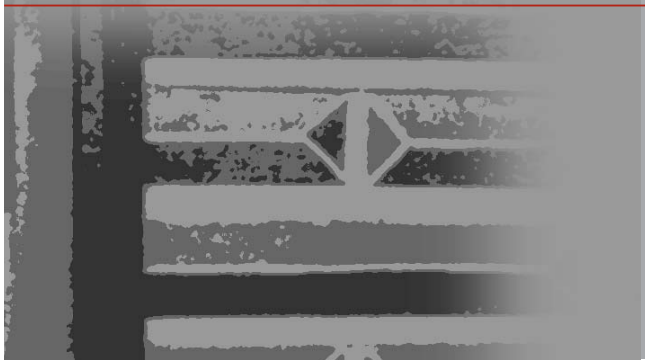
The maintenance series



Information sheet

7.2

NSW Heritage Office

# Paint finishes

## Introduction

Paint finishes are renewable surface coatings which rarely remain unaltered during a building's evolution. Owners and occupiers apply new paint finishes in accordance with changing fashions and to give a fresh, clean appearance to surfaces which have become soiled through use and natural aging. Significant paint schemes do often survive, however, under layers of modern paint or behind wallpapers, furniture and fixtures. The question of how to research and uncover authentic paint schemes, and how to conserve them, requires some basic understanding of the processes of painting and the normal ongoing processes of renewal.

## What is paint?

Paint is a protective or decorative layer applied to most types of surfaces. The traditional methods of painting buildings include the application of oil paints to timber, metal and plaster and the application of water-based washes and distempers to plasters and some masonry surfaces. Decorative painting treatments such as graining and marbling, stencilling and gilding were used in all styles of buildings according to their function, or prevailing fashions and the available means. Wallpapers and other applied finishes were used in conjunction with painting.

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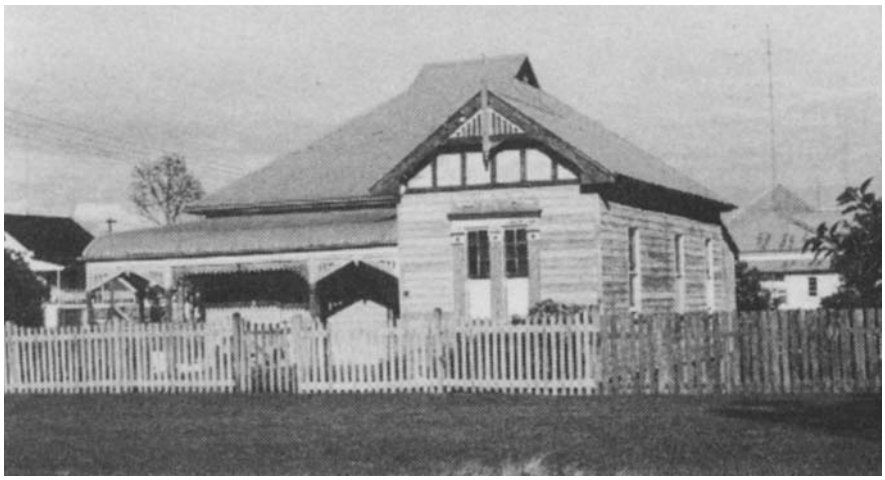
Traditional paints are composed of a liquid medium, such as linseed oil or water, a colouring agent called a pigment, and other agents to facilitate the flow or the drying of the paint. Water-paints, like the so-called washes and distempers, contained various ingredients to give them durability and to facilitate their application. Modern paints differ little from traditional paints in their general properties, but they differ significantly in their manufacture and in their detailed formulation. Ready-mixed paints are largely a 20th-century innovation. The application of modern, industrially manufactured paints is a far simpler task than the arduous process of mixing and applying traditional paints and washes.



