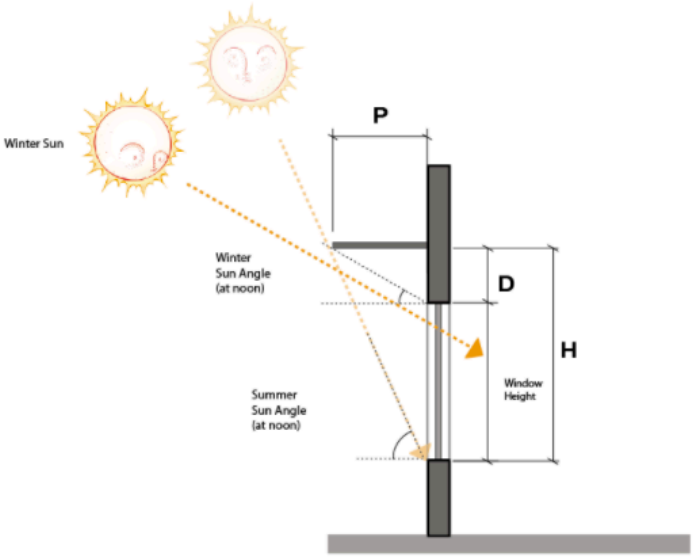
Section 1: Overhang

A horizontal overhang is a straightforward method for shading solar glazing in summer.

Passive heating strategies call for major glazed areas (solar glazing) in a building to be oriented towards the equator (south in the Northern Hemisphere and north in the Southern Hemisphere). However, large solar glazing areas, sized to admit sunlight for heating in winter, will also admit sunlight during warm periods when it is not wanted. To control direct sunlight from entering a building, it is important to incorporate shading strategies as part of architectural design.

Sizing an Overhang

An overhang is simply a horizontal projection located at the top exterior face of a glazed opening or window. The projection extends just far enough to block the hot summer sun, but allows the lower winter sun (heat) into the space during the winter months. The optimum projection of the overhang from the face of the glazing is dependent upon the glazing height, latitude and climate. For example, the larger the opening height, the longer the projection. The following equation provides a quick method for determining the projection of an overhang:

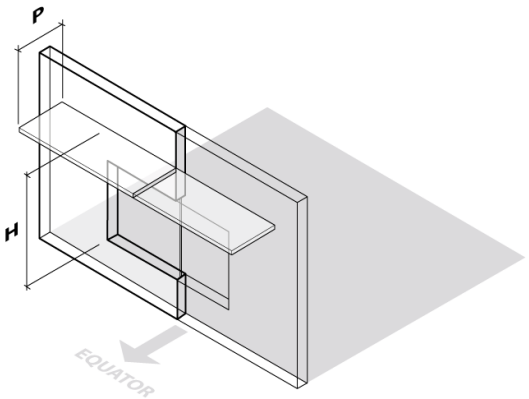


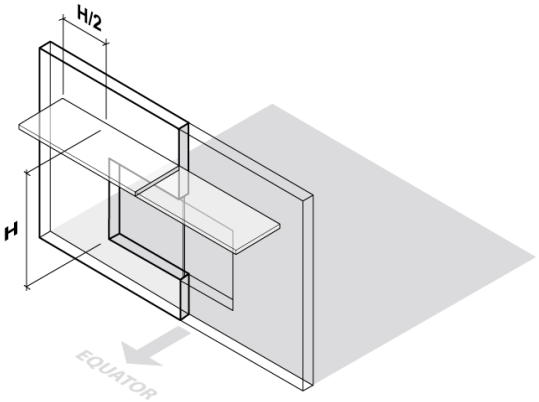
Projection (P) = glazed opening height (H) / F

Where F= a factor from the following table

Latitude	F Factor
28˚	5.6-11.1
32˚	4.0-6.3
36˚	3.0-4.5
40˚	2.5-3.4
44˚	2.0-2.7
48˚	1.7-2.2
52˚	1.5-1.8
56˚	1.3-1.5

Note: Select a factor according to your latitude. The higher values will provide 100% shading at noon on June 21st, the lower values until August 1st (for warmer climates). Source: the Passive Solar Energy Book by Edward Mazria.



