SOLAR ABSORPTANCE FACTSHEET



This factsheet will focus on **optimising energy efficiency** through solar absorptance, as well as its association with the Urban Heat Island (UHI) Effect.

The Solar Absorptance (SA) of a surface is the fraction of the sun's radiation that the surface absorbs. Roofing materials are classified using a solar absorptance value ranging from 0 to 1. **Higher values indicate the surface absorbs a larger amount of solar radiation.**

Roof tiles have excellent thermal mass and thermal lag properties, allowing for optimal performance in all climates. Using roof tiles with lower solar absorptance values in naturally warmer climates will optimise a building's energy use through reduced cooling costs. The opposite also holds true in cooler climates.





Concrete Roof Tiles

Terracotta Roof Tiles

Figure 1: Warranty periods for Terracotta and Concrete Roof Tiles within 100m-200m of breaking surf or exposed areas (refer to manufacturer).

Colour	Solar Absorptance Value
Dark Grey	0.85
Red, Green	0.70
Dual Silver	0.65
Light Grey	0.55
Yellow	0.45
Off White	0.35
Light Cream	0.30

Table 1: Typical Solar Absorptance Values for Tile

 Colours



Figure 2: Embodied Energy Costs of Typical Roofing Materials

DURABILITY AND MAINTENANCE	Roof tiles hold warranty periods up to 50 years*. This reflects their performance over other roofing materials, being able to retain their true colour longer. Concrete tiles get stronger with age, whilst clay tiles do not fade in colour.
	The high thermal mass and thermal lag of roof tiles help to regulate and distribute the absorbed heat overtime, stabilising temperatures passively. This keeps the building cool during the day and warm at night reducing energy costs . Combined with the right value for solar absorptance and a suitable profile guarantees a comfortable home.
	Roof tile's thermal lag properties release heat overtime which help to reduce sharp spikes in temperature associated with the UHI Effect. Choosing a lighter colour and an appropriate roof profile also contributes to mitigating the UHI Effect.
REDUCED CARBON FOOTPRINT	Tiles are made through naturally occuring ingredients which have relatively low embodied energy reducing carbon emissions. Passively regulating heating and cooling by selecting the right roof tile also helps lower associated carbon emissions generated by lower energy consumption.



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SOLAR REFLECTIVE INDEX (SRI)

A Solar Reflective Index (SRI) Value ranges from 0-100 and can be obtained from your roof tile manufacturer. It indicates how hot the material can get, with lower values suggesting a higher heat capacity and higher values associated with a lower heat capacity. Similar to Solar Absorptance, when the SRI value is taken into consideration with the superior thermal properties of roof tiles, you can optimise the energy efficiency of the building through passive design. Over time, the SRI value tends to fluctuate due to local environmental conditions. A 3-year aged SRI value scales the roof tile's design SRI data over 3 years to obtain realistic figures. For optimal performance roof tiles should have:

- low 3-year SRI values in cooler climates; and
- high 3-year SRI values in warmer climates



Figure 3: Effect of Solar Radiation on a Roofing

URBAN HEAT ISLAND EFFECT

An Urban Heat Island (UHI) is an urban area which is significantly warmer than its rural surroundings due to the human impact of infrastructure developments. As darker coloured surfaces will absorb more solar radiation, this can consequently affect its surrounding environment, especially in warmer climates. Roof tiles help to combat the effect of UHIs by regulating temperature output through thermal lag. When used in accordance with a sensible SA or SRI value, it helps to mitigate the UHI Effect by radiating consistently cooler temperatures to local surroundings.