***Cottage at Grafton***

*It is rare to find buildings with their exterior paint colour schemes intact. In this illustration of an early 20th-century timber cottage it is possible to see how the paint has been used to enhance the architectural detail, creating a handsome effect on a modest building.*

## Limewash

Limewash, or whitewash, is a very early form of water paint which was daubed onto surfaces as a hot slurry of slaked lime. Tallow and alum were added to most limewash recipes to improve their properties; and colouring agents, such as the earth pigments, were added to replicate the mellow browns, pinks and yellows of classical architecture. Limewashes were used on all classes of buildings in the early colonial period and on less noble structures and service areas, even when oil paints became more readily available.

## Distempers

Distempers like calcimine (or kalsomine) were mixtures of whiting, size and coloured pigments. They were used only indoors on walls and ceilings to provide dead flat colouring in areas where decoration was needed. They were not suitable for service areas.

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## How was paint applied?

Paint was applied by brush. Rollers and sprays are largely the tools of the modern painter.

External paints were applied directly to masonry surfaces in one or more coats. Timber surfaces required the application of primers and undercoats before the finish coats. Timber needed to be protected from the effects of the environment, whereas masonry surfaces required only decorative treatments.

Internal plaster walls could not be painted successfully without adequate preparation. Plaster had a tendency to soak up the first coats of paint, leaving an uneven finish, so in traditional work of high quality it was usual to apply many coats of oil paint to build up the finish. The final coats of oil paint on plaster were flatted, by the incorporation of turpentine, and stippled with a special brush to even out the brushstrokes.

An economical alternative to oil paint was found in water-based distempers, or calcimines, which produced a flat, even finish of limited durability. These finishes were applied over a preparation of size (called claire colle) which greatly reduced the potential of the plaster to absorb the paint unevenly. This traditional preparation usually appears as a clear

***Chalking, flaking, peeling and blistering are all common forms of paint failure. The effects of sunlight and other environmental factors are significant in the failure of external paintwork.***

yellow transparent finish on original plaster ceilings and wall plaster surfaces. Pressed metal surfaces were prepared for painting by the application of a coating of linseed oil which, when discovered on original surfaces, can also appear as a clear yellow film.

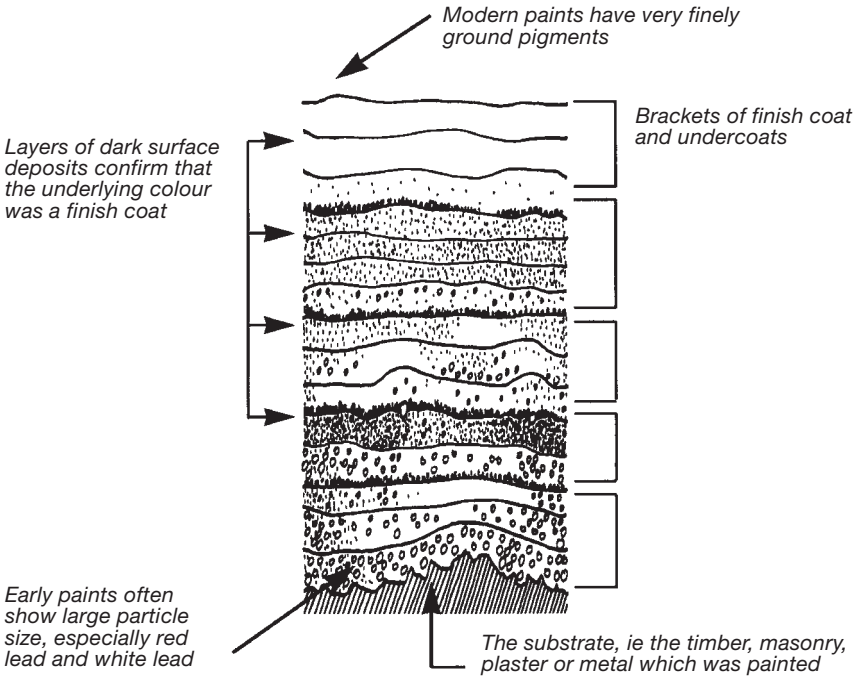
Special effects such as wallpaper, gliding, graining and stencilling required the skills of tradespersons who called themselves decorators. Their work is encountered in all classes of buildings of the 19th and early 20th centuries. Elaborate schemes of decoration have been discovered in the residences of the rich and in the offices of public officials, as well as in the public spaces of major public buildings and churches.