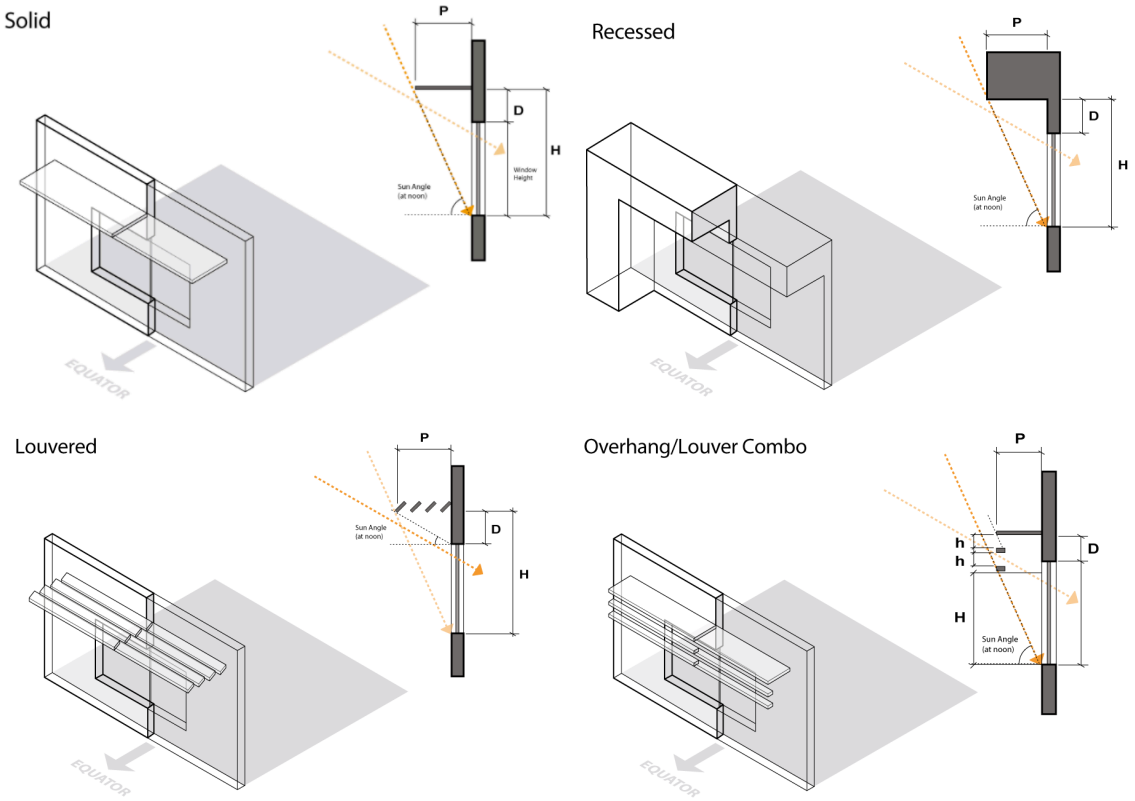


The overhang projection should be placed high enough above the top of the glazing (D) so that all available winter sun is admitted.

To block unwanted sunlight (heat gain) during the early morning and late afternoon, extend the overhang on each side of the glazed opening. The extension should be equal to half the distance between the bottom of the opening and the bottom of the overhang, or H/2.

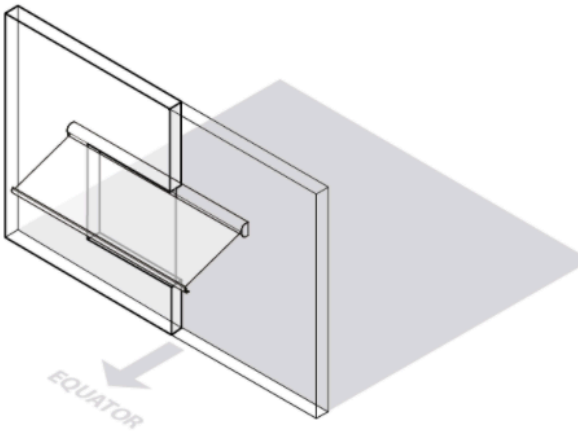
Types of Overhangs

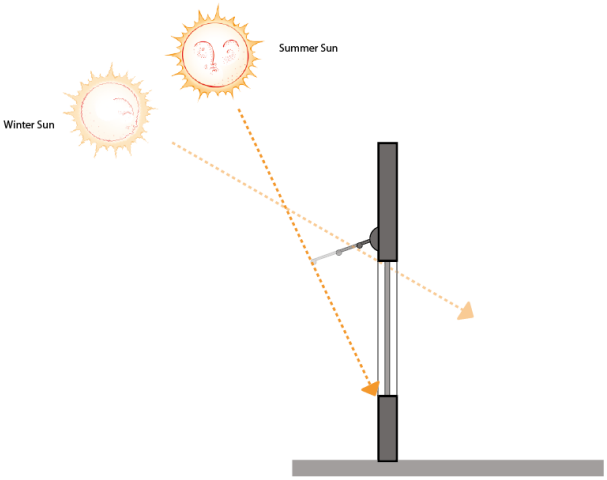
A horizontal overhang can be solid, louvered, or an overhang can be achieved by recessing the glazing within the exterior wall. An overhang can also be a combination of a projection and louvers, in which case the 'glazed opening height' (H) is measured from the bottom of the glazing to the bottom of the last louver. Design the louvers according to Section 2.



