

TECHNICAL ADVICE

PERFORMANCE

Deep Colour Issues



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What

What are the issues with using Deep Colours?

“Bold Colours can affect paint performance!”:

As deep hue colours are currently in vogue with today’s design community, choice of colour is a decision frequently made by the Specifier or Property Owner to primarily achieve the desired aesthetics.

This decision however should also take into account the possible impact that colour choice can have on the long term performance of the coating system. In general terms, lighter colours will always outperform darker colours, within the same product, environment and exposure conditions.



The selection or use of Deep, Bold, Dark or Vibrant colours should be carefully considered as they can actually have an adverse effect on the paints properties and performance, as well as on the project’s ability to meet schedule, budget and achieve overall long term aesthetics.

Why

Why Deep Colours can be problematic?

Colour Durability - This is defined as the resistance of the coating to change colour or fade on exposure to the elements. Generally speaking, darker coloured paints absorb more UV rays than lighter coloured paints thereby putting more stress on the paint system and the substrate.

One of the many factors that influence paint durability is choice of colour. Different colours have differing light stability. Whites have the greatest stability to UV degradation where deep hue colours (especially reds & yellows) are traditionally the most UV sensitive and therefore fade more readily.

Surface Imperfections - The combination of low “Light Reflectance Value”(LRV) deep hue colours, used in conjunction with low sheen level paint, means less light is reflected (more is scattered) hence any surface abrasions & imperfections, especially on internal surfaces, become more visible because they look shiny.

Heat Absorption – Deep hue colours have a lower LRV and reflect less light but also absorb more heat than lighter colours. This can have a detrimental effect in several ways. Hotter surfaces will cause the substrate to expand and contract more than cooler surfaces, thereby placing significantly more stress on the paint coating itself and underlying substrate. The designer may need to include more control joints.

Some building materials actually specify a minimum LRV for the colour used, under which substrate performance will be compromised and the manufacturers’ warranty becomes null and void.

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Over time, as the paint film ages, it will become less flexible and less capable of withstanding the stress and constant movement in the substrate. The destructive result can be loss of adhesion through Crazing, Cracking, Flaking, Peeling or Blistering of the paint system. Deep hue colours traditionally breakdown more quickly and have a shorter life expectancy to first maintenance, than lighter colours within the same environment.

Applying darker colours over previously painted exterior surfaces can generate more heat in the substrate, which in turn causes any moisture present to force its way out, any way it can. Often the moisture travels via capillaries in the old weathered paint film to the surface but cannot escape quickly enough through the new paint film. The result is Blistering of the paint film back to bare substrate requiring complete removal of all paint coatings. If LEAD is present in the old paint, this becomes an expensive & difficult problem to address.

Colorant Levels - Deep hue colours that are tinted in-store have significant quantities of universal colorants (up to 85mls per litre of paint) added to the relevant tint-base. These colorants contain non-drying glycols or surfactants (even the new zero VOC products) so the strongest colours, tinted to the maximum allowable level, will have a high quantity of glycol or surfactant present which can, in practical terms, alter the paints formulation and possibly change the characteristics of the paint in various ways.

The paint characteristics that can be significantly altered by high colorant (tinter) levels include;

- 1. Marring or Burnishing** –The deeper the colour the less white pigment (TiO₂) it contains. Coloured pigments are softer than TiO₂ pigment hence deep hue colours are less resistant to abrasion, marking and burnishing (polishing-up).
- 2. Pigment Transfer** - Deep hue colours are more prone than lighter colours to “Pigment Transfer” (the colour actually rubbing off) and subsequent surface marking. This is an industry-wide issue relating to the very high level of colorant being added to transparent (low TiO₂) bases. The soft pigment in the colorant sits close to the surface hence it is prone to marking & rubbing off. The higher the colorant level, the greater the tendency to mark.
- 3. Sheen Level** – A slight drop in the sheen level of the paint may occur due to the high concentration of glycols / surfactants present in the colorants present. In some circumstances, the sheen level can appear slightly higher.
- 4. Drying Time** – The speed of dry can be noticeably slowed (especially in humid conditions) by high colorant levels because the non-drying glycols / surfactants that are present act as slow evaporating solvents that keep the applied paint film wetter for a longer time period. This delayed drying time can sometimes be twice as long as expected.
- 5. Hiding Power** – The Opacity of deep hue colours (especially Reds, Orange & Yellows) can be relatively poor as large quantities of colorant are added to either Clear Base (no opacity) or Extra Bright Base (very low opacity) in order to produce a paint that has adequate depth of colour. As little or no white pigment (TiO₂) is present, the hiding power of the colour is totally reliant upon the relatively poor opacity pigments within the colorants alone.

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Matching another Manufacturer's Colour – In-store attempts to eye-match another companies deep hue colours can be quite difficult and may result in excessive amounts of colorant being added. Problems are frequently encountered when unsuspecting store-staff attempt to provide a match to a colour using another company's tint-bases & colorants.