## Why does paint fail?

Paintwork fails for many different reasons. Chalking, flaking, peeling and blistering are all common forms of paint failure. The effects of sunlight and other environmental factors are significant in the failure of external paintwork. Interior painted surfaces usually deteriorate under the effects of moisture, particularly damp, in the supporting structure.

When paint fails, examine the situation carefully to determine the root cause of the failure. Every situation is different. For example, the chalking of external paintwork is more pronounced on north-facing surfaces than it is on south-facing ones due to the effect of greater exposure to sunlight. External horizontal surfaces, such as window sills, experience paint failure very quickly due to the combined effect of sunlight and the unavoidable accumulation of dirt which prevents new paintwork from adhering properly to the old paint beneath. Sunlight will age and embrittle oil medium paints and cause crazing, flaking and peeling.

***Cross-section of paint***

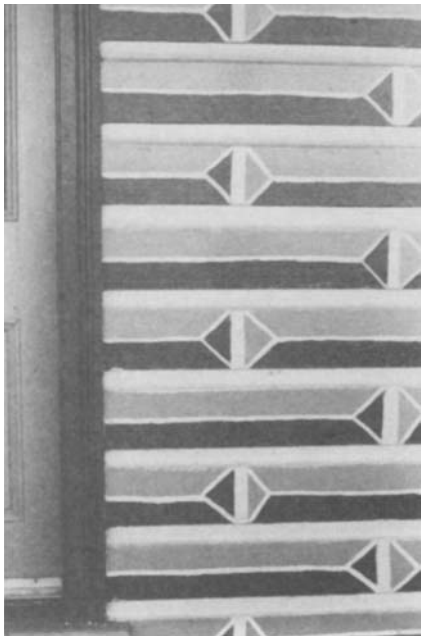



*A magnified cross-section of a sample of paint built up over many years shows distinct patterns. The surface or finish coats are identified by the accumulation of dirt deposits which survived the painter's preparations, even on vertical surfaces.*

The failure of interior paintwork is most pronounced in areas of unstable environment, such as in kitchens and bathrooms, where condensation occurs. Paintwork is sensitive to the effects of fluctuations in temperature and relative humidity.

Damp in walls is another major case of failure in paintwork. When moisture is trapped behind impervious paint layers it will usually cause disruption of the paint layers as it breaks through to the surface. A common place to find the effects of damp and moisture is low down in plastered walls. The movement of moisture-bearing salts usually causes severe disruption to the paintwork, showing as a white efflorescence or even a dark stain. The repair of paintwork on damp-affected surfaces will not be successful unless the damp is corrected.

***Painted rusticated weatherboards***



*The example of painting onto decorative weatherboards seeks to imitate rusticated stone. It can be observed from the surface patterns that the shading was achieved by using different paints of unequal properties.*

## How do traditional paints differ from those available today?

Traditional external paints fall into two main categories: those used on masonry and those used on timber and joinery. The former included the simple limewashes used on service buildings, and the more sophisticated washes applied to better classes of buildings. The latter were the functional, protective coatings designed to shield timber and woodwork from the ravages of the environment. Oil paints, mixed on a base of white lead and linseed oil, were most commonly applied to timber and sometimes masonry surfaces. However, as the harmful effects on human health of white lead became fully understood, replacement pigments, including zinc oxide and titanium dioxide, were introduced to replace lead. It is no longer possible to purchase white lead and red lead paints for general use.

Interior finishes included water-based distempers for walls and ceilings and a range of clear varnishes made from resins for use on timber joinery. The modern equivalents of these materials are the water-thinnable emulsion paints and acrylics, which can produce the same flat, even finishes as calcimine, and the synthetic resin varnishes.

## Theory and use of colour

Paint comes in a very wide range of colours today. This was not the case 100 years ago when the palette was limited. 150 years ago there were even greater limitations due to the scarcity of suitable pigments. This brochure will not attempt to chronicle the growth in use of colour, but it is important to understand some consistent principles which dictated how colour was used.