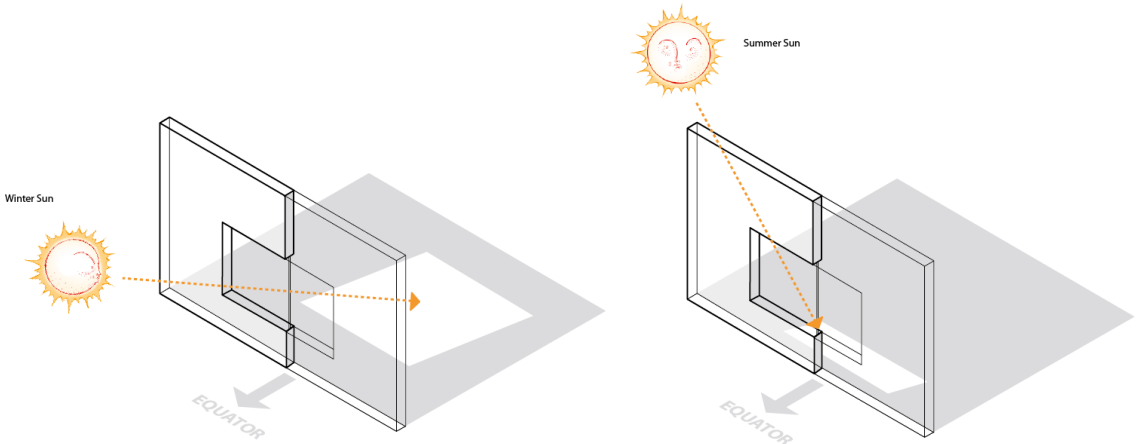
Adjustable Overhangs

A fixed overhang, while effective, is not necessarily the best solution for shading solar glazing, since climatic seasons do not correspond to the sun's movement across the sky. In the Northern Hemisphere, for instance, the middle of the summer climatic season does not coincide with the longest day of the year (June 21), nor the middle of the winter season with the shortest day (December 21). In most regions there is a time lag of at least a month. In addition, a fixed exterior shading device will provide the same shading on September 21, when the weather is warm, and on March 21 when it is cold. This happens because the sun's path across the sky is the same on those days. Adjustable overhangs provide a potentially better solution. They can be regulated seasonally, for example, to partially shade a window in September and then adjusted to admit full sunlight in March. However, these devices may be more expensive to build due to additional hardware. Also, they are sometimes difficult to design and maintain, and they require the correct seasonal adjustments to be effective.



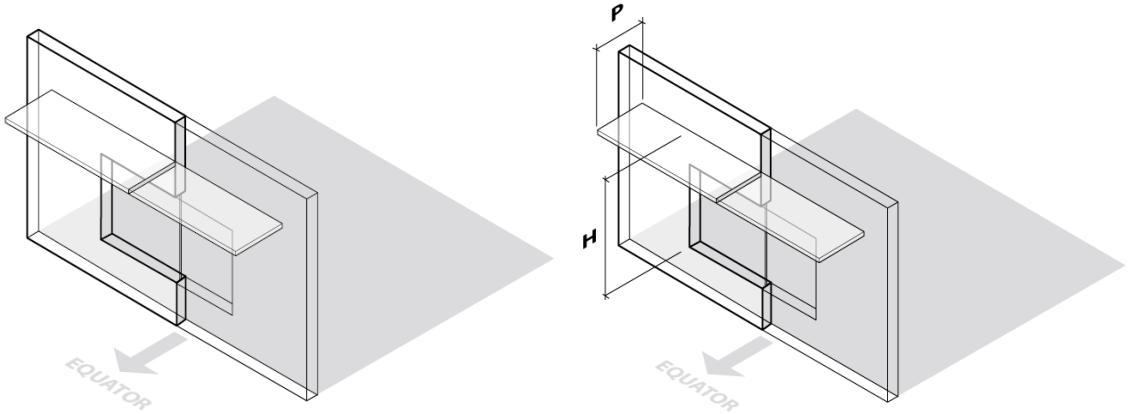


OVERHANG TYPES:

