Ceram-4000 Cool Roof Solutions

Astec Ceram-4000 is labeled with the Energy Star® logo and is a qualified Energy Star® product. Ceram-4000 meets the Energy Star® specifications for cool roof coatings and strict energy efficient guidelines set by the (E.P.A.), Environmental Protection Agency.

INTRODUTION;

Dark Coloured Coatings for Concrete Tiles no longer need to be HOT……!

A coating doesn't have to be white to be cool…… As an Architect, Builder or Homeowner rich, dark colour is an important part of your building design and decoration. Unfortunately, dark colours soak up the sun and get hotter and hotter as the day progresses. As a result, building temperature and power consumption are increased and greater demand is placed on our environment and global resources.

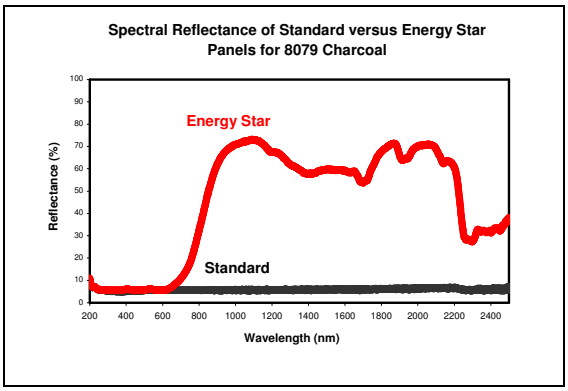
In a world that now demands we be more energy efficient and resource conscious, the use of dark colour, although attractive, presented a design challenge for our industry to overcome. It would be the "holy grail" in coating technology, to achieve a black or deep tone that would reflect solar heat and stay cool.

As a result of ongoing research and development into heat reflective coatings Astec developed a new technology of colour infused nano ceramics that reflect heat by selective reflection of infrared light. This technology has enabled us to offer dark colour coatings that reflect fully 50% of Solar energy and provide positive results for our environment and consumers.

The successful development of Energy Star Ceram-4000 enables you to make choices to provide positive contributions to our global environment with reductions in Urban Heat, Smog and through it's energy efficiency, help reduce CO2 emissions.

Our environment is constantly changing and we are all making choices that have an impact now and into the future. Choose Energy Star Ceram-4000 with confidence and *Paint with Pride*.

The comparative data represented on the graph below is actual Spectral results printed during tests conducted to ASTEM E-903 on a Lambda 9000 Solar Reflectometer. The graph shows the difference in heat reflection between a standard Charcoal roofing paint and Ceram-4000 Carcoal.



PRODUCT TYPE;

Waterbased, 100% acrylic coating with High Infrared Heat Reflectivity and low thermal conductivity.

DESCRIPTION

Ceram-4000 is a low V.O.C., 100% acrylic, high build ceramic coating that has very low thermal conductivity, resulting in low heat transfer through the product to the internals of a roof. Thermal conductivity, (0.1 W/ m / Deg C).

The product is flexible, impact resistant and flows extremely well to a smooth linen appearance. The product can be used as a stand alone top-coat over primed roofing or can be over-coated with Astec Metal-Flex, Tileshield or IR Gloss for additional performance benefits. The combination of say, Ceram-4000 top-coated with Energy Star I.R. Gloss, will result in high solar reflectivity, high emissivity and low thermal conductivity while providing good dirt pick-up resistance.

Rain Noise Reduction
The high build design of Ceram-4000 provides a composite dry film that reduces the transmission of noise that is experienced on metal roof sheets during rain.

Tests conducted by Vipac Engineering proved to reduce the rain noise transmission to the internals of a building by, 8 db average noise reduction.

Definition of Thermal Conductivity
In physics, **thermal conductivity**, λ, is the intensive property of a material which relates its ability to conduct heat.

Thermal conductivity is the quantity of heat, *Q*, transmitted through a thickness *L*, in a direction normal to a surface of area *A*, due to a temperature gradient Δ*T*, under steady state conditions and when the heat transfer is dependent only on the temperature gradient. thermal conductivity = heat flow rate × distance / (area × temperature gradient)
$\lambda = Q \times L / (A \times \Delta T)$

Material	Thermal conductivity (298K) $W \cdot m^{-1} \cdot K^{-1}$
Silver	429
Copper	401
Gold	317
Aluminium	237
Iron	80.2
Brass	120

Ceram-4000 is designed for use on all correctly prepared and primed sloped roofing. The product's high build design provides good substrate fill for the re-surfacing of excessively aged concrete tiles and aged asbestos sheet. Ceram-4000 provides a smooth and level appearance to the surface that can be left with it's linen appearance or subsequently top-coated for a higher gloss.

The product is tough, flexible and remains cool, even in dark colours. Testing has shown that they will last eight times longer than all conventional exterior acrylic roof paints. Astec Energy Star paints were the first in Australia to earn the ENERGY STAR label for energy efficient paints. As an Architect, Builder or Homeowner, cooler buildings are a positive contribution to our global environment with reductions in Urban Heat, Smog and through energy efficiency, help reduce CO2 emissions.

