

## TECHNICAL NOTE No. 50

June 1992

Updated January 2006

# Paint

### *Historical Note*

All paints consist of three basic ingredients – pigment, binder and solvent.

Before the 17<sup>th</sup> century all but the simplest most basic paintwork had been reserved for decorative interior work. External painting generally made use of earth pigments such as lime, umber and ochres and durability was not a prime factor. These materials were all used in water solutions. A basic change took place when native timber supplies were exhausted and European red and white pine became the common materials for windows and doors. Paint now had to be used for protection and had to be durable. Oil took the place of water and since the paint was to last longer, more care had to be taken in the selection and preparation of the pigments. These early oil paints were ‘flat’ (matt), but were sometimes given a gloss finish by applying varnish over the paint. Painters ground their own pigments and mixed their own paint, with the result, because of the toxicity of so many of the materials used, a painter’s life was notoriously short.

The use of water based paints for walls remained universal until the advent of oil based stucco and Roman Cement renders. Even these were at first either self coloured or painted with water based paints but increasing pollution of the atmosphere caused practice to change so that from early in the 19<sup>th</sup> century town buildings have been painted mainly with oil based paints.

Since the Second World War a fundamental change has taken place in the formulae and manufacture of paints. The one common characteristic is an increased impermeability, which can be a severe problem when choosing suitable materials to decorate buildings with solid walls that have no damp-proof courses.

### ***Faults and Repair***

A great deal of original paintwork survives very often covered by a failing application in more modern times.

Paint failures fall into two basic groups:

i. failure apparent soon after application which are usually due to one of the following reasons:

a. in the case of redecorating old surfaces poor presentation can leave old flaking paint, dirt, grease, damp or mould growth. Failure can also be due to the new paint having a totally different physical characteristic to the paint onto which it is applied; a common example of this follows the application of dense resin vinyl or latex based paint onto a weak water soluble paint surface;

b. in the case of decorating new work the most common faults are caused by insufficient time being left for the underlying surface to dry out; the fluid may be water or the solvent in a wood preservative treatment. This condition is aggravated when heat is introduced after decoration, especially if the fuel used by the heater produces moisture during combustion (eg, paraffin or gas);

c. faulty priming, sealing of knots, etc.

ii. failures after the paint has had time to mature. All paints have a limited life span. This period of time varies widely depending on paint type, care in preparation and application and climatic conditions.

Most old paints are lime or lead based and as they age, the surface dusts. On external surfaces this gives them a fresh appearance because the dust is washed off by the weather continually revealing a new surface. This process will continue until damp can penetrate the skin when cracking and flaking will begin.

Harsh climatic conditions will accelerate this process as well as the more obvious effects of wind and rain; sunlight will bleach colours and sometimes cause blistering and cracking. Blistering in sunlight is usually due to substances melting in the head behind the paint surface, for example, resin in timber knots or old varnish disguised by later paint. Sunlight will also be destructive where overpainting has left a series of absorbent and reflective colours overlaying each other causing local heat to build up due to relatively different expansions within the paint film itself. It is very common to find an 18<sup>th</sup> century reflective lead based paint, over painted with a dark 19<sup>th</sup> century layer and finally a reflective modern application; such a combination does not stand much chance in direct sunlight conditions.

When assessing paint failure always check that the backing of timber, metal or plaster is sound. Failure on the surface is often a system of failure below and until the root cause is corrected, every future coat of paint will have a very limited chance of survival.

Where a paint film has failed, there is no alternative to stripping back to a firm surface. This process offers a unique chance to record the history of decoration in an old building. Whatever is found should influence the choice of redecoration. The stripping process itself must be carefully executed. Modern warm air strippers are good, they keep dust to a minimum and do not damage the underlying features, mouldings, etc. Chemical strippers can be used for oil based paints but beware of the caustic varieties. Caustic salts can build up in the surface of timber and plaster resulting in later damage to the newly applied paint. Remember that lead dust is highly toxic so that the rubbing-down of the old lead paint must be done using wet abrasive papers or wet sugar soap – remember too when decorating that lead based paints are only toxic if they get into the mouth.

There are no toxic fumes from new paint.