## External colours

External walls were invariably painted in the stone colours of naturally occurring mineral pigments. Buildings were painted in colours representing natural stone. In Sydney, throughout the second half of the 19th century, ordinary stuccoed terraces were painted in the predominant yellow ochre to salmon and brown hues of Sydney sandstone. This practice was followed also with timber (or weather-board) buildings. Some timber buildings even had their timber-boarded facades painted with shading to imitate rusticated or dressed stone.

Joinery trim was painted in complementary colours ranging from cream to deep shades of brown, red or green. Primary colours (red, blue and yellow), and their many shades, were avoided altogether. Ironwork, including so-called Sydney lace, was always painted in a small range of deep greens, browns and reds. White is strictly a 20th-century colour choice for most architectural elements, although whitewash was used from the early colonial period.

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Towards the end of the 19th century red brick and terracotta tiles became the preferred materials for walls and roofs. The fashion was so strong that it resulted in the widespread practice of painting timber walls and even corrugated iron roofs in venetian red and deep oxide red in imitation of the preferred materials.

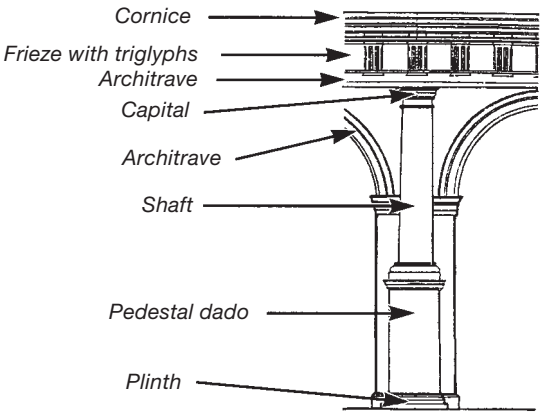
Internal colours included most light and dark shades. Colour choice was personal, but the employment of those colours conformed to accepted principles. Room colours were graded from the darkest at the floor to the lightest on the ceiling. The use of all-over white or very light pastel shades is really a very recent trend, although it can be traced back to the beginning of the last century.

The division of rooms was based on classical principles. Rooms were individually coloured to reinforce their architectural features or their function. Hallways were usually painted in stone-like colours and finishes in conformity with an architectural tradition dating back to the days of horse-drawn vehicles. Bedrooms and parlours were decorated in soft feminine shades. Dining rooms and living rooms had another identity, as can always be noted in architectural features such as the black or dark marble chimney pieces in former dining rooms and the white ones in former drawing rooms.

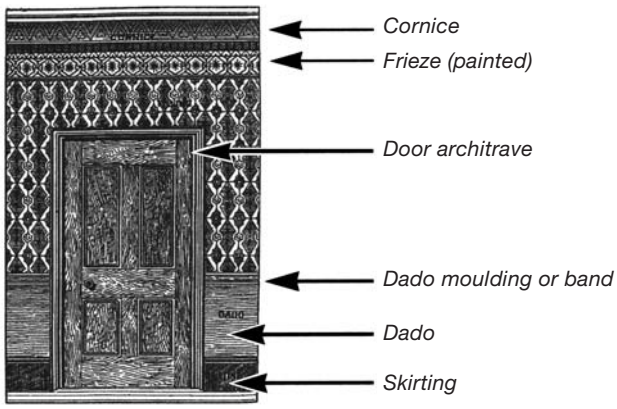
In the reconstruction of traditional colour schemes it is usually possible to accurately reproduce the colours and finishes of early paint schemes. However, it is sometimes necessary to introduce conjecture to finalise all of the details. In such cases it is advisable to work from one of the 'heritage' colour ranges to choose colours which are known to be correct for the period, since these palettes of heritage colours are based on authentic paint colour palettes.