DURABIITY;
Energy Star coatings have increased durability and life expectancy compared with conventional paints. Independent laboratory testing to ASTM Standards confirmed Solar Reflectance Indexes of 241% greater than normal paints on a dark colour of Slate Grey.

Heat generated by the sun's Solar Radiation is the major contributing factor to exterior coating degradation, especially in a standard dark colour.

Ceram-4000 will remain cool even in a Black.
After exposure to 2800hrs of UVB 313/Moisture testing, in accordance to ASTM G53-96 the, depth of colour - adhesion and film integrity remained un-changed providing a performance increase of more than 400% when compared to a standard roofing acrylic.
Quite simply, the less heat on the coating the longer they last.

Ceram-4000 is one of the Astec Energy Star range which are the most advanced and functional roof coating available in Australia. They provide high Solar reflectivity in dark colours, excellent resistance to moisture and remain cleaner far longer than any other roofing acrylic available.

KEY PROPERTIES

- **High Solar Reflectivity in dark colours**
- Energy efficient.
- Cooler internal building temperatures.
- Reduces Urban Heat output
- Suitable for rain water collection (after 3 rains)
- Outstanding Durability and flexibility.
- Low Rain Noise Transmission, (8db lower)
- Plasticizer free.
- Rapid cure and bond strength.
- Excellent resistance to alkali and efflorescence.

PRINCIPLE USES;

- Galvanized and pre-painted metal roofing, concrete tiles and asbestos roofing.

COLOUR RANGE;
44 standard exterior colours.

SUBSTRATE;
Correctly prepared new or aged metal roofing.
Correctly prepared new or aged fibro roofing.
Correctly prepared aged concrete roofing tiles.

PREPARATION;

Aged Concrete Roofing Tiles

- All surfaces must be clean, dry, structurally sound and correctly sealed prior to any topcoat application.
- Ensure down-pipes to rain-water tanks and storm water are disconnected before cleaning
- The surface should be high pressure water cleaned to remove the moss, lichen and chalky surfaces. Ensure that all mould deposits are removed from the leading edge and shoulders of the tiles. The most suitable nozzle to achieve the best results on concrete tiles is a Kranze Turbo Nozzle. Any deposits of grease , oil or silicone must be removed.
- Structural defects to areas such as the ridge capping should be correctly repaired by re-bedding or re-pointing; any defective tiles should be replaced.

MOULD TREATMENT;

- Apply one coat of **Astec Barrier** to the entire roof surface with a back pack, low pressure or airless spray unit. When applying **Barrier** you need only to dampen the surface ensuring efforts are made to contact all shoulders and edges of the tiles. **Astec Barrier** will effectively retard any dormant mould spores in the substrate that can cause under film mould spoilage, **Barrier** is an extremely low cost solution that adds years of service free life to concrete roof restoration.

SEALING;

- The pressure cleaned surface of the tile should be checked for surface integrity before the selection of the correct sealer.
- If the surface is clean, but when rubbed continues to produce a powder on your finger. It means that the original factory finish has and needs to be re-bound to ensure top-coat adhesion.
- Powdery surfaces require the application of one coat of Astec Multi-Seal. Multi-Seal has a very low surface tension and will penetrate and bind the chalky surface prior to top-coating. Apply one coat of Astec **Multi-Seal** at a coverage rate of no more than 6 m² per litre.
- Surfaces that do not produce a powder when rubbed are seen as normal and should be sealed with one coat of Astec Tile Sealer. Apply one coat of Astec **Tile Sealer** at a coverage rate of no more than 6 m² per liter.
- Apply one full, wet coat of **Astec Cap Seal** to any fresh mortar repairs. **Cap Seal** is highly resistant to alkali attack from green mortar, and when applied to fresh cement, protects the topcoats from lime burn and leaching salts. It is imperative that **Cap Seal** is used under **Ceram-4000** on fresh mortar repairs to eliminate any chance of unsightly top-coat white out.

Previously painted metal:

- All surfaces must be clean, dry and free of contaminants. Remove dirt or dust with a wire brush and any grease with a household detergent. Alternatively, the surface should be high pressure water cleaned to remove any surface contaminants. The most suitable nozzle to achieve the best results is a Kranze Turbo Nozzle.
- Any deposits of grease, oil or silicone must be removed.
- Scrape off any loose or flaking paint then sand any remaining paint to a flat finish. Any existing paint that exhibits a complete lack of adhesion should be entirely removed for the best results. Wipe down with a damp cloth to remove any dust.
- Rusted surfaces or nail heads should be treated with Astec Rus-traint and once cured spot primed with Astec B-16 I.R. Grey Primer. (See relevant technical bulletin).
- Prime the entire surface with one light, transparent coat of Astec B-16 I.R. Grey Primer. (See relevant technical bulletin).

New unpainted metal:

- Degrease thoroughly with Astec Enviro-green, while frequently changing rags.

- Prime the entire surface with one light transparent coat of Astec B-16 I.R. Grey Primer. (See relevant technical bulletin).