If the failure in the paint is due to defects in the material on to which it is applied, ie, damp, rot efflorescence, weeping knots, rusting etc, then these must be all attended to first.

There are a wide variety of modern preparatory dressings – epoxy binders, antisuction primers, alkali resistant primers, fungicidal washes, rust arresting preparations, etc.

When considering the use of any of these preparations it is a wise precaution to consult the technical advisory section of the manufacturer of the paint that it is intended

to use in subsequent applications. One rule always applies, never seal damp into a wall – or simply paint over defects. If you do, your problem will gradually get worse. When you have to decorate onto walls that do reach relatively high saturation levels use only porous paints. For external use paints with this quality are lime based, cement based or silicate based. Be wary of builders who give low prices for decoration. You are likely to be given poor preparation and/or low quality paint. Either or both will result in a much shorter life than would otherwise be the case.

For regular preventative maintenance external paintwork should be inspected every three years and certainly no less than every five, and the necessary redecoration put in hand.

Internal paintwork will have a life varying with the style of use or abuse to which it is subjected. It is not performing a protective function and therefore is not critical except in terms of appearance.

When choosing decorative schemes be selective not only over the chemical composition of the paint but also texture and finish. Textured paints are all recent innovations and alter the appearance of older buildings. So called 'natural finishes' are also innovations. They are generally only suitable for hardwoods, the use of which for external joinery is practically unknown during the 18<sup>th</sup> century and most of the 19<sup>th</sup> century; they also have a relatively short life and therefore are more costly to maintain than opaque paint.

### ***Notes on the Preparation of Contract Specifications***

Describe which surface are to be treated;

- a. surfaces for redecoration;
- b. new surfaces receiving their first decoration.

Describe protection for adjacent surfaces, and methods of preparation to be used. No application of paint should be made until the owner or his consultant has inspected the prepared surfaces.

If older decorative schemes are to be investigated by scrapes, etc, this should be stated.

If sample areas are to be provided before a final choice is made for the final decoration, describe what is to be done and where.

Describe any required surface treatments or repairs in advance of painting.

Describe the types, manufacturers and colours of the paints to be used, the number of coats and the preparation between coats. Finally describe the protective measures to be taken.

NOTE – if there is any technical advice necessary from the paint manufacturers or advisory bodies it should be obtained by the owner or the professional consultant, not left to the painter. Any such information received must be made freely available to the painters themselves while they are working. It will do no good lying in an office miles from the job in hand.

## Health and Safety

Be aware of Health and Safety concerns and take appropriate measures. Manufacturers often will produce guidance. Lead Paint can be used under permit for all listed buildings in Northern Ireland. The permit scheme is self certifying. Potential users must write to this agency requesting a form. They certify to the paint manufacturer that the intended use is for one of the categories exempted under the legislation i.e. a Northern Ireland listed building. The advantage of lead to a historic building is that the colour is more historically accurate, the paint has properties which are beneficial to the timber (linseed oil base), and the material weathers by 'dusting' which maintains colour and does not trap moisture. Such paint would have been used widely until the 1960s, its use is now limited because of concerns over the toxic nature of some of the ingredients.

## **Technical References**

### *Building Research Establishment Digests*

Digest 70 - 'Painting Iron and Steel'  
Digest 106 - 'Painting Woodwork'  
Digest 113 - 'Cleaning the External Surfaces of Buildings'  
Digest 149 - 'The Co-ordination of Building Colours'  
Digest 197 - 'Painting Walls: Pt 1 Choice of Paint'  
Digest 198 - 'Painting Walls: Pt 2 Failures and Remedies'

### *Other Publications*

Lead Paint Regulations 1927 (HMSO) [officially superseded but very practical as a guide].  
Painting and Decorating – by H E Hurst and G H Goodier (9<sup>th</sup> Edition 1980).  
Your House – the Outside View – by John Prizeman 1975.  
Mortars, Plasters and Renders in Conservation – by John Ashurst – 1983

NOTE - all the major manufacturers maintain a Technical Advisory Service. If in doubt of an address to contact refer to either the Paint Research Association or one of the Buildings Centres listed.

## **Environment and Heritage Service**

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