CASE STUDY

Cool Roof Commercial (White)

COOL ROOF™ With InfraCOOL® Technology

BACKGROUND:

- Due to their large surface area and angle of exposure, roof surfaces can capture large amounts of the sun's total light energy (including visible and infrared radiation)
- Reflecting the sun's energy before it is absorbed helps to prevent surfaces 'super-heating' or getting warmer than the ambient temperature
- Heat absorbed though roof surfaces can penetrate insulation and heat the spaces below.
- Dulux® Cool Roof Commercial (White) reflects up to 90% of the sun's total light energy, maximizing reflection of both visible and infrared radiation, and provides maximum roof surface cooling efficiency.

COOL ROOF BENEFIT:

- ASTM E1980-01: Solar Reflectance Index is the internationally accepted test method for estimating the surface temperature cooling benefit of heat reflecting paint technology when compared with standard paint colours and uncoated surfaces
- ASTM E1980 comparisons assume a constant air temperature (37°C), solar conditions (Solar Flux = 1000 W/m^2) and use a mathematical equation for calculating a Solar Reflective Index (SRI) and estimated surface temperature, based on the measured Total Solar Reflectance (TSR) and Thermal Emittance of the surface.
- ASTM E1980 estimated surface temperatures are reported at three different wind speeds, as wind speed affects the rate of cooling of a surface.

DULUX ACRATEX® COOL ROOF COMMERCIAL PERFORMANCE COMPARISON:

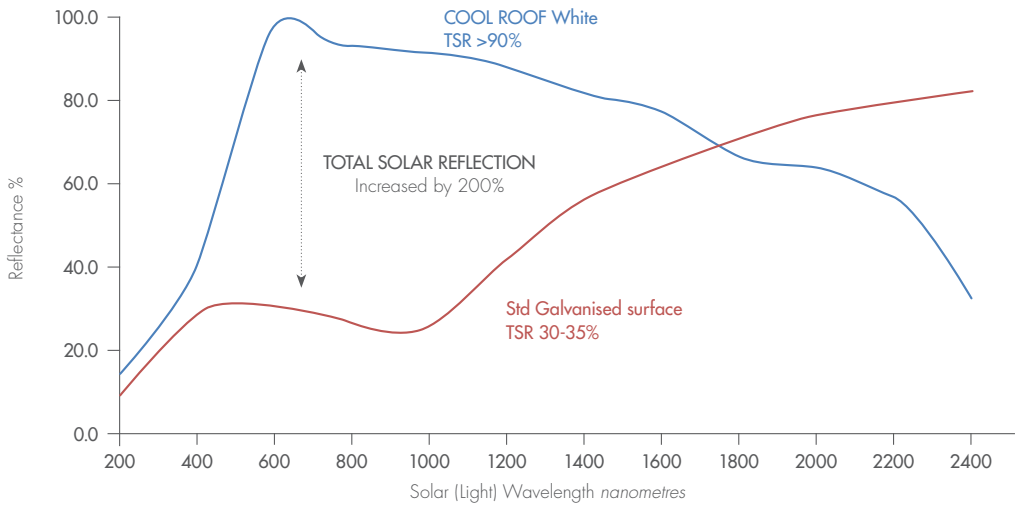
- ASTM E1980-01 estimates *Dulux AcraTex* Cool Roof Commercial (White) to be 38°C cooler than a weathered Zincalume® surfaces and 44°C cooler than a weathered galvanised iron surface under medium wind conditions.

