

Opacity of Paints



MPNZA is aware that there is, amongst some sectors of the building industry, a belief that colour choice does not affect the opacity of architectural and decorative coatings. The fact is, however, that colour does affect opacity or hiding power of the paint. Unless properly handled opacity problems can also affect colour tone so that the desired shades are not obtained. Problems arise in commercial work where a specification is issued, quoted on by the painter and / or a paint company, before the colour(s) is known. If a painter quotes on 2 or 3 coats, but additional coats are required, a costly dispute may result.

If the colour is known in advance a suitable system can be prepared and quoted. In some cases a special factory mix batch may be required. This may involve an allowance for lead time or additional cost for exterior quality light fast pigments. To address these problems the industry needs the cooperation of architects, specifiers, designers and builders to provide this information, to avoid conflict when the job is being painted. MPNZA members are able to work with these groups to provide custom specifications.

The technology behind Australian/NZ formulated broad wall interior and exterior self-priming latex (water-based) paints is at the forefront of world coatings technology. Australian/NZ tinting systems are more sophisticated and more accessible to trade painters and DIY market than in most overseas countries. It is however wrong to assume that all Australian/NZ formulated paints will provide uniform opacity across the full colour spectrum using a standard two coat system.

The increased use of organic pigments, due mainly to legislative restrictions on the use of inorganic pigments such as lead chromates, has adversely affected the opacity or hiding power of certain latex paints. This is particularly noticeable in regard to paints based on red, yellow and orange pigments. Compared with lead chromate pigments, paints tinted in house or at point of sale with organic reds, yellows and oranges may provide considerably less hiding power.

Opacity is largely influenced by the relative refractive indices of the pigment and the medium as well as the particle size and distribution of the pigment ie the shape and degree of aggregation of the particles, the proportion of pigment in the vehicle and the thickness of the applied film.

Since for white pigments there is little or no absorption of light, the hiding power of white paints depends entirely on the scattering of the incident light. The higher the refractive index of the pigment relative to that of the medium and the nearer the particle size to the optimum, the greater the scatter and the greater the opacity of the paint.

The hiding power of a paint containing a coloured pigment is also dependent on the ability of the pigment to absorb light, as well as to scatter it as a result of its refractive index and particle size distribution. With black pigments good hiding power is obtained owing to the almost complete absorption of light and refractive index as such contributes only little to the effect. For other coloured pigments both of these properties, absorption and scatter are wavelength dependent and the end effect is a complex combination of all the various factors involved.

All inorganic pigments have high refractive indexes, and hence, when used to colour paint give high opacity. Such colours from inorganic pigments generally include white, black, and yellow, red and green oxides. Colours comprising combinations of inorganic and organic pigments may have high opacity, depending on the proportions.

Pale yellow and apricot colours, which have organic yellow, red or orange pigment in combination with white, have been found to lead to coverage problems due to refractive index reduction. The number of topcoats can be reduced significantly however by first applying a top quality undercoat tinted grey or tinted from the same colorants as the selected colour. The key is to obliterate the surface and leave a solid, uniform base prior to application of the topcoat.

This information is not intended to discourage the public, paint specifiers and others from specifying colours of their choice. It is intended merely to point out that paint tints based on red, yellow and orange may need additional coats to achieve the hiding power required.

Your paint supplier can provide more specific information on tinting and the opacity of the tinted product.

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