ARCHITECTS MEMO
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paint exposed

Paint, like all other products offered for sale here must be 'Fit for Purpose'. Resene research and development chemists spend their time trying to develop better and better products. New products must always be tested in order to ensure that they achieve their basic 'fitness for purpose' as well as for any new novel claims that might be made for the product - and this can involve novel testing.

For the majority of paint properties, there exist a wide range of standard test methods; promulgated by recognised standard authorities; performed in registered laboratories: on calibrated instrumentation; by trained people; delivering reproducible, relevant results.

Interestingly, berets and giant catapults are not part of the standard laboratory wear or equipment.

There are some areas where the range of standard tests or testing equipment are unable to duplicate the complexities of the property one wishes to test - flooring materials are such an example. While there are abrasion resistance and scratch resistance tests available, they do not give the full picture of the range of subtle stresses a floor is subject to. Our architectural flooring finishes are therefore always tested on the stair treads leading to the factory's 'smoko' room and our industrial flooring finishes in a high forklift traffic area in the factory. A difficult test to incorporate in a standard!

For architectural coatings aimed at exterior use, the ability to retain function; both physical and aesthetic; is critical. Testing exterior durability appears relatively simple - stick a few samples (over appropriate substrates) outside and wait 10 years or so before assessing! A wee problem is that 10 years is a long time to wait for a result and suitable means need to be found to reduce the duration of the test while still producing meaningful results.

The three elements of atmospheric exposure, in decreasing order of aggression are U.V. light, moisture and heat. U.V. levels, typically measured from 290-450 nms, vary widely depending on sun - earth separation; cloud cover; altitude; pollution and surface reflections. A summer's day (when the sun is at its closest) in the north of the country can have a U.V.I (U.V. Index) of greater than 14 while a winter day in the South would typically have a U.V.I of about 1 (measured on a clear day around noon).

While a U.V.I of 14 is considered extreme, it is positively benign compared with some areas in altiplano in the High Andes where values of double this are not uncommon!

Northern hemisphere U.V.I's are typically 40% lower than in the southern hemisphere due to the sun being at its apogee; higher ozone levels and higher pollution levels.

Back here, a clear summer's day in Leigh, North Auckland would be 2 U.V.I units higher than a similar day in Invercargill. A similar difference exists between a year which experiences a 'good' summer as against a 'poor' one.

The interplay between U.V. and moisture is a subtle one. It is your scribe's belief (unsupported by hard data) that moisture typical of what we experience in humid regions can prevent self-repair mechanisms in paint films which can occur in high U.V., arid exposure sites.

There are several pieces of equipment which attempt to accelerate natural weathering manipulating the levels of the three antagonists mentioned above. However there are subtleties in natural weathering (particularly in the precise spectrum of U.V. received) which make correlation between natural and artificial weathering extremely difficult.

We have observed pigments which perform exceptionally well in artificial weathering which fail abysmally on natural weathering - and vice versa. While this may seem like a gloomy view of artificially accelerated weathering, data generated, in the hands of a knowledgeable and experienced chemist, does add value.

Multiplying the effect of natural weathering can be achieved by exposing panels at a site closer to the equator; angling the panels to maximise U.V. exposure; rotating the panels to follow the sun from rise to set; adding reflecting mirrors to increase the units of U.V. hitting the panels and adding water spray to the assembly.

All of these facilities are available from commercial exposure facilities, the nearest of which is at Allunga on the outskirts of Townsville. Such exposures are sometimes called up in standards.

Because of the large amount of exposure data required, most paint manufacturers will have their own ISO-endorsed exposure site and expose their panels facing north and elevated to 45° from the horizontal. Resene has such sites at Upper Hutt and Tauranga and a non-endorsed tropical site just outside Nadi, Fiji.

Because of the seasonal variabilities outlined above, new products must always be exposed alongside known performers to account for this. While a five year exposure under these conditions can guarantee a 'worry free' night's rest for the formulating chemist, positive (or negative) feelings occur after two years.

Experience has shown that our climate is unique and harsh and even the most fully tested product can occasionally show earlier than expected breakdown. The best yardstick that the development chemist can have is the knowledge that previous analogues of the technologies being used have already stood the test of time in local conditions and that the new product is performing at least as well as the known standards. So, unless paint is really designed for and tested in our harsh environment, it really can be exposed.