

THERMOBOND

Keeps you cool - when the heat is on!

HRC

Product Information

The Simple Stuff:

Shieldcoat's **Thermobond HRC** (heat reflective coating) keeps you cool when the heat is on by reflecting solar infrared and visible rays that cause the build up of heat in roof cavities creating more comfortable interiors. It is cost effective, attractive, easily maintained, environmentally friendly and available in white and most pastel colours. Thermobond HRC is one of the most advanced, high performance acrylics available on the market today utilising only the best available raw materials in production to ensure it will easily last beyond its 10 year guarantee.

Thermobond HRC was formulated for optimum performance over all roofing substrates including:

- Colorbond
- Bare Galvanised Iron
- Cement Tiles
- Decramastic
- Fibro
- Cement Sheeting
- Masonry

This makes it suitable for **domestic** and **commercial applications** such as houses, steel garages, sheds, industrial sheds, caravans, patios, farm sheds, pipelines, storage tanks and more. Its environmentally friendly ingredients make it ideal for use on roofs used to **collect drinking water** as well!

Roofs are the most exposed areas on a building and are especially responsible for heat re-radiation into ceiling cavities and flat roof buildings due to the poor insulative qualities of most roofing systems. As a consequence the inside air temperature gets a lot hotter than the outside air temperature, creating a "hot" house effect.

Coating a roof with Thermobond HRC will prevent heat re-radiation into ceiling cavities and buildings thus creating more **comfortable interiors**.



SHIELDCOAT PTY LTD

Your Solution

Example:

On a sunny summer's day where the ambient air temperature is 31°C, your ceiling cavity temperature can reach as high as 55°C-60°C. Once Thermobond HRC is applied the cavity will reach only 35°C-38°C, just a few degrees above outside ambient temperature. Then, if the overnight air temperature is lower, (as it usually is) the ceiling cavity will actually remain cooler than the outside air temperature, creating a "cool" house.

Thermobond HRC is made up of an **highly UV resistant** pure acrylic resin* specifically recommended for heat reflectant coating applications as it possesses the required hardness, adhesion and gloss retention qualities needed to make the **best possible finished product**. The hardness of the resin is double that of the most popular coatings. This ensures very low dirt pickup properties whilst still maintaining its thermo plasticity. Its durability and performance have been proven over many harsh Australian seasons.

The system employs a "second generation" formula for heat reflectant coatings which has in it expensive **specialist pigments** and fillers designed to re-radiate all spectrums of light/heat rays, including visible light and infra-red (which make up 97% of heat from the sun).

All this means that applying Thermobond HRC to your roof can actually save you money. How? Independent tests carried out project a **saving of up to 21% a year** on air-conditioning costs, if Thermobond HRC is applied to the roof. Tests carried out in December 1997 reported the following:

4 Panels, (600 x 600mm)

1. Galvanized iron coated in a traditional roof red.
2. Plain zinalume.
3. Colorbond Off White.
4. Zinalume coated with 2 coats of Thermobond HRC.

All panels were placed facing due west in full summer sun conditions. Digital thermometers were placed 50mm under and away from each panel. Readings were taken from 1pm to 4pm, every 30 minutes. At 2.30pm the ambient air temperature was 31.6°C, the highest temperature recorded. Relative humidity was 82%.

The three panels without Thermobond HRC measured a re-radiated temperature of between 52.4°C and 58.7°C degrees Celsius, the Off White being the lowest and the zinalume the highest. The Colorbond Off White panel temperature was surprisingly high.

The panel with Thermobond HRC measured a re-radiated temperature of 35.6°C. The difference observed was between 18.8°C and 23.1°C. The panel with Thermobond HRC never exceeded 35.6°C.

*The resin or binder is the main ingredient in any coating or paint system and therefore it is crucial that the one chosen is specific for its application and of the highest quality.

The Tricky Stuff:

WHY HEAT REFLECTANT COATINGS REALLY DO WORK

Heat reflectant coatings operate on three levels that involve: solar reflectivity, heat emissivity (*noun - Thermodynamics*: the ability of a surface to emit radiant energy compared to that of a black body at the same temperature and with the same area) and coating thickness.

To illustrate: Zincalume roofs have a very high solar reflective index but a very poor heat emission rate. That's why they reradiate intense heat underneath that can reach temperatures exceeding 60°C. Its emission rate is slower than its ingress rate and thus the heat build-up.

So, for a heat reflectant coating to work it has to have a very high Solar Reflective Index to stop heat ingress (SRI above 50% is the minimum requirement), very high emissivity to allow fast heat emission (above 80%) and a minimum dry film thickness of 150um (which can be achieved in 2 coats). A thin coating (75um or less dry film thickness) of heat reflectant paint would only prevent heat ingress for a short period of time.

This specialised high build coating simply does not allow the passage of heat from the visible and invisible light spectrum to reach the substrate. The coating **blocks the visible and invisible light/heat rays** with specialist pigments **not present in other coatings**, and because of its very high emission rate it does not readily store heat. If any heat is retained by the substrate it is rapidly released.

The Proof:

AMERICAN ASTM TEST METHODS & COMMENTS FROM CSIRO & POSITIVEenergy COMMISSION

On September 15th 2003, PRI Asphalt Technologies Inc. (6408 Badger Drive, Tampa, Florida) tested 4 samples of Shieldcoat's **Thermobond HRC**. They were given two white and two beige samples for the purpose of determining the solar reflectance and emittance properties. The samples for testing were received from Uni-Glaze (17927 Ida Drive, Los Gatos, California), the principal distributor of Shieldcoat's **Thermobond HRC** in the U.S. The actual tests results are attached. The following is a summary of the results:

The tests were conducted against ASTM C 1549: Standard test method for determination of Solar Reflectance and ASTM C 1371: Standard test method for determination of Infrared Emission. Both of these methods are Cool Roof Rating Council (CRRC) accepted methods for determining these properties.

Solar Reflectance is the amount of visible light/heat reflected by the coatings surface. Typically a reflectance of a high quality white commercial paint would be around 82-84%, some white coatings can be as low as 70% or less. A result of **88%** for the white Thermobond HRC is an excellent value.

The solar reflectance results for the beige samples were also exceptional at 79.5%.

The Proof cont:

Emittance is a measure of a material to release heat in the form of Infrared radiation. A very high emittance rating would be 0.90 or 90%, and a low emittance rating would be 0.06 or 6%. Again the result for **Thermobond HRC**, both white and beige of 0.88 or 88% is outstanding.

Solar Reflective Index (SRI) is the real measure of a coatings performance as a heat reflectant system. The system was developed by the Dr Paul Berdahl of Lawrence Berkely Institute at the University of California. This index takes into account the products solar reflectivity, its infrared emittance and any subsequent temperature rise. This index is calculated using ASTM E 1980. It gives a value relative to a standard black and a standard white surface. The standard black surface is assumed to have solar reflectance of 5% and thermal emittance of 90%, and the standard white surface has solar reflectance of 80% and thermal emittance of 90%.

Dr Lisa Gartland, Director of PositivEnergy in Oakland California wrote in her email dated 18th September 2003 that ***“...Your white product performs better than the standard white surface, so it has an SRI value higher than 100. Your brown (beige) products also perform very well....”*** Dr Gartland calculated the SRI for our white Thermobond HRC to be **110.5** and the beige to be **98.9**. Dr Gartland also stated that ***“... The State of California is considering defining a cool roof as one with a solar reflectance of 70% or higher and a thermal emittance of 75% or higher, for an SRI of 82.5 or higher....”***

Obviously **Thermobond HRC** in both white and beige far exceeds the requirements for an effective heat reflectant coating.