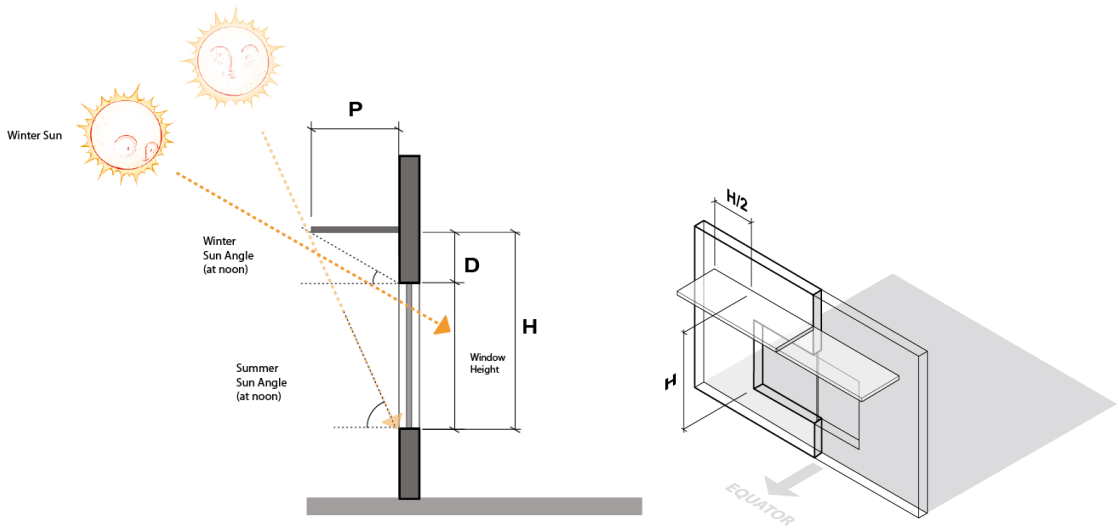


Solar glazing is sized to admit the winter sun for passive heating, while minimizing the amount of light and heat admitted into the space in summer time.

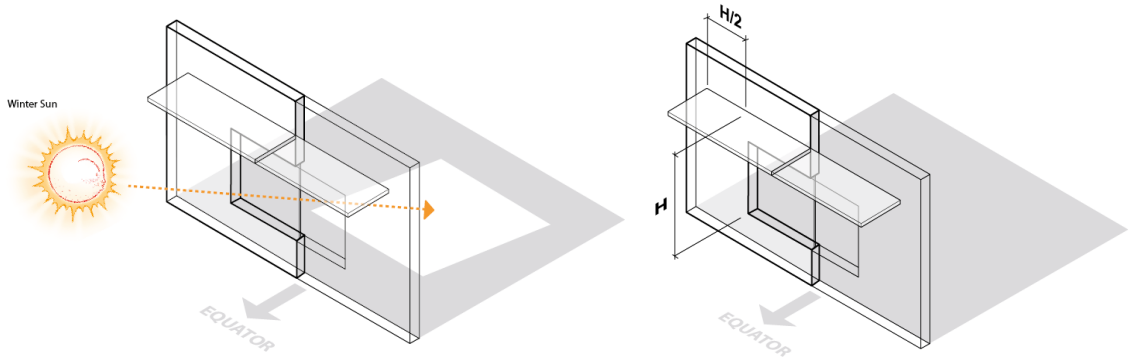
Horizontal Overhang



A horizontal overhang can block unwanted heat gain. The overhang projection (P), the distance above the top of the glazing (D), and the height of the window (H) are the critical dimensions for sizing horizontal overhangs.

