

Built shade materials and structures

Select materials that offer the highest ultraviolet radiation (UVR) protection rating where possible.

A variety of materials, from opaque materials such as steel to translucent materials such as poly-carbonate and a variety of fabrics, may be suitable for your structure, depending on the purpose.

Choosing materials

- Select the highest possible ultraviolet protection factor (UPF) within the available range for your material.
- Check that the UPF is stable and guaranteed over the entire life span of the material. You need reliable and consistent UVR protection.
- Choose a material that limits the reflectance of indirect UVR – select darker colours, textured and matte surfaces. Soft rather than hard surface finishes limit reflectance more effectively.
- Consider the surroundings, the location and the type of strains the material may be subjected to, including the possibility of vandalism or misuse.
- Consider level of cost and skill required for cleaning and general repairs. Set manageable maintenance and repair requirements.

Compare the sun protection related properties of different materials—see the comparison table on page 3.

Fabrics

- Must have UPF of 10 or over
- There should be no visible holes/gaps in fabric; the weave needs to be as tight as possible
- Select darker colours/tones
- Choose the highest quality you can
- Consider the effect of stretching the fabric; make sure that does not reduce UVR protection.

General structures

- Make sure foundations suit soil type/ground conditions.
- Balance initial construction costs with long term operation and maintenance costs.

Your shade system, including the materials you choose and your design recommendations, should be structurally appropriate for the climate and the weather extremes of the location:

- Consider the macroclimate and the site conditions when designing your solution.
- Check wind codes and building codes so your structure resists wind and rain loading and meets appropriate standards.

When designing your solution refer to the [Shade design factors to consider for limiting UVR](#).

Fabric structures

Fabric structures need to be suitable for the site. Consider:

- Safety:
 - Does it involve guy ropes that may result in a trip hazard?
 - Is electricity provided? Make sure it is bonded/ earthed correctly, especially if it is near a pool.
- Finishes and component parts:
 - Are they suitable for the application and location? e.g. corrosive environments such as pools require careful design consideration.
- The likelihood of vandalism or misuse.

If your structure is temporary, consider:

- Ease of operation—setup should require a minimum number of people
- Safety in operation
- Storage—can it be safely stored out of season? You should also consider how storage impacts longevity and the possibility of vandalism.

'Off the shelf' structures

There are many ready-made solutions available, which still need to be assessed for suitability and sun protection. Ask about:

- The lifespan of UVR protection and the lifespan of the product itself. Is it flexible enough to adapt to future needs if that is a requirement?
- How the structure meets regulatory requirements
- Australian building standards:
 - The design, construction and materials need to conform to relevant standards.
 - The design should be certified by a qualified structural engineer
- Maintenance implications—are repairs affordable? Are parts readily available? Can the structure be maintained with a minimum of specialist labour and equipment?

When choosing your supplier, think about:

- Lead time for ordering and delivery of the structure
- Warranty conditions—some warranties cover re-supply of defective materials but do not cover the costs of labour to put materials back in place
- Inspecting previous work completed by the company. Has it performed well over time?
- The supplier's quality assurance certification.

Source: Queensland Health (1997) *Shade for Public Pools - Planning Sun-safe Outdoor Environments in Queensland*, p 132-147.

Comparison table

Compare properties of different materials that are commonly used for the development of built/constructed shade structures.

Type of Material	Suitability	Approximate Ultraviolet Protection Factor (UPF)	Waterproof	Light transmission	Solar heat gain	Structural implications	Lifespan	Maintenance requirements
Glass	Good windbreak where visibility and light are required	Depends on thickness. House window glass absorbs 90% of UVR	Yes	High depending upon presence of tinting	Less heat gain if tinted	Need to select glass appropriate to the site	Long life if it does not sustain impact	Needs regular cleaning
Polycarbonate and fibreglass sheeting	Roofing, walling louvre, awning, skylights, canopies	Very high	Yes	High - but varies according to thickness, colour and profile	High	Need to incorporate wind uplift considerations into design	About 10 years Discolouration may occur sooner	Low maintenance impact resistant
Canvas/tightly woven cloths	Good for small, low-budget jobs	Very high when new, lower if material deteriorates over time	Yes, watertight up to saturation point	Light colours allow more light	Dark colours are hotter	Guy ropes (if present) can cause obstruction	Limited. Susceptible to breakdown due to UVR exposure	Without specific treatment is not mould resistant
Knitted polyethylene or woven PVC shade cloth	Canopies	Moderate UVR protection. Double knits or double layers may give higher protection	Porous, lacks rain protection	Light colours allow more light but reflect and scatter more UVR	Darker colours are hotter but reflect less UVR	Wind drags through porous material	5-10 years	Susceptible to mould growth and dirt accumulation
Timber	Pergolas, Trellis, screens	Very high. Direct barrier to UVR	Depends on detailing and use	Depends on detailing	Does not conduct heat	Need to incorporate wind uplift consideration into design	Long life if maintained well	Guard against termites
Steel roof sheeting	Roofing, walling. Steep or low pitches	Very high. Direct barrier to UVR	Yes	No light transmission	High if not insulated	Need to incorporate wind uplift consideration into design	Long life if maintained well	Subject to moisture and condensation conditions