



DID YOU KNOW?

- hints and tips from the Technical Department

COOL COLOURS – THE FACTS

Cool Colour Technology has recently become popular as a means to obtain fashionable dark colours on exterior surfaces while avoiding excessive heat build up due to the absorption of solar heat. Though this technology is clever, there is a danger of over-selling the concept and using it inappropriately.

Consider the claims made and the facts behind those claims.

CLAIM: Cool Colour Technology keeps the substrate cool.

FACT: Only relative to a dark paint not pigmented with Cool Colour Technology black pigments. A black is black only because it absorbs all light in the visible region. This is 45 to 50% of the energy received on the surface of the earth from the sun's radiation. All absorbed energy from the sun eventually gets converted to heat. White paints reflect almost all of the sun's radiation, Conventional Technology black pigments absorb almost all of the sun's radiation, Cool Colour Technology black pigments reflect the invisible infra-red radiation, which is about half of the sun's radiation energy. So, at best, a Cool Colour Technology black is only half as good as a conventional technology white in reflecting the sun's radiation. Cool Colour Technology black pigments still absorb the visible and ultra-violet radiation from the sun.

CLAIM: Cool Colour Technology results in lower temperature giving added longevity to the coating.

FACT: About 5% of the sun's energy is in the ultra-violet range – not a lot but it is very damaging to organic matter, due to its very short wavelengths. White reflects the sun's radiation in the visible and ultra-violet range. Both black and Cool Colour Technology black absorb the sun's radiation in the visible and ultra-violet range. The binder that holds the paint together is organic and is gradually destroyed by ultra-violet light. White protects the binder by reflecting that damaging radiation away, black and Cool Colour Technology black do not, so breakdown of the binder is the same, irrespective of whether the paint is pigmented with a conventional black pigment or a Cool Colour Technology black pigment. There is some protection afforded by a Cool Colour Technology black in reducing the stress on the coating and substrate due to thermal movement, but this is still not as effective as painting with a light colour.

CLAIM: Imagine dark trim enamels that did not flake off windowsills in two years?

FACT: This is already possible, cool colour or not, with the new generation acrylic enamels. Black alkyd enamels, cool colour or not, will flake off north facing windowsills within two years due to brittleness caused by oxygen and ultra-violet exposure and the orientation of windowsills to the sun, which magnify the exposure to the sun.

CLAIM: Cool Colour Technology saves energy costs.

FACT: Cool colours will only save energy costs if the building has air-conditioners that constantly cool the interior. Most New Zealand homes need heating more than cooling,



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so virtually all New Zealand households have some form of heating available in the home. Very few New Zealand homes have air-conditioners, and those that do have reverse cycle air conditioners that run on the heating cycle at least as often as they do on the cooling cycle. Cool Colour Technology increases energy costs of heating as the natural heat energy of the sun is reflected away rather than absorbed by the building that requires heating. More and more New Zealand homes have domestic ventilation systems, such as DVS or HRV, which reduce energy costs by circulating the warm dry air in the ceiling cavity into the living areas of the house. Painting a roof in a Cool Colour Technology colour will reduce the effectiveness of these systems by reducing the amount of energy from the sun that is available to warm and dry that ceiling cavity.

CLAIM: Cool Colour Technology reflects much of the infra-red heat.

FACT: This claim should be qualified with the statement that the reflection of infra-red is significantly better when the Cool Colour Technology dark paint is applied over a totally reflective substrate, i.e. a white basecoat. When Cool Colour Technology is used most effectively, by applying the paint over a white base coat, the white base coat can show at joints on weathering due to normal seasonal thermal movement.

CLAIM: Cool Colour Technology is available in a timber stain.

FACT: Timber stains are designed to penetrate into the timber surface. Even where there is a film on the surface, this film is semi-transparent and most of the radiation gets absorbed and/or reflected by the underlying timber. A stain applied over Pine will have greater reflectance than the same stain applied over, say, Kwila. Obviously a white base coat cannot be applied prior to applying a penetrating timber stain, so it makes little difference to substrate temperature or durability if Cool Colour Technology is used in a timber stain. Cool Colour Technology pigments can be used in a timber stain, but these pigments provide minimal Cool Colour Technology benefits.

CLAIM: Cool Colour Technology is available in any colour.

FACT: Colours with an LRV of greater than 40% are "cool colours" because they reflect more than 40% of the sun's radiation that falls on them. Of the pigments commonly used today in the New Zealand paint industry only carbon black and iron oxide black absorb virtually all incident infra-red radiation. Coloured organic pigments; the pigments used to give clean violet, blue, green, red and yellow paint colours, are mostly transparent to infra-red, coloured inorganic pigments, the pigments used to give muddier red, yellow and green shades, mostly reflect infra-red. As long as the colour does not use carbon or iron oxide black to achieve its shade, and is painted over a white basecoat, the colour is a Cool Colour Technology colour. Cool Colour Technology effects are most noticeable in dark shades that normally would contain a significant amount of conventional black pigments.



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