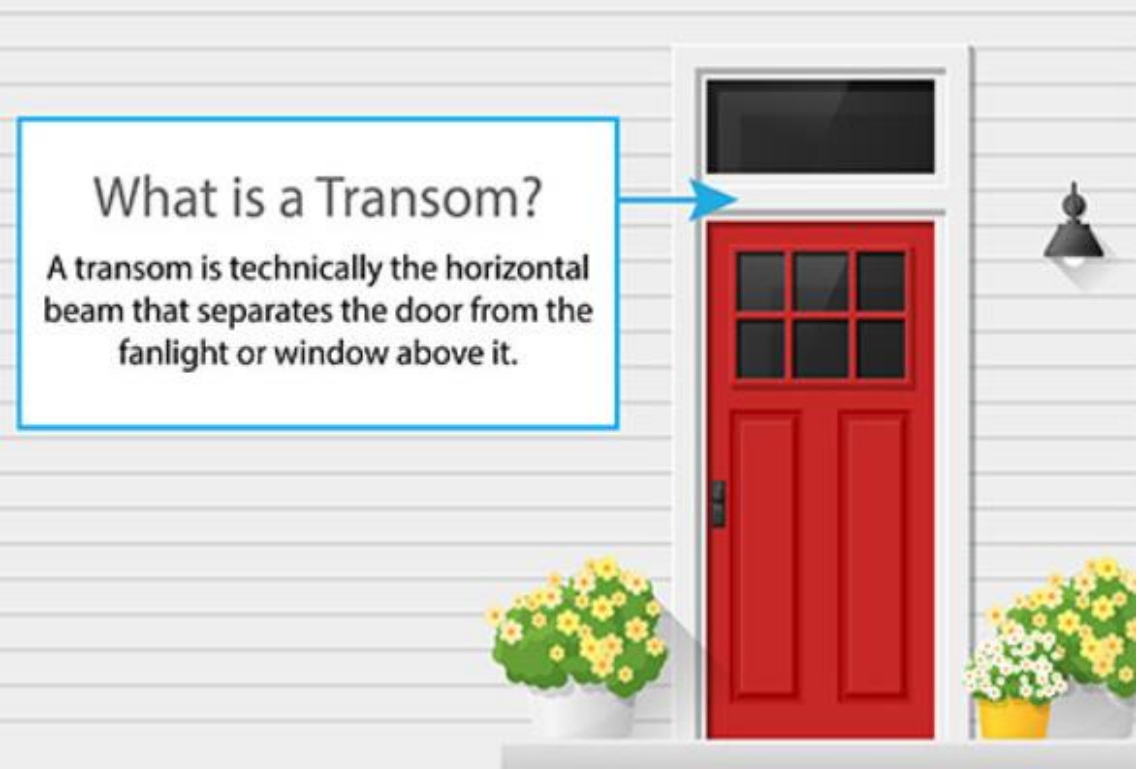
These are fixed windows on the sloping roofs.

- Admit natural light and help distribute light more evenly throughout the room. Considered an energy saver feature.
- In addition to reducing the need to use electric lights, it can deliver warmth in the winter and cooling in the summer, minimizing the need for fuel-based heating and air conditioning. On winter days, the sun's radiant energy can shine through a south- or west-facing skylight to warm interior surfaces. And in the summer, a ventilating skylight can promote air circulation by releasing the warm air that naturally rises.
- The opening for the window is made by cutting common rafters. The framework consist of trimming pieces, curb frames, bottom rail and top rail. The opening is treated with lead flashings to ensure water proofing.
- Skylights may be plastic or glass, fixed or operable, and made in any number of sizes and styles.


Backer flashing extends upslope under shingles a min. of 3 courses. (Where deemed necessary hold shingles up 1 course and nail high, depending upon anticipated debris and/or snow accumulation.)
Counter flashing laps over step flashing approx. 2" min.
Skylight
Integral counter flashing with hemmed drip-edge
Apron flashing with lower edge hemmed under
Raised curb (2"x8" suggested as min. to attain flashing clearances). Underlayment turned up curb
Step flashing


iStockphoto

- Fanlights: The small window or ventilator fitted above the door or window frame separated by transom. The function is to ensure cross ventilation in the room even if the door or windows are closed. They also assist in admitting natural light.
- Ventilator: It is a narrow window of small height fitted near the roof of a room for ventilation. The construction is similar to the fanlights. They are horizontally pivoted.



References

- Building Construction by Sushil Kumar
- Building Construction by B.C. Punmia; Ashok Kumar Jain and Arun Kumar Jain
- Building Construction & Materials by Gurcharan Singh

THANKYOU