SDAPP
Sustainable Design Assessment in the Planning Process
10 Key Sustainable Building Categories

GREATER DANDENONG
City of Opportunity

2.1

Sunshading

Building design for a sustainable future

What's included in this fact sheet:

This Fact Sheet explains the different types of sun shading and the impact it will have on the indoor environment quality and energy demand of a building. It also details the type of shading that is best suited to the different orientations and facades of the building.

What is sunshading?

Historical architecture relied on passive design approaches, such as the inclusion of sun shading to provide comfortable indoor conditions. Since the second half of the 20th century, when technology became affordable and readily available, building design was able to rely on energy hungry devices, such as air conditioning and artificial lighting to provide the desired comfort. With energy becoming more expensive and showing the effects on our environment, Council encourages you to design buildings that thrive on passive design, rather than active appliances.

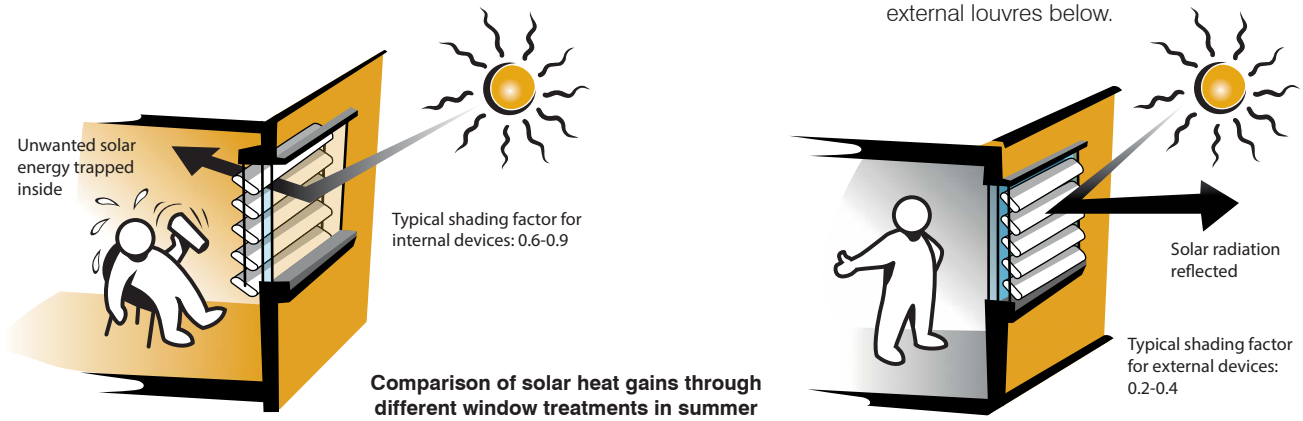
Did you know that external sun shading can be up to 5 times more effective than internal shading?

External shading devices protect the building envelope and reduce heat transfer through the building fabric. Whereas internal shading devices can reflect a small proportion of the heat that has already penetrated the buildings fabric.

Appropriately designed sun shading will not only support comfortable building temperatures but will help you save energy and money on cooling and heating systems.

Melbourne's climate requires building facade design that responds to changing summer and winter temperatures and changing sun angles throughout the year. Fixed or flexible external shading should protect your windows from unwanted heat gain in summer and allow for desired heat gain in winter.

The effectiveness of different shading devices is expressed as the Fc value, also called the shading factor. It is measured in the proportion of solar energy entering a window. A low figure means the shading device is very effective, most of the solar energy is excluded. A high figure means the shading device is not very effective, a lot of heat enters the room. A figure of 1 means no shading device is applied. Refer to the example of internal and external louvres below.

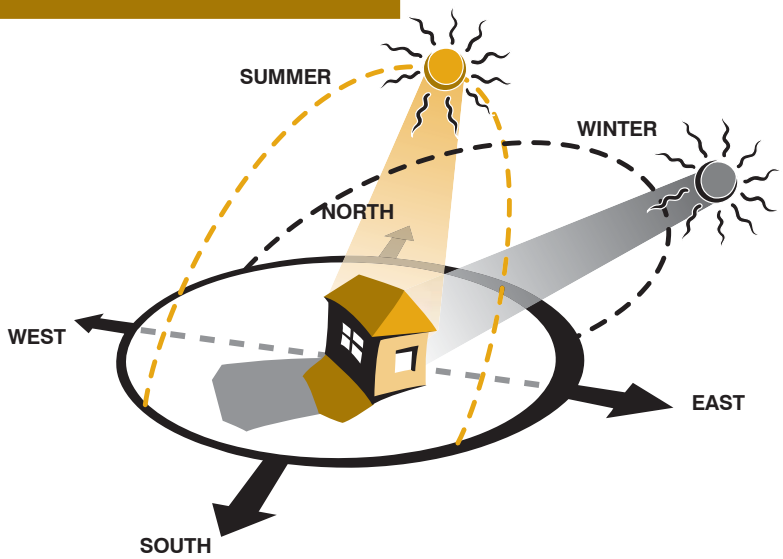


Comparison of solar heat gains through different window treatments in summer

Sun angles

Different facades require different external shading

The graphic to the right shows how sun angles change, depending on the season, the orientation, and time of the day. Generally speaking, summer sun angles are high (up to 75°) and winter angles are considerably lower (up to 29°). Furthermore, midday sun in the North is higher than morning or evening sun in the East and West.