***Divisions of wall spaces***

*For the purpose of decoration, walls were divided on classical principles. Dark colours were used on the lowest surfaces to withstand soiling and to give the appearance of strength. Friezes and cornices were often richly decorated.*




*Classical Order*




*Traditional Wall Decoration*

***Uncovered Paint Schemes***

*Removal of an architrave at the Chief Secretary's building in Sydney has revealed the earlier decorative paint scheme.*

*Photograph by John Whitlock.*

## Researching paint colour schemes

It is known from observation that buildings are periodically repainted to restore their appearance. The renewal of external paintwork is usually made necessary by the failure, through peeling, of paintwork on joinery and the chalking of paintwork on walls and other masonry surfaces. Internal paintwork is periodically renewed in line with changes in fashion or to restore surfaces soiled through normal usage.

A common cycle of painting would be ten years for the renewal of external paintwork and less for internal paint schemes. This rule of thumb can be used in research to roughly date paint layers. Of course, there are many exceptions to this general rule, as, indeed, there are some rare examples of paintwork which have survived for decades without repainting. Red lead and white lead oil paints were especially durable outdoors.

## Paint removal

There are many situations where paint removal will be considered. However, it must be remembered that when paint is removed so too is the authentic record of the history of the object or building. Thus, the removal of paint to expose an early decorative scheme, or simply to achieve a sound base for repainting, will result in the loss of very significant historic material. Remember that good conservation practice follows a philosophy of minimal intervention.

The three principal means of paint removal are physical removal by scraping, chemical removal and heat gun. Aggressive physical methods such as abrasive grit blasting are not covered in this brochure because of their potential to cause significant damage to historic buildings, although hard metals, including wrought and cast iron, can be cleaned very effectively by blasting with an appropriate medium.
Seek professional advice.

## Heat guns

Heat guns are only successful with oil medium paints in sound condition. They cause a softening of the oil medium which enables the paint to be easily scraped off. Dry and chalky paints are not affected by the heat.

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## Chemical strippers

There are two types of chemical paint strippers: fast-acting organic solvents in gel (including methylene chloride and a mixture of dimethyl adipate and dimethyl glutarate), and slow-acting caustic solutions which soften all layers right down to the substrate. None is equally effective in all situations and each must therefore be assessed against the particular proposed use to assess its suitability. With all chemical stripping techniques it is essential to wear full protective clothing and to maintain good ventilation.

## Investigation

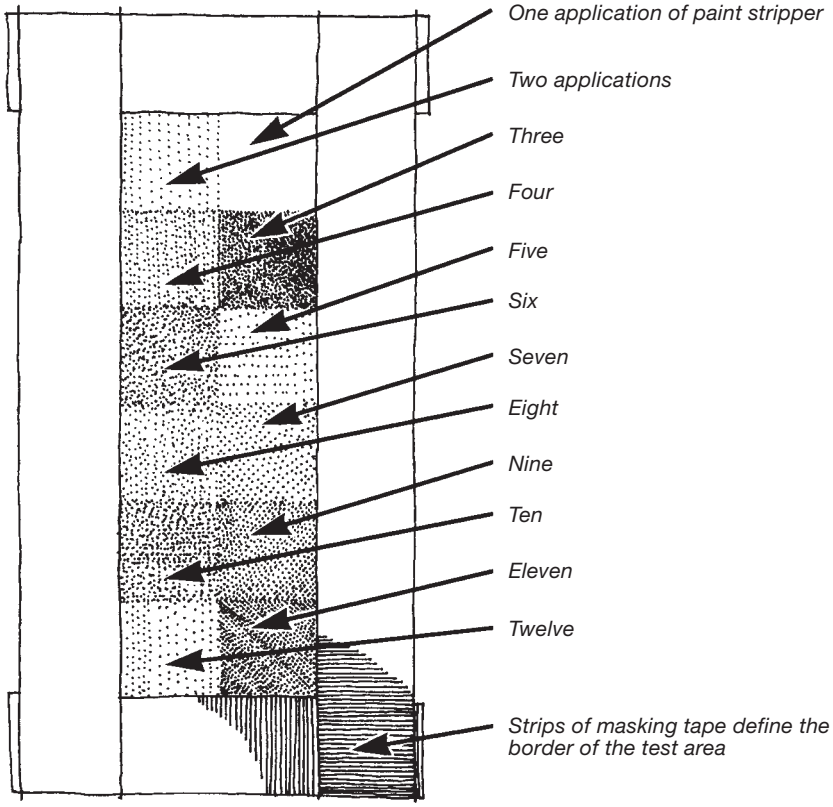
The first step in investigating a paint scheme is to seek out a surface which has been covered over at some stage in the life of the building. Fixtures such as cupboards, electrical conduits, mounting boxes and the like can be removed to reveal an earlier scheme of decoration in good condition. The advantages of starting with this approach are that anything uncovered will reveal both an accurate representation of the earlier finish and an example to which all other information can be compared for the purpose of dating.

