

EXTERNAL SHADING DEVICES

External shading devices, such as eaves, awnings, and verandahs, play a critical role in reducing unwanted solar heat gain, especially in cooling-dominant climates and during summer in temperate climates. Shading devices work firstly by restricting unwanted direct solar radiation through windows. Secondly they assist by reducing the direct heating of walls. External shading devices are the most effective way to control solar heat gain.

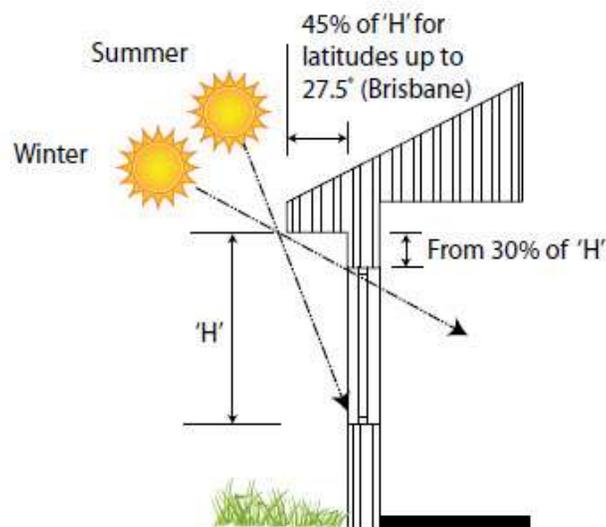


FIGURE 3.12
North-facing shading for passive heating in heating-dominant climates.

As discussed under the High-Performance Glazing Section, passive heating in heating-dominant (temperate and alpine) climate zones relies on maximising solar heat gain from north-facing windows in winter. However sufficient shading must exist on the north, east, and west facades to block out unwanted heat in summer.

For north-facing facades in locations south of Brisbane (latitude 27.5°) this shading can be successfully achieved with eaves or fixed horizontal overhangs at the top of the wall or window as illustrated in Figure 3.12. The short eaves block out the sunlight in summer due to its more vertical angle of incidence, but allow entry of sunlight in winter due to its more horizontal angle of incidence.

The eastern and western facades of a building receive large amounts of sunlight in the early morning and late afternoon, respectively, and are therefore more suited to adjustable shading devices such as awnings, roller shutters and louvres. In heating-dominant climates adjustable shading also allows for full solar gain on eastern and western windows during winter, and variable levels in spring and autumn.

In cooling-dominant climates at low latitudes (tropical and hot and dry) full shading, where practical, on all sides of the building facade is necessary to minimise heat gain all year round. This can be achieved with fixed awnings, verandahs or deep overhangs.

Benefits

External shading devices provide the following benefits:

1. Reduced peak cooling requirements, with reductions in annual cooling energy demand of up to 15% ⁴⁶
2. Reduced glare and improve visual comfort, leading to increased satisfaction and productivity;

Implementation Recommendations

Residential

As required in each individual case, adjustable awnings are proposed for all exposed east-, west-, north-east-, and north-west-facing windows in all climates, except cooling-dominated climates (Zone 1 and 3) where fixed awnings on all exposed walls are proposed.

Education

For education buildings without appropriate shading it is proposed to add fixed awnings to north-facing windows of length 600 mm or with the shading ratio as illustrated in Figure 3.12, and 300 mm fins to east- and west-facing windows.

Retail

High-street retail buildings (also known as strip shopping centre buildings) normally have awnings or walkways in place on their street frontage, however where these do not exist, fixed or adjustable awnings should be added.

Shaded walkways should also be added to neighbourhood centres and big box retail buildings where they do not already exist above glazed areas.

Office

Older or low-rise offices with masonry cladding can benefit from fixed external awnings to reduce solar heat gain.

However, it is difficult to retrofit shading elements to the outside of existing curtain wall buildings without costly and inconvenient structural changes to the facade. Internally applied selective low-e films are proposed for these building types.

Other non-residential

A range of other building types, including food retail, accommodation, and warehouses could all benefit from the addition of shading devices. However, there is limited data on the extent to which they are already shaded, so no shading retrofit strategy has been proposed for these building types. Awnings need to be installed with sufficient space between the window and the awning to ensure heat does not build up in the cavity.

Costs

Shading and blind installation must be adapted to the window measurements of each building type. Companies offer free measurement and quote for purchase and installation and therefore calculation of costs must be undertaken on a case-by-case basis. Table 3.7 provides costing to provide insight into potential costs.

Product issues and development

TABLE 3.7

Shading material costs

Window covering	Installed Cost per square metre	Estimated Labour Cost per square metre
Blockout curtains	\$20 - \$50	\$20
Pelmet	\$20	\$10
Awnings	\$100 - \$150	\$15

The installation of shading on commercial buildings varies widely between individual buildings depending on location, surroundings, design, climate, etc. It is recommended that shading be incorporated in new buildings and where possible implemented into existing buildings, taking into consideration the following:

- The specific location and design of the building
- Wind loads due to wind tunnels, building height and other effects
- Potential wind noise problems with certain types of shading such as canvas awnings
- Prevention of reflected heat or glare into surrounding buildings
- Ongoing maintenance – one of the main reasons external shading is currently not used in many buildings

- Day lighting and winter heating needs to be balanced with shading.

Other Service Upgrade Options

Trees can be used to provide effective shading. However, they have not been considered as part of a national retrofit package in this plan.

Source: <http://decarboni.se/publications/zero-carbon-australia-buildings-plan/2-improving-thermal-performance-building-envelope>