Coatings for claddings

By Colin Gooch, Resene Technical Director, 2006

New Zealand homes are mainly built from materials with intrinsically low durability. Paints are a necessity to protect buildings from our clear skies and marine environment, which together provide ferocious amounts of U.V. light and windblown salt.

Better than minimum durability

The New Zealand paint industry has responded to these environmental demands by pursuing a high-quality-paint marketing approach. Anyone who doubts this should benchmark New Zealand products against leading American or European brands. As a result, the industry had little difficulty meeting the New Zealand Building Code's Durability clause (B2), which recognises that painted claddings are relatively easy to access and to replace, and thus have a durability requirement of 5 years.

Most paint manufacturers realise that complete failure after 5 years is not acceptable but because of erosion, normal wear and tear, colour fade etc, the coating may need refurbishing with further coats at this time. Preparation for each refurbishment should only require thorough cleaning and occasional spot repair. Failure by flaking or peeling is never acceptable.

Colourfastness

Colourfastness is perhaps the most contentious area of durability. Most paint companies work with a palette of about 12 pigment pastes to develop all their shades. Not all these pigment pastes have the same colourfastness. Shades based on iron oxides (sometimes known on earth colours) are significantly more colourfast than yellow, orange and red shades, which are based on the brighter and cleaner organic pigments.

A wide range of these organic pigments is available of similar hue, but with vastly different costs and lightfastness. While one shade from one manufacturer may be recommended only for interior application, a nearly identical shade from another manufacturer may be suitable for exterior exposure.

Shades based on blends of pigments with dissimilar lightfastness can expect colour change on exposure, in the direction of the more lightfast pigment.

Using U.V.-absorbing clears over the top of sensitive colours significantly improves the overall lightfastness of the system, but the concept of zero colour change is impossible. What is possible is to measure colour change and to agree an acceptable limits before selecting colours.

New surfaces damage coatings

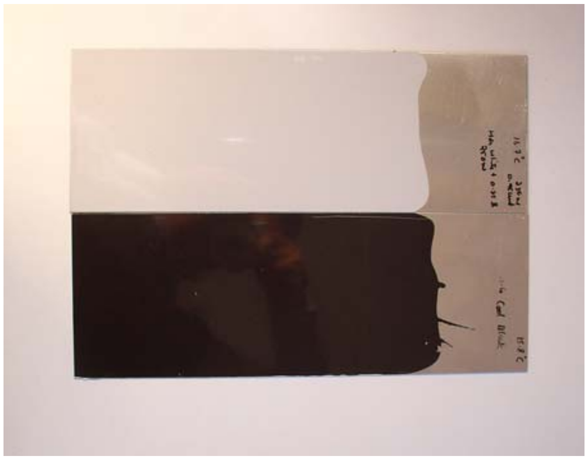
A couple of modern building practices have impacted on the paint industry. The first is the increasing popularity of thin, highly polymer-modified, cement-based renders. The drying schedules imposed by the high levels of polymer often preclude the desired hydraulic setting of the cement. What results is a highly alkaline substrate containing significant amounts of free lime. Although this will slowly react with carbon dioxide from the air to form benign calcium carbonate, in its active form it can wreak havoc. Free lime can form an antagonistic alliance with U.V. light, but when confronted with both together can be overcome.

High alkalinity can also negatively interfere with fungicides and algaecides incorporated into coatings to keep them free from mildew defacement. This destruction of the film preservatives can lead to premature colonisation and early disfiguring of the surfaces.

Light reflectance and claddings
The other area of controversy is with claddings that are unstable at high ambient temperatures. To control the problem, cladding manufacturers generally specify a minimum light reflectance value for any subsequently applied coatings. This makes sense because, as everyone knows, dark coatings get hot – don't they?

Visible light, however, only makes up about 50% of the total energy emitted by the sun with another 45% in the infrared range of the spectrum. Some pigments absorb strongly in the visible range but actually reflect infrared. This completely changes the paradigm, making it redundant to specify by light reflectance only.

The differences are not trivial – a light grey corresponding to BS5252 00A01 made on standard technology has the same heat reflectance as the dark grey corresponding to BS5252 10A11 (refer picture below).



Architects and colour designers clearly want to be able to use the freedom afforded by this technology. Providing the correct framework for their use could be complex and will require co-operation and understanding between all interested parties.

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