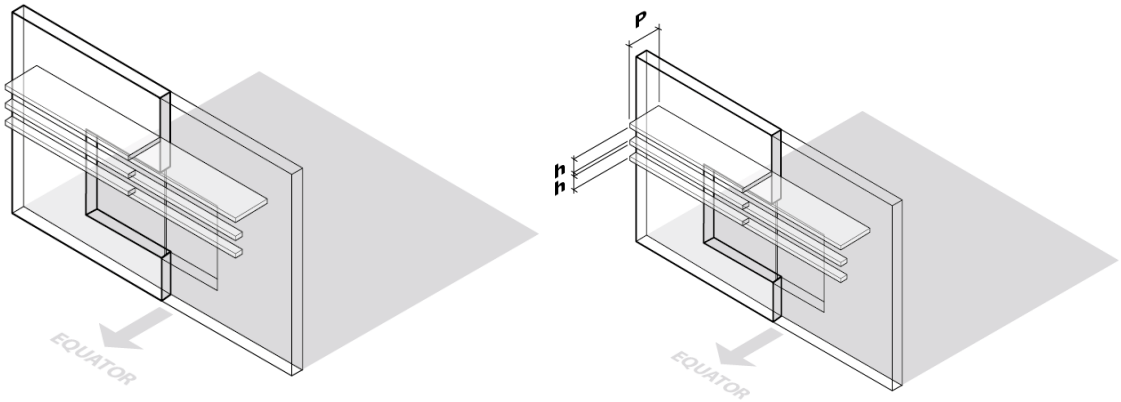


The overhang projection should be placed high enough above the top of the glazing so that all available winter sun is admitted. The overhang projection (P) should extend far enough so that summer sun is not admitted.

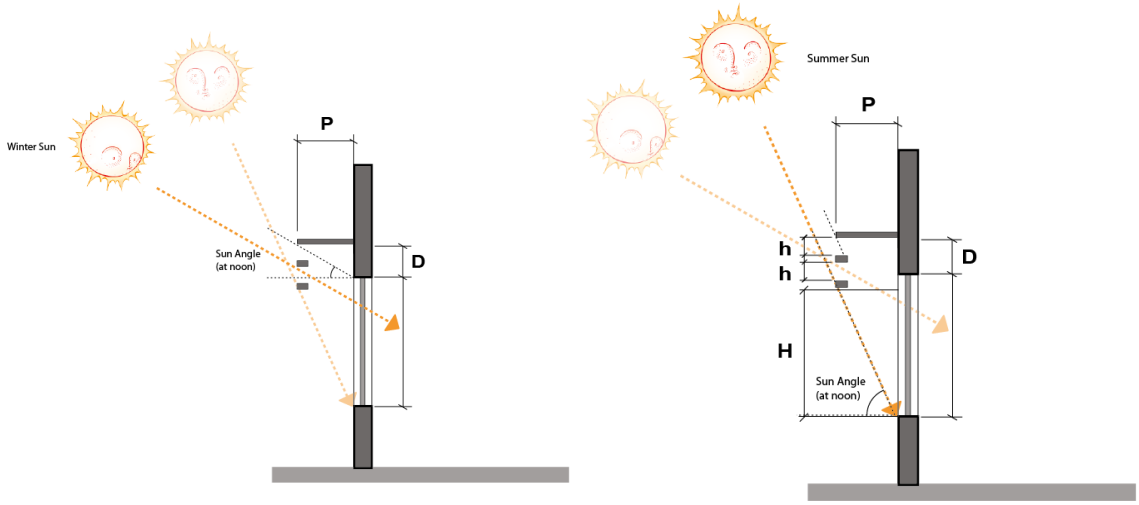


Use the winter sun angle (the altitude of the sun at noon on the winter solstice) and the summer sun angle (the altitude of the sun at noon on the summer solstice) to determine P and D. Extend the overhang on each side of the glazed opening to provide summer shading in late morning and early afternoon. The extension should be one half of distance between the bottom of the opening and the bottom of the overhang projection, or H/2.

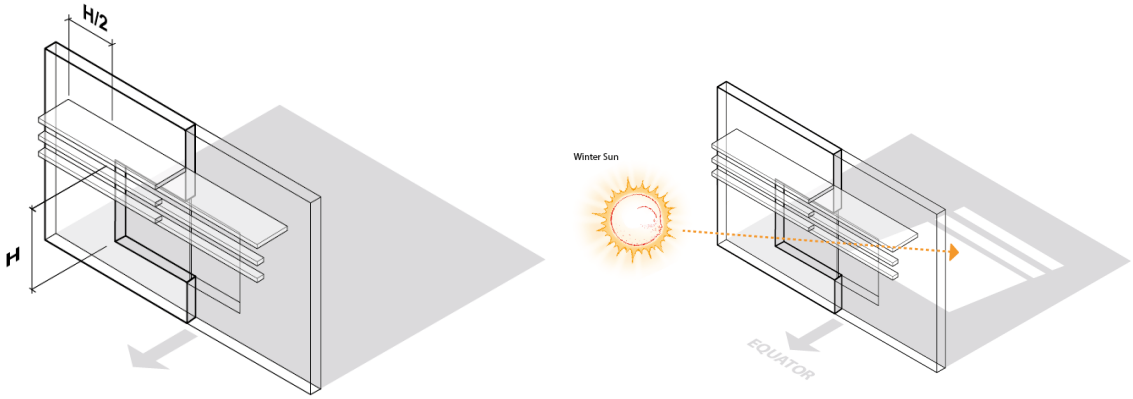
Combined Overhang and Louver System



A combination of a horizontal overhang and louvers can also be used as a solar shading device. The horizontal overhand projection (P), the distance above the top of the glazing (D), the number of louvers, the distance between lovers (h), and the height of the window (H) are the critical dimensions for horizontal overhang and louver combined systems.