North:

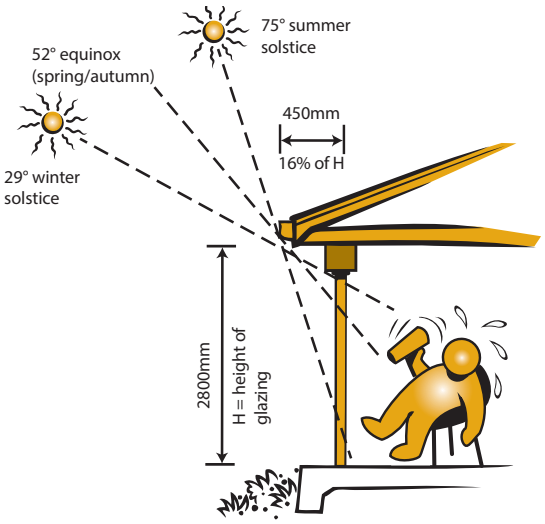
Due to the sun's high angle in summer, shading can be horizontal and fixed. To provide full shading from late October to late February in Melbourne, the depth of the horizontal overhang should be approximately 45% of the vertical height to be shaded, measured from the window sill to the underside of the shading device. This depth represents a good compromise between shading in summer and winter solar gain. Fixed horizontal shading can be provided through structures, such as eaves, awnings, pergolas and verandas. Adjustable external shading devices are also an option for north facing glazing, however they rely on the occupier understanding when to operate them for maximum benefit.

East and West:

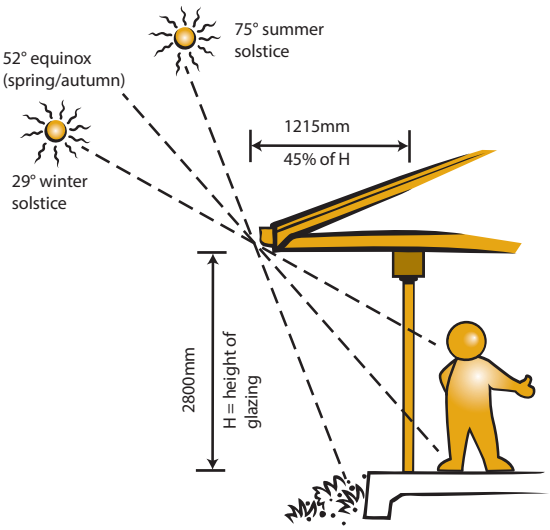
Even in summer, eastern and western facades are exposed to relatively low sun angles. On 21 December (mid-summer), eastern and western sun angles remain below 60°. Due to those low sun angles, normal fixed horizontal sun shading becomes ineffective. Therefore adjustable shading devices are recommended. These include (horizontal or vertical) canvas blinds, conventional or roller shutters, angled metal or timber slats and shade cloth over pergolas. The flexibility will allow occupants to respond to different seasons and individual comfort levels. Furthermore, well designed flexible shading will contribute to a building's architectural appearance and meet occupant's privacy requirements.

South:

In Australia, southern facades receive very little direct sunlight. Only in mid-summer will some low angled sun hit a southern facade, in the morning and evening. Therefore it is not required to provide external shading devices. However, when a building has an overheating problem, a flexible shading installation on the southwest can be an valuable addition. Nevertheless, internal glare protection should be provided, especially for working environments.

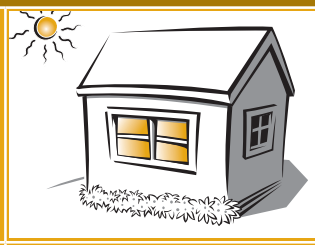
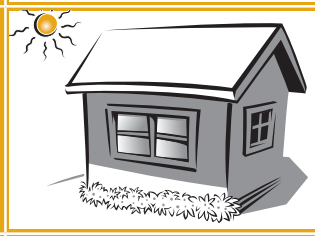
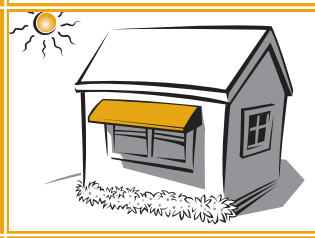
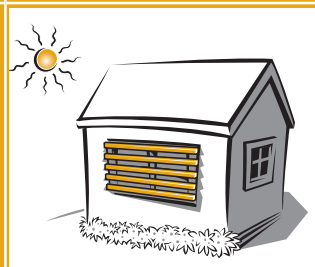


