

# Colorbond® Steel With Thermatech® Solar Reflectance Technology -Year-Round Climate Control

Average temperature in the world has increased over the last few years. The frequency of hot days and nights has increased and is likely to continue to be so. It is creating stressful, unhealthy, and unproductive working conditions. These conditions are more common in cities, where urban heat islands (UHIs) are caused by the intensity of non-reflective, high mass materials that absorb a comparatively large proportion of solar radiation. There is a need for alternatives to mechanical air-cooling solutions to reduce energy demand & related greenhouse gas emissions.

To address the issue, BlueScope R&D team has introduced COLORBOND® steel with Thermatech™ Solar Reflectance Technology shows the brand's enduring qualities - innovative, superior, cutting-edge and trend leading. With Thermatech™ technology, we are helping to create a future that is comfortable not just for people, but for the environment too. Combined with COLORBOND® steel's renowned durability, colour retention and flexibility, you now have the power to shape the landscape to suit your business objectives, vision and conscience.

Thermatech™ technology is a solar reflectance technology incorporated into COLORBOND® steel without changing its appearance. It lowers surface temperature by absorbing lesser heat from the sun. In other words, COLORBOND® steel with Thermatech™ technology is able to

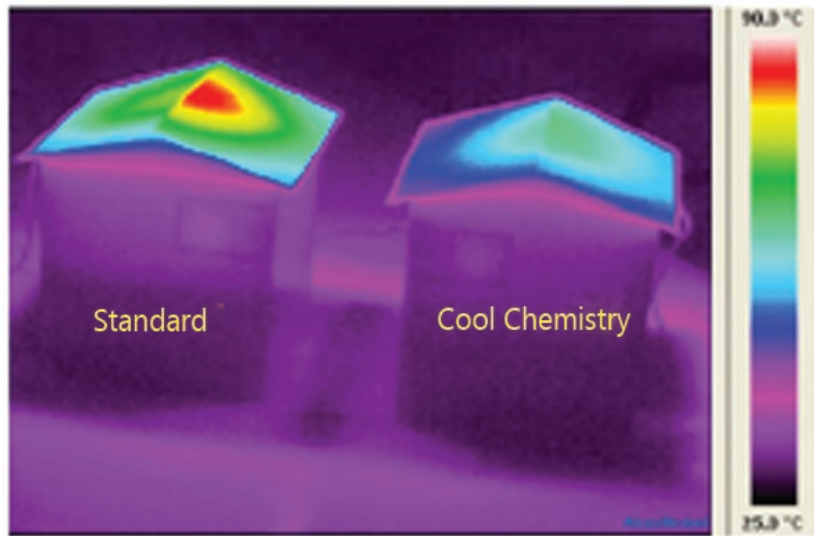


Figure 1

reflect more solar heat, thereby keeping both roofs and buildings cooler ( fig 1 ). Reduced heat stress also means greater durability for entire roofing systems and superior ROI. Thus, Thermatech™ solar reflectance technology ensures cool comfort, while reducing energy cost.

### The Fact: Thermal Performance for School Buildings

Most people can relate to an experience of oppressive summertime heat in a classroom where the air-conditioner has struggled or there was no air-conditioner present. It is hardly conducive to good learning outcomes. Good design can avoid these scenarios and also lead to reduced

energy costs and positive environmental outcomes.

One of the main factors that makes a school building different from a home is that it is predominantly occupied during the day. Therefore it is important when designing a school building that it performs well on hot days, and – in a climate-constrained world – minimises energy use on mechanical cooling. For this reason choosing materials with high solar reflectance to minimise the impact of heat absorbed from the sun is important. BlueScope Steel has recognised this and developed Thermatech® solar reflectance technology. The inclusion of this technology has increased the solar reflectance of

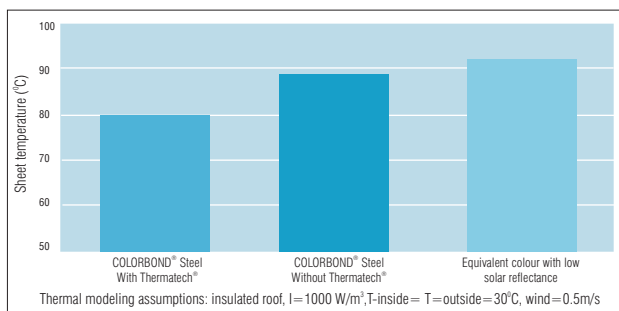


Figure 2: Roof Sheet Temperature on a Hot Day - Woodland Grey® COLORBOND® steel

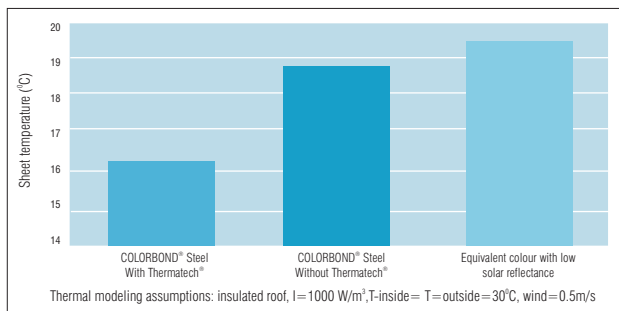


Figure 3: Peak Cooling Load Through Insulated (R3.3) Roof - Woodland Grey® COLORBOND® steel

