

## COLORBOND® steel with THERMATECH™ Technology offers Cool Comfort than equivalent conventional roofing material

India has witnessed significant strides in the e-commerce space during the last few years. World class retailers derive their efficiencies from their warehousing and logistics capabilities that are very critical to their business. Ensuring their goods remain safe inside the building is a top most concern for every warehouse owner. Selection of the right roofing and walling material for warehouse building is very imperative, as roofing and wall cladding is one of the principle building components that provide longevity of the building and protection of goods in rains and extreme weathers. Hence it is highly critical to select the right material that would ensure longer life, low maintenance, greater thermal comfort, high flexibility on design and aesthetics etc. for a warehouse.

Average temperature in the world has increased over the last few years, creating stressful, unhealthy, and unproductive working conditions. It is highly critical



*THERMATECH™ Solar Reflectance Technology*

for warehousing company to have adequate inside temperatures to ensure goods remain intact without loss of quality.

Tata BlueScope Steel, in its constant endeavour to offer its patrons with innovative solutions has introduced THERMATECH™ Solar Reflectance Technology incorporated in its COLORBOND® Steel.

## What is THERMATECH™ Solar Reflectance Technology?

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 reflect more solar heat, thereby keeping both roofs and buildings cooler. 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. Thermal reflectivity of painted products varies color to color, very dark and bright color fade fast and have more heat radiated inside the building. COLORBOND® steel are complying the LEED (Leadership in Energy and Environmental Design - SRI value > 78 in low slope and SRI value >29 in steep slope building) credits. We suggest to always go with earthy colors to keep building newer for longer as it content stable inorganic pigments and has higher solar reflectance value.

The preference to cladding material typically given based on cost of the material, its durability and aesthetics value. In industrial and applications, height of the shed is more, the bare (un-painted) coated steel sheets are preferred for roof and pre-painted steel is preferred on wall cladding. The pre-painted steel has better SRI value than the unpainted products, Higher SRI value means building will have better cool comfort inside

the buildings. Most of the owners miss this opportunity when they uses unpainted steel sheet on roof. Tata BlueScope Colorbond® steel cladding material has THERMATECH™ solar reflectance technology, can reduce the temperature inside the building by up to 6 0C in hot weather (depending upon the level of insulation already installed), thus reducing the need for air conditioning. In moderate to hot climates, it can reduce annual cooling energy consumption by up to 15% compared to roofing materials of similar colour with low solar reflectance. (The average reduction is about 5%: results will differ depending on the level of insulation, building shape and function). The technology helps mitigate the Urban Heat Island (UHI) effect.

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

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## 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 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 below graphs (Refer Fig. 1) provide an indication of the benefits for school buildings from Thermatech™ when choosing the roof colour Woodland Grey.

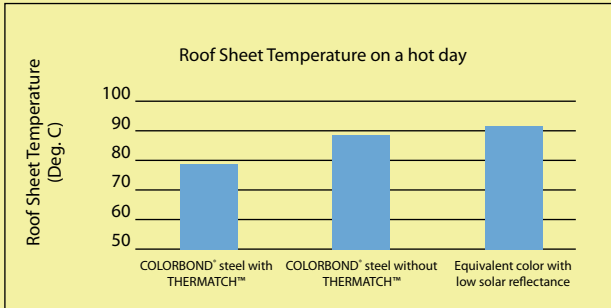


Fig. 1 Thermal modelling assumptions: Insulated roof, I-1000 W/m<sup>2</sup>, T-inside=Outside=30° C, wind : 0.5m/s

\* Test conducted on COLORBOND® XRW steel Woodland Grey Color

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%. 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 typically 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. Refer Fig. 2).

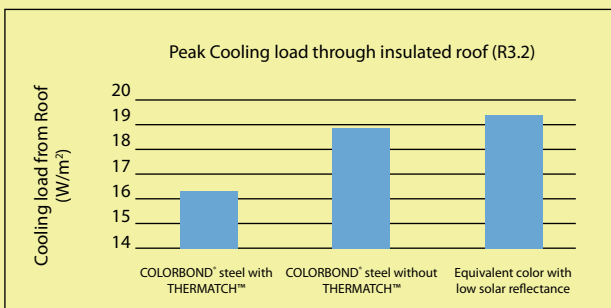


Fig. 2 Thermal modelling assumptions: Insulated roof, I-1000W/m<sup>2</sup>, T-inside= 30° C, T-Outside =40° C, wind : 0.5 m/s

\* Test conducted on COLORBOND® XRW steel Woodland Grey Color

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 2.6 kW 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, similar to extreme climatic conditions experienced in India. 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%).

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.

Reference :

1. Akbari H, Konopacki S and Parker D, Updates on revision to ASHRAE Standard 90.2: Including roof reflectivity for residential buildings, Proceedings of the ACEEE summer study on energy efficiency in buildings, 2000.
2. Cool update – Selling a green roof, Metal Roofing, April/May 2006 [http://www.coolmetalroofing.org/elements/uploads/news/TMI\\_CaseStudy\\_11.pdf](http://www.coolmetalroofing.org/elements/uploads/news/TMI_CaseStudy_11.pdf)
3. Akbari H, Global cooling: Increasing worldwide albedos to offset CO<sub>2</sub>, 5<sup>th</sup> Annual California Climate Change Conference, Sacramento, CA 9 Sep 2008.