Within a paint store, there is also no real control over the quantity of colorant being added or whether the tinting guidelines are being followed by the store staff hence there is no guarantee that the result achieved will be an accurate match to the chosen companies colour or deliver a satisfactory performance when applied.

Each paint company designs its tint-bases and colour systems to accurately produce its own colour range offer. Not all paint companies use the same colorants and rarely are the tint-bases the exact same strength, however when a paint company matches another companies colour it does so with all the scientific backup available to achieve the best possible match whilst staying within the formulating limits and guidelines, thereby minimizing the risk of poor performance.

How does it occur

There are two methods primarily used to produce colours in decorative paints...

- 1. In-Store Tinted Colours** – The paint manufacturer produces "Tint-Bases" in various packaging sizes into which universal colorants are dispensed in-store from a tinting machine, to a predetermined colour formula or recipe. This is the most widely used method of producing colour as it provides the specifier and the consumer with an endless range of colours to choose from.
- 2. Factory-Made Colours** – The paint manufacturer produces a select range of pre-made "stock" colours that are made in the factory from the base raw materials rather than from colorants. A less common method employed these days due to the restricted colour range and potential high demand on shelf space in-store.

Solution

The Industry Standard (AS/NZS 2311) generally calls for one coat of prep-coat plus two coats of intermediate/topcoat for broadwall surfaces; however as indicated above, this may fall short of what is actually needed to achieve a satisfactory result, in terms of opacity and desired finish, particularly when deep hue colours are being selected.

It is not unusual for Paint Specifications to include a statement to the effect that "Deep hue colours or Accent clear-base colours may require more than the specified or standard number of coats in order to achieve full coverage".

In-Store Tinted Colours – Application of the correct primer/undercoat (PrepCoat), strategically selected to complement the topcoat, applied carefully to achieve a totally uniform background colour and overall appearance, will generally result in satisfactory coverage (hiding) being achieved with two coats of PrepCoat and two coats of topcoat/finish. Small quantities of tinted colour can easily be produced by this method.

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Factory-Made Colours - When deep hue colours are produced in the factory, the manufacturer can optimise the formula by adding ingredients that enhance the products performance, strengthen the paint film and increase the hiding power. The quantity that can be produced as factory made-to-order colours for specific corporate clients is however quite significant (over 500 litres per batch).

Prevention Carefully consider the potential impact of colour choice before the project starts!

The time to realize there is a problem should be after the first or second coat, NOT after the sixth coat.

A well-meaning contractor may believe that deep hue colours tinted from Accent-clear tint bases will always require four, five or six coats to achieve full coverage or hiding. This can and should be avoided.

Guidelines for achieving successful results when deep hue colours are selected or specified...

- Minimise surprises by arranging for a series of tests to be carried out before the work commences.
- Seek paint manufacturers advice on what PrepCoat product will provide optimal hiding underneath the specified topcoat colour and optimal adhesion to previously painted surfaces.
- Learn which undercoat colours enhance the hiding power of which topcoat colours. For example, straight untinted white would be the correct undercoat colour for a bright lemon yellow topcoat colour. Red finish coats are best undercoated with a more robust hiding light grey tinted undercoat.
- When repainting non-uniform surfaces, always specify or employ the correct "Tinted Undercoat" to totally obliterate any background colours and appearance. A completely uniform background colour is essential under deep hue topcoat colours.
- Make sure that the selected "Tinted Undercoat" does not interfere with or adversely affect the vibrancy and/or undertone of the deep hue topcoat colour. Avoid any shadowing or grey tone which can telegraph through the topcoat colour.
- Follow the paint manufacturer instructions on dry time between coats. Premature recoating can actually re-wet, soften and/or partially remove the first coat.
- The paint manufacturer will also provide valuable information regarding suitable application equipment (tools), methods and accessories to achieve optimal hiding power and aesthetics. The correct type of roller sleeve and nap-size can make a huge difference to the final result.
- To minimize or avoid Burnishing & Marring on deep hue colour painted surfaces, Dulux® recommends ultra premium quality Wash&Wear® with 101 Barrier Technology for interior broadwall surfaces. This product range has built-in scrub and stain resistance that allows more frequent & rigorous cleaning methods to be employed without adversely affecting the surface appearance.
- In high traffic areas, deep hue colours are best protected by applying a high performance wear-resistant clear-coat finish over the topcoat colour. In Australia, Dulux® recommends Professional SteriGuard® Ultra (low sheen) Clear.

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References Further information on the “Selection of Colour” is provided in Australian Standard AS/NZS 2311 “Guide to the Painting of Buildings” Section 1.9

Information on the use of colour for the marking of physical hazards and for the identification of certain equipment in industry is provided in AS1318. Information on colours used for the identification of the contents of piping, conduits and ducts is provided within AS1345.

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