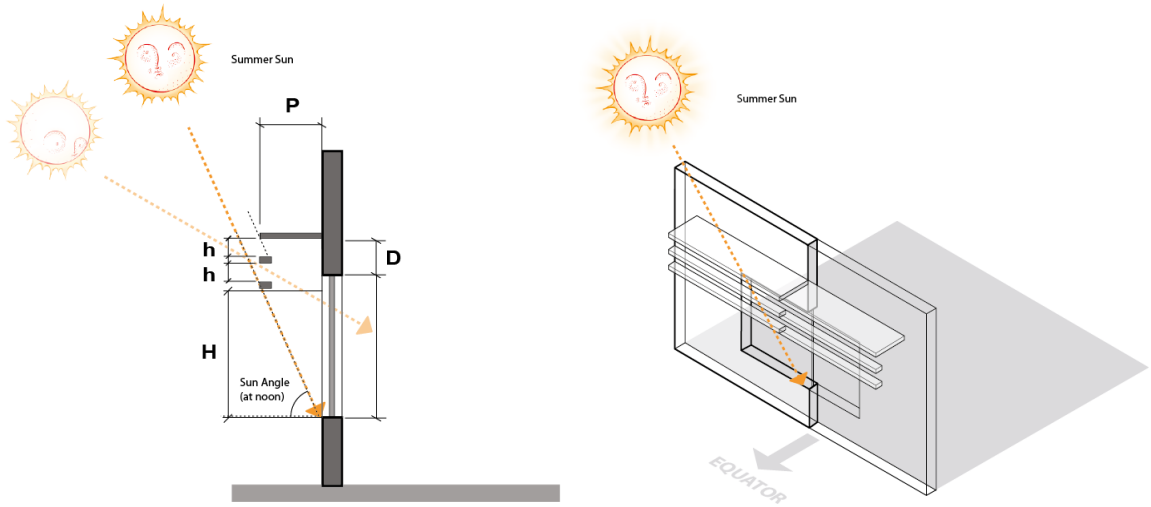


The overhang projection should be placed high enough above the top of glazing so that available winter sun is admitted. The distance above the top of the glazing (D) will depend on the overhang projection (P) and on the size and number of louvers used. The overhang projection should be placed high enough above the top of the glazing so that available summer sun is blocked, keeping unwanted heat out.



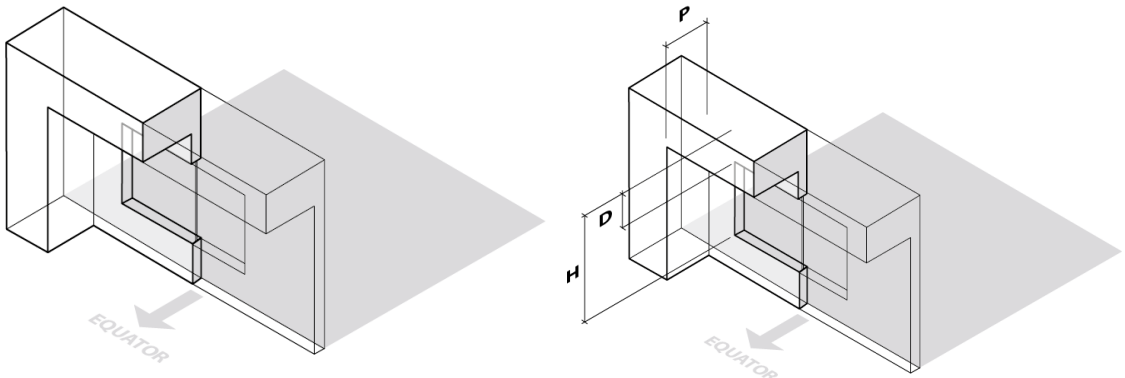
Extend the horizontal overhang and louvers on each side of the glazed opening to provide

summer shading in late morning and early afternoon. The extension should be one half the distance between the bottom of the opening and the bottom of the overhang projection, or H/2. (H=H D). A successful overhang projection and louver system allows nearly all available winter sun to be admitted.