Example of not enough overhang on north facing window

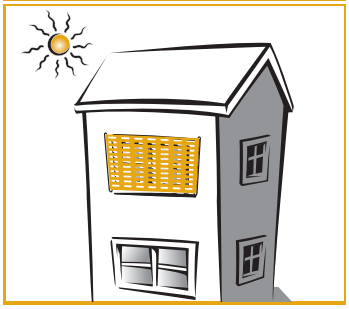


Rule of thumb for sizing north facing window overhangs

Comparing different external shading devices

Sunshading Description	Benefits and limitations	
No Shading device Relies solely on the thermal performance of the window and glazing system to prevent heat transfer which is usually the building's weakest point. Internal blinds will be minimally effective.	• Not effective • North: Good during winter Not good during summer • East/West: Good during winter Not good during summer	
Integrated or 'built in' sunshading The sunshading is usually integrated into the design of the building such as an eave, overhang or balcony which cannot be easily removed and is considered within the overall design of the building.	• Moderately to very effective • North: Ideal if designed at 45% rule • East/West: Will have some impact but is not optimal	
Fixed horizontal projection The sunshading is commonly fixed above the glazing to the building's facade. If designed to the 45% rule for Melbourne it will effectively shade the glazing during summer and allow for the sun to penetrate through the building envelope in winter.	• Moderately to very effective • North: Ideal if designed to 45% rule • East/West: Will have some impact but is not sufficient	
Fixed horizontal battens Timber, aluminium or other material battens are placed at carefully considered spacings across the glazing and fixed to the façade. This can be very effective if designed to the 45% rule for the battens and spacing.	• Moderately to very effective • Can prevent overlooking • Will reduce daylight penetration • North: Ideal if designed to 45% rule • East/West: Will have some impact but is not sufficient	
Adjustable devices Adjustable shading devices are typically roller blinds, sliding screens or shutters which commonly are constructed in timber, aluminium or shading fabric and are either integrated into the building fabric or are fixed to the external façade. These can be manually operated or automated and allow for the occupant to easily control their thermal comfort.	• Very effective • North: Good option if the user operates the shading device at the right times, i.e. closing shutters on summer days to reduce heat gains and having shutters open on winter days to capture wanted solar energy • East/West: Ideal to control eastern and western solar gains. However, as per north orientation, it relies on occupant awareness to function as intended	
Fixed vertical fins or battens Vertical elements cover the glazing and are fixed to the building's facade. These elements typically provide shading for one direction. Installed on west facing glazing, they block most western sun. However, spacings and angles are important as protection will be at its least when the sun is parallel to the device's angle.	• Moderately to very effective • Can prevent overlooking • North: Moderatly effective as is will not protect glazing at optimal times. Midday sun will strike the glass which is good in winter but undesirable in summer • East/West: Very effective	

Comparing different external shading devices cont.

Sunshading Description	Benefits and limitations	
Adjustable vertical fins/battens Adjustable vertical elements, such as sliding shutters or rotating fins which are placed across the glazing. These can be manually or automatically operated to protect the glazing at optimal times.	• Very effective • North, East & West: Very effective if adjusted according to the changing seasons and sun angles	
Fixed perforated screens Perforated screens or meshes will provide varying levels of shading to the glazing, depending on their percentage of transparency. Patterns can be generic or custom designed to suit different applications.	• Moderately effective • Can prevent overlooking • Will reduce daylight penetration • North, East & West: Moderatly effective as commonly too little heat gain is prevented in summer and too little heat gain is possible in winter	

> "It is amazing what a difference the installation of external blinds made. In summer we just keep them closed during the day, which means when coming home in the evening the house is still comfortably cool. In the past we had to turn on the air conditioning units and wait at least half an hour before temperatures became comfortable. Not to mention the electricity costs associated with relying on air-conditioning."

Mandatory Requirements and Council's Design Advice

Mandatory requirements

- NCC Part 3.12 and Section J shading to walls and windows.
- Overlooking in clauses 54 and 55 of the Victorian Planning Provisions (VPP). 54.04-6 and 55.04-6 Overlooking Objective.

Confirm these requirements before lodging your planning permit.

Council's Design Advice

A window and shading design that balances undesired heat gains in summer and desired heat gains in winter and also maximises daylight penetration throughout the year.

Show on Planning Application Drawings

External fixed and flexible shading devices.

Where can I find out more?

How to shade windows for summer
Sustainability Victoria
www.sustainability.vic.gov.au and

Shading
Your Home
www.yourhome.vic.gov.au

External shading devices
Ecospecifier
www.ecospecifier.org

Other Fact Sheets in this series are also available to provide guidance on the 10 Key Sustainable Building Categories. For further information on Sunshading, consider the fact sheets entitled:

- Indoor Environment Quality
- Energy Efficiency
- Urban Ecology