Total Solar Reflectance (TSR) and Thermal Emittance are measured and then used to estimate the surface temperature		Weathered *Zincalume*			Weathered* Galvanised Iron			*Dulux AcraTex* Cool Roof Commercial (White)		
Total Solar Reflectance (TSR) (Reflectance of light across the broad solar spectrum including visible (colour) and invisible (infrared) radiation.)	ASTM C1549 (% TSR)	40			30-35			90		
Thermal Emittance (The ability of a material to release captured heat energy. The higher the number the faster the heat is released.)	ASTM C1371 (0-1 scale)	0.26			0.26			0.88		
ASTM E1980 uses a mathematical formula to calculate Solar Reflective Index (SRI) and estimates surface temperature at three different wind speeds, based on Total Solar Reflectance (TSR)		ASTM E1980 defines three different wind speeds (Low, Medium, High). (Medium wind speeds are typical in Australia.)								
		Low	Medium	High	Low	Medium	High	Low	Medium	High
Calculated Solar Reflective Index (SRI) (Relevant to wind conditions)		-18.6	11.0	29.1	-35.5	-2.7	17.4	113.0	113.1	113.2
Estimated Surface Temperature (Maximum relevant to wind conditions)		115.0	78.0	55.0	124.0	84.0	58.0	42.0	40.0	38.0
Predicted benefit of *Dulux AcraTex* Cool Roof Commercial (White) with InfraCOOL® Technology based on ASTM E1980-01. (Difference between coated and uncoated surface temperature at each wind speed.)		73.0	38.0	17.0	82.0	44.0	20.0	-	-	-

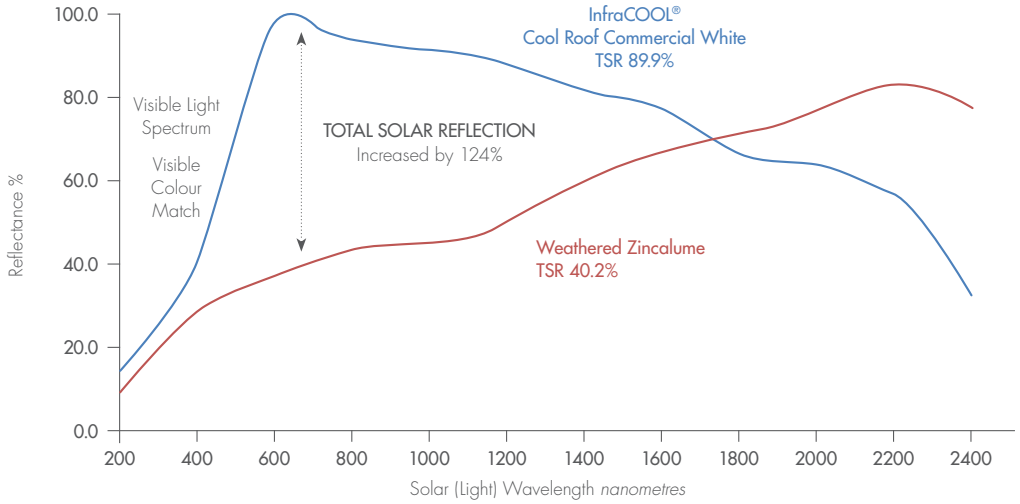
*A greater range of reflectance is typically found in older galvanised iron roofs.

TOTAL SOLAR REFLECTANCE:

- ASTM E903: Solar Absorptance Test Method is the internationally accepted method for calculating Total Solar Reflectance (TSR) and Spectral Reflectance.
- Using ASTM E903 Spectral Reflectance of two surfaces can be compared at individual wavelengths from 200-2500 nanometers.



Comparison of Spectral Reflectance of Cool Roof and Galvanised Iron



Comparison of Spectral Reflectance of Cool Roof and *Zincalume*

INTERPRETATION:

- Similar reflectance in the visual region (200-700 nanometres) indicates that the surfaces are of a similar colour.
- Diverging reflectance in the infrared region (700 – 2000 nanometres) indicates that the surfaces reflect infrared wavelength to different degrees.
- *Dulux AcraTex* Cool Roof Commercial (White) increases the Total Solar Reflectance of a weathered galvanised iron surface up to 200%.
- *Dulux AcraTex* Cool Roof Commercial (White) increases the Total Solar Reflectance of a weathered *Zincalume* surface by over 100%.
- The largest proportion of solar energy arrives in the invisible near-infrared range (between 700nm and 1400nm). The effect of solar wavelength on heat gain diminishes at longer wavelength (ie. above 1400nm).

Notes: Refer to *Dulux* Duspec specifications for full details on surface preparation and coating systems for the applicable substrate and substrate condition.

Refer to *Dulux AcraTex* Cool Roof Commercial brochure for further product information.

Visit **acratex.com.au** for full product and system information.
For general enquiries call **13 23 77**

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