Previously painted fibro; ***NOT ASBESTOS:***

- Remove all loose, chalked and flaky paint, sand any remaining paint to remove any gloss.

- Spot treat any bare areas with Astec Barrier, then spot seal with Astec Rivett, Multi-seal or Triple-flex to seal and condition the bare areas. Apply suitable Energy Star top coat,

Weathered asbestos sheeting:
Do not sand or scrub the surface as the dust can be harmful to your health. Pick off any large clumps of mould or debris, apply two coats of Astec Barrier which will kill any mould growth. Apply Astec Rivett in multiple coats until all contaminants are securely locked to provide a hard bound surface, (refer to Astec Performance Spec No. 8712). Apply suitable Energy Star top coat.

APPLICATION;

LEAKS / FASTENERS / FLASHING SEALING ;

- Any loose flashings, holes or sheet overlaps that can allow water ingress to the roof can be repaired by using 70 mm wide Astec Sontara tape embedded in Astec Taping Membrane.

- Allow the Taping Membrane to dry (usually four hours), and recoat any thin areas to cover any pin holing.
- Apply a dob of Astec Ultra-Flash to all fasteners with a small brush to make them water tight.

TOP-COATING;

- Apply one full wet coat of **Ceram-4000**, to the entire roof surface. (Coverage rate not to exceed 5m² per liter). WFT 200 microns.

- Apply a second full wet coat of **Ceram-4000** straight from the drum at a coverage rate of no more than 5m² per liter. WFT 200 microns.

- The above coverage rates include average substrate profile area for concrete tiles.

If Unsure, Contact Astec for the correct preparation technique, sealers, primers and undercoats before proceeding.

NOTE;
If the roof is to be used for the collection of drinking water, the down pipes should only be reconnected after exposure to 3 or 4 heavy rains.

MIXING;
Thoroughly mix before use with a paint wacker or broad flat stick.

PRECAUTIONS FOR USE;
Avoid contact with skin and eyes; always use a respirator during spray applications

LIMITATIONS
Ceram-4000 is a waterbased material, therefore should not be applied during inclement weather or when precipitation or freezing are imminent.

PACKAGING
20L open top pail.

WARRANTY
The technical data furnished herein is based upon data believed by Astec Paints to be true and accurate at the time of writing, however, no guarantee of accuracy is given or implied and is subject to change without notice. It is given in good faith for the assistance of users. No legal warranty expressed or implied is made as to its accuracy, completeness or otherwise. Every person dealing with this material herein does so at their own risk absolutely and must make independent determinations of suitability and completeness from all sources to ensure their proper use. We have no control over the condition under which these products are stored, handled or used, therefore our recommendations must not be regarded as a mounting to legal warranty or as involving any liability on us.

PRODUCT DATA;	
S.R.I. *Solar Reflectance Index* (White) to ASTM E 1980-01	110.29
%T.S.R. *Total Solar Reflectance* (White) to ASTM	87.90
Emittance to ASTM C	0.88
Thermal conductivity	(0.1 W/ m / Deg C).
%T.S.R. 44 standard colours	See test reports or exterior colour card
S.R.I. 44 standard colours	See test reports or exterior colour card
Gloss level	Linen
Drying Time at 25°C @ 100 MIC W.F.T.	35 min dry and block resistant
Recommended thinners	Water / Thinning not recommended.
Wash up	Water
Recoat time at 25°C	1 to 2 hrs
Spread rate at recommended D.F.T (260 D.F.T.)	2.50 m² per ltr (including two coats and profile)
Theoretical spread rate at D.F.T (30 microns Dry)	21.67 m² per ltr
Specific Gravity.	1.090
Volume Solids.	65% V/V
P.V.C.	52% V/V

Table 1 - Physical resistance properties compared to a Premium Acrylic.

TEST DESCRIPTION	PREMIUM ACRYLIC	CERAM-4000
1 Boiling Water Test	Fail Severe whitening	Pass – 2
2 Water Resistance -Blistering -Whitening	 Dense poor 8 DL + 4.88 (Whitening did not recover)	 Spars good 2 -0.348
3 Crosshatch Adhesion	OB,c	OB,c
4 Accelerated Weathering (ASTM G53-96)	Moderate chalking and surface whitening.	Excellent gloss retention with little to no surface change.

1 Boiling Water Test
Place 24hr old test panel into boiling water for 30 minutes. Removed and dried panel then noted blistering and adhesion loss.

2 Water Resistance Test
Placed 24hr old test panels into lab temperature water, 25 deg C, for 48 hrs. Remove, dry and measure for water whitening and blisters.

3 Cross Hatch Adhesion Test
A test panel has lines scribed through the coating to the substrate at 3mm intervals in a cross hatch pattern. Adhesive tape is applied and remove noting any failure.

Rating:- OB = 90% squares removed.
C = Cohesive substrate failure.

4 Accelerated Weathering (ASTM G53-96)
2800hrs of UVB 313 Lamps/Moisture testing, in accordance to ASTM G53-96. Sample were exposed to four hour cycles of U.V.B. at an irradiance of 1.05 then moisture at 60 deg C for a total period of 2800 hrs.