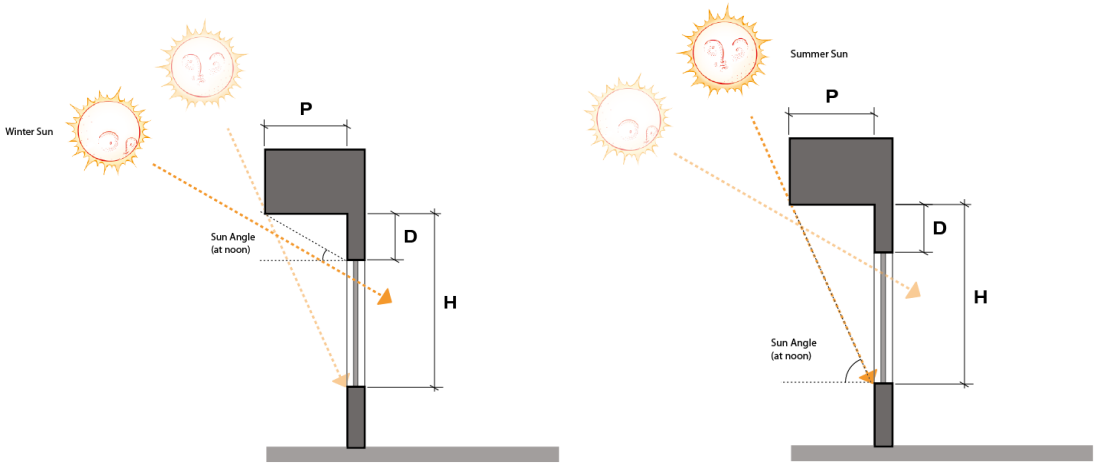


The overhang projection should be placed high enough above the top of the glazing so that available summer sun is blocked, keeping unwanted heat out. A successful overhang projection and louver system blocks all unwanted heat gain in summer, when it is not needed.

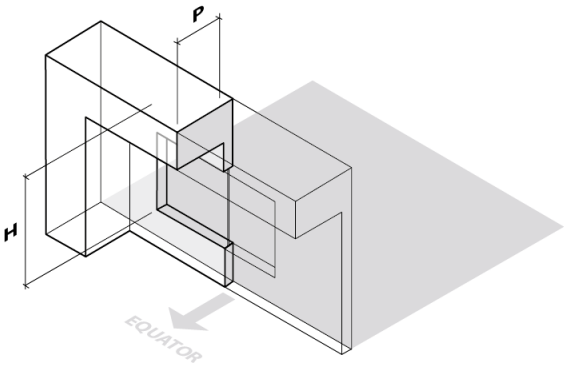
Recessed Opening



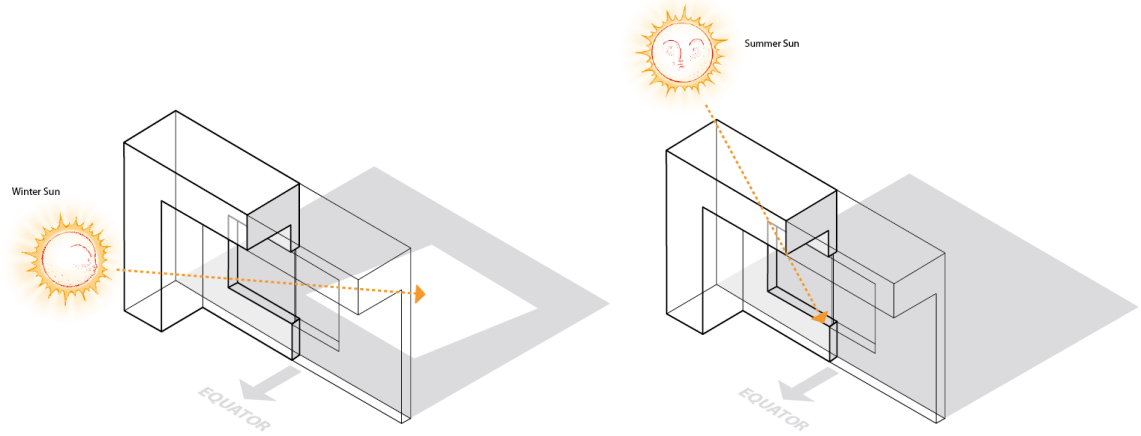
A recessed opening (building projection) can also be used as a solar shading device. The recessed opening (P), the distance above the top of the glazing (D), and the height of the window (H) are the critical dimensions for sizing recessed openings.