The next stage of investigation requires the use of a scalpel or similar hobby tool to lift away overlayers of paint to reveal what lies beneath. When this is done systematically it is possible to build up an accurate profile of information about the history of painting of most buildings. An experienced person can move through a building making discreet investigations to verify the existence of early paint schemes and other forms of surface decoration.

Chemical strippers can be applied in successive layers to open up small windows to early decorative schemes. The stripper is applied with cotton tips to uncover a layer of information (about 100 x 200mm) and successive paint layers by making further applications.

***Colour Ladder***

*A colour ladder is formed by removing layers of paint in a pattern to expose the layers in a defined sequence. Finish coats can be revealed side by side for comparison.*



## Recording

Information is best recorded by noting the sequence of colours and finishes, describing them and making a colour notation with coloured pencils. A table of information can be developed for the purpose of relating the colours on different surfaces or in different rooms. The unifying thread which might lead to the accurate dating of the different schemes could be a consistent joinery treatment, such as graining, or it might even be a wall colour which was used in more than one room in a unified colour scheme. For example, many interiors in the 1960s were painted all white.

Colours can be matched to standard paint colour reference cards such as the Australian Standard AS2700 or to a universal measure such as the Munsell system. However, in most cases, where archival accuracy is not a priority, it will be sufficient to match directly to current commercial 'heritage' paint colour cards for the purposes of recording, matching and specifying colours.

The 'heritage' colours are a representative range of the more common traditional colours and are therefore suitable for comparison and appropriate for the reproduction of traditional colour schemes.

***When authentic decoration survives intact, it is best cleaned with distilled water (with the addition of some alcohol) to remove harmful surface deposits and to restore the appearance.***

## Conservation

Although reconstruction (repainting to match a previous scheme) represents the most common conservation approach with paintwork, restoration (removal of subsequent layers or simply cleaning and preserving) should also be considered as an option. It is unusual to discover intact examples of historic decoration which can be conserved in situ. Usually the interesting paintwork and decoration lies buried under later schemes of paint and decoration. Where authentic decoration survives intact, it is best cleaned with distilled water (with the addition of some alcohol) to remove harmful surface deposits and to restore the appearance. Chemical cleaning agents should not be used without professional direction. Even the water cleaning process must be handled very carefully.

Washes and distempers can be cleaned effectively by dry methods; however, this involves the inevitable loss of some of the paint. Great care is therefore needed to ensure satisfactory results.

Since modern paints come in a wide range of colours and finishes it is now usual to repaint old paint schemes to match closely the originals, at least in terms of their colours and gloss levels. But it must be remembered that new paintwork will never achieve the same surface characteristics, because modern paints are more sophisticated and, when brushed out with conventional brushes, will appear smoother and more uniform than the original. For most people this is an acceptable compromise.

Care should be taken in specifying finishes which will not adversely affect the conservation of the substrate. For example, modern paints do not allow damp substrates to "breathe", although some acrylics achieve a degree of permeability.

Professional consultants are available to undertake the full process of researching, recording, specifying and supervising painting conservation projects. It is always advisable to involve professionals in order to minimise the potential for any loss of the valuable historical record provided by surface finishes and to ensure that the ensuing conservation works will be correctly specified and supervised.

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*Munsell Book of Colour* by Munsell Colour, Macbeth Division of Kollmorgan Corporation, 2441 N. Calvert Street, Baltimore, Maryland 21218.

*APT Bulletins* by the Association for Preservation Technology International, vol XI No 1, 1979; vol XII No 2, 1980; Vol XV No 2, 1983; and Vol XVI No 3-4, 1984.



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