all colours in the standard COLORBOND® steel palette, with an average increase of about 5%. When compared to similar colours of lower solar reflectance the difference is much greater. Thermatech™ allows you to choose from a range of attractive colours, with the knowledge that the colour has been optimised to provide the best outcome, with regards to energy efficiency and durability with all of the attributes expected from COLORBOND® steel.

The graphs in this article provide an indication of the benefits for school buildings from Thermatech™ when choosing the roof colour Woodland Grey.

The inclusion of Thermatech® increases the solar reflectance of Woodland Grey by about 15%.

This will keep the roof up to 10°C cooler (even cooler when compared to similar colours of low solar reflectance) which will assist in keeping the building cooler and reducing the need for air-conditioning. Studies have shown that in moderate to hot climates the energy savings from increased roof solar reflectance through changing from a dark solar absorptive roof to a light solar reflective roof vary from about 10% to 50%<sup>1</sup>. The savings depend upon factors such as the climate, the building shape and form, the level of insulation and the usage of the building. As school buildings are predominantly occupied during the day, combined with their often high roof to wall ratio, they typi-

cally derive high-energy savings. This would translate to possible cooling energy savings approaching 12% through the inclusion of Thermatech™ for Woodland Grey (15% when compared to roofing materials of similar colour of low solar reflectance).

Increasing roof solar reflectance reduces peak cooling loads on air-conditioning equipment. The inclusion of Thermatech™ will reduce the peak cooling load from an insulated (R3.2) Woodland Grey roof by about 2.6 W/m<sup>2</sup>. This will place less strain on the air-conditioning equipment or for a 1000 m<sup>2</sup> conditioned school building, allow equipment downsizing as a result of a 2.6kW reduction in load.

A study of two similar schools, identically coloured, with the only difference being the solar reflectance of the roof demonstrates the large savings possible from using materials with high solar reflectance. The study was conducted in Georgia, USA in a subtropical climate, with hot summers, not unlike Australian coastal regions north of Brisbane and very cold winters, not unlike Hobart. The study showed that the higher solar reflectance roof, resulted in cooling savings of 13% (when heating was included the annual energy saving was about 9%<sup>2</sup>).

Lawrence Berkeley National Laboratories have been studying the value of high solar reflectance roofing on climate change. They have recently quantified

that the reduced warming provides an equivalent offset of about 1 tonne of CO<sub>2</sub> for every 10 m<sup>2</sup> of roofing that has its solar reflectance increased by 40%. This equates to 2.5 kg.CO<sub>2</sub>-e/m<sup>2</sup> per % change in solar reflectance. On this basis the inclusion of Thermatech™ for Woodland Grey has an offset value of about 37 kg.CO<sub>2</sub>-e/m<sup>2</sup> or 37 tonne for a 1000 m<sup>2</sup> school building. Of course when the direct energy savings are included, the net CO<sub>2</sub> emission reductions due to Thermatech™ are even greater.

High solar reflectance roofing also offers other benefits as a result of reduced warming of the local environment (urban heat islands). This translates to reduced cooling loads on other buildings. Choosing high solar reflectance materials for school buildings throughout all but the coldest parts of Australia is entirely appropriate. Choosing COLORBOND® steel with Thermatech™ provides peace of mind that your chosen colour has been optimised to provide the best sustainability and any energy efficiency outcomes. ♦

**For further details:**

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**RIDOT Employs Accelerated Bridge Construction Techniques for Rapid Replacement of Key East Bay Bridges**



Rhode Island Department of Transportation (RIDOT) officials adopt accelerated bridge reconstruction project for the East Shore Expressway and McCormick Quarry bridges in East Providence. The bridges serve as a vital link in Rhode Island's highway system. Both bridges have structural deficiencies that cannot be addressed without a complete replacement. Accelerated bridge construction is a technology or practice that is well-established in most of the states. RIDOT is putting in place the quick replacement of a bridge, which is based on prefabricated components, specialized equipment and very tight coordination between the client, the designer and the contractor. The concrete members can be fabricated in a controlled plant environment with reduced dependency on the weather, and it leaps right over the construction intensity of forming, rebar placement, concrete placement and curing at the bridge site itself. It is a huge machine that moves the superstructure onto the existing infrastructure, and through the laying in of the component to the correct level and alignment is undertaken with the ordinary high care, the whole process is essentially one of plug and play. RIDOT officials believe this is an excellent alternative to traditional bridge project delivery and should be considered one for the many possible ways to update the infrastructure.

Image: youtube.com