The recessed opening (P) should begin high enough above the top of glazing so that all available winter sun is admitted, but deep enough that summer sun is not admitted.

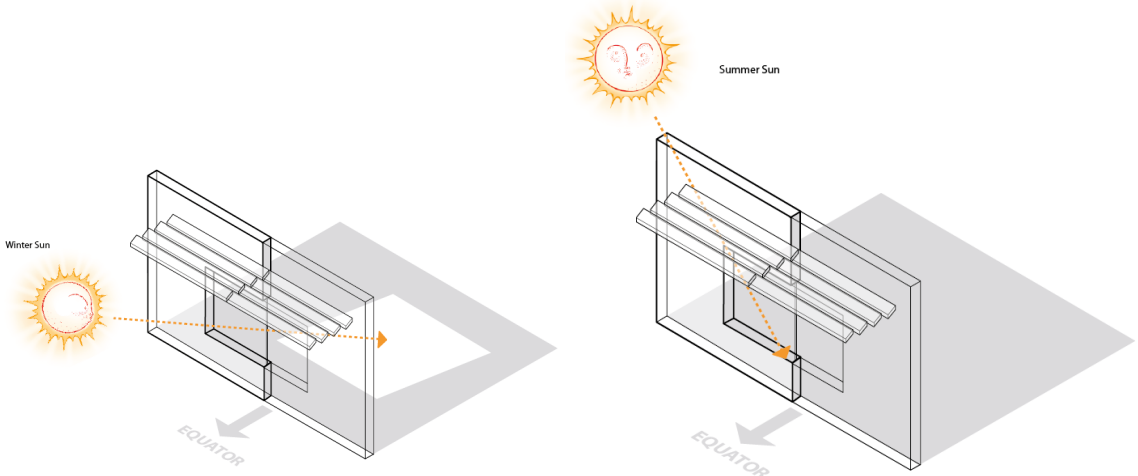


The recessed opening should have enough distance on each side of the glazed opening to provide summer shading in late morning and early afternoon. The distance from the side of the glazing opening to the start of the recession should be one half of the distance between the bottom of the opening and the bottom of the recessed opening, or H/2 (H=H D).

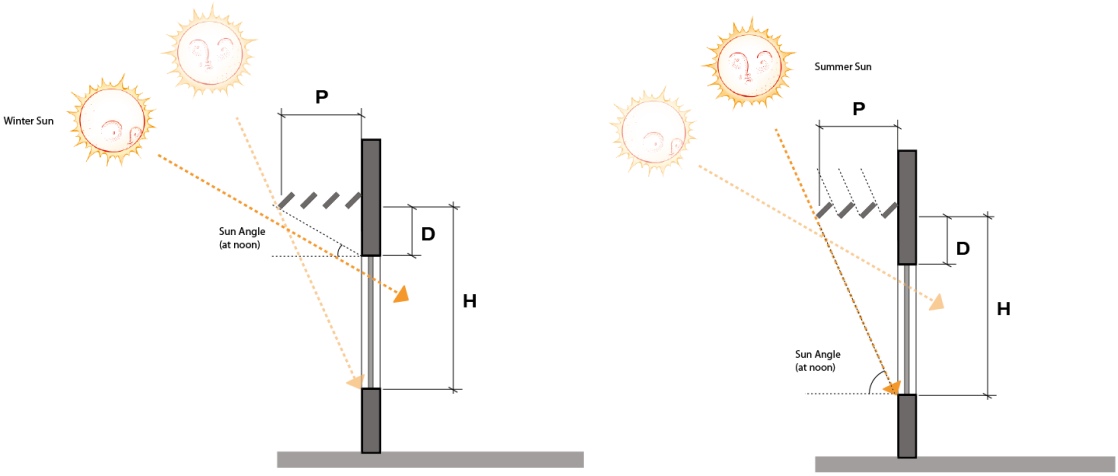


A successful recessed opening allows all available winter sun to be admitted, but blocks all unwanted heat gain in summer, when it is not needed.

Horizontal Louvers



Horizontal louvers can be used as a solar shading device to allow winter sun to be admitted while blocking all unwanted heat gain in summer, when it is not needed.



The horizontal louver projection (P), the distance above the top of the glazing (D), the number of louvers, and the distance between louvers (H) are the critical dimensions for horizontal louver systems. The highest horizontal louvers should be placed high enough above the top of glazing so that available winter sun is admitted. The distance between the top of the glazing and the highest horizontal louver (D) will depend on the horizontal louver projection (P).