

## Paint and Colour

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### Introduction

Paint and colour are important aspects to your home or commercial building as it accentuates the building's features and lines, expresses design tastes and mood of a particular time, and protects the underlying materials from the elements. Maintaining painted surfaces is an ongoing job. Exterior paint will, on average, last five to eight years on wooden surfaces. It is important that exterior paint be kept in good condition, as it protects the underlying material from moisture and consequent deterioration. Interior paint will typically last longer as it sustains less damage from the elements.

Heritage conservationists recommend that paint should be retained and repaired instead of replaced, whenever possible to preserve your home's authenticity. Paint removal and re-painting is one of the most demanding conservation tasks and can present many health hazards.

We advise you to contact a qualified professional and/or resources for technical information, as well as advice and safety precautions for paint removal, paint testing, and waste management.

### Conservation of Paint and Colour

Prior to undertaking a painting project on your heritage property it is important to decide what type of conservation project you wish to undertake: a preservation, rehabilitation or restoration project.

**Preservation:** No desired changes to the paint and colour. Paint is cleaned, maintained and repaired as needed. If the paint requires new application, the new paint will match the existing paint in terms of colour and type.

**Rehabilitation:** Aims for an efficient reuse or renovation of spaces or features. Paint colour decisions can be based on research of similar examples with comparable architectural style and era, historic paint research, the taste and opinion of the current owner, and economical factors.

**Restoration:** Aims to faithfully represent the property as seen during a carefully selected period, most often the period of greatest significance for the property. The paint colours and textures will be based on historical research, onsite collection of paint samples and laboratory analysis. The evidence takes precedence over the preferences and tastes of the current owner.

## Types of Modern Paints

A first step in all painting projects is determining the type of paint that you will be using. This decision is based on the existing paint, the surface material and your desired finish. There are several types of modern paint to choose from:

### Primers and Sealers

Primers and sealers can be either oil or water based and should be matched to the existing coating as well as the expected top coat. Primers are applied before the application of a new coat of paint on an existing paint layer for optimal adhesion. Water-based paints should not be applied to existing oil-based paint without an oil-based primer. Metal surfaces are prepared with anti-rust or galvanized primers. Primer and paint should be bought in combination from the same manufacturer.

Sealers are applied to prevent top coats of paint from soaking into unpainted wood or to surfaces that have lost all previous paint in an effort to provide a uniform surface.

### Oil-based and Alkyd Paints

Prior to the 1870's, colour pigments mixed into linseed oil had only been used to cover the homes of the wealthy due to its expense. Pre-mixed oil-based exterior paints were made widely available in the 1870s.

Oil-based paints are best applied with brushes, and provide efficient adhesion and durability, especially over previously painted surfaces with oil-based paints. These paints are slow drying. Today, oil-based paints used for architectural coatings are steadily being phased out due to newly developed latex and waterborne paints that are more environmentally friendly and provide lower volatile organic compound (VOC) emissions.

Within the family of oil-based paints, alkyd paints refer to paints using alkyd resins as a binder.



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The use of these resins creates a quicker drying paint with the ability to sustain daily wear and tear. Traditional alkyd paints have, for the most part, been discontinued due to their high level of VOCs. Following the Government of Canada's 2010 VOC regulations, the production of alkyd paints have ceased with the exception of the following products, identified by Dulux Paints:

- Flat for Calcimine (Stucco) Ceilings
- Alkyd Dry fall
- Stain sealing primers
- Rust preventative metal paints
- High gloss floor enamels

Although the use of traditional paints may be preferred by some, alternatives have since been developed and continue to improve. Waterborne alkyd primers and paints preserve the high performance of traditional alkyd paints, yet provide safer alternatives for interior application due to their low VOC levels and minimal odour. These paints can also be cleaned with water and soap, a much safer alternative to the use of mineral spirits required for traditional alkyd paints.

### Latex (Acrylic Waterborne) Paints

Latex paints are quick drying synthetic resins carried in water. They can be applied to surfaces with a roller. They are very porous and will permit water from within to evaporate. They are therefore recommended for exterior surfaces, such as masonry and shutters that might retain water. They are also encouraged for their low level of VOCs. Latex paints need to be applied following an oil-based primer for best adhesion results if the paint previously applied was oil-based. Selections from historical colour palettes are available today.

### Milk Paints

Milk paint is a historic type of paint that is environmentally friendly with no VOCs. It is composed of milk protein (casein), limestone, clay, chalk, and natural pigments, with slight variances. Although it does not have long retail longevity, it is mold resistant and very durable once applied. It is appropriate for interior and exterior surfaces, and best applied on porous surfaces. Milk Paint Bonding Agent (purchased online or from some paint retailers) can be included in the mixture for better adhesion on previously painted and lacquered surfaces.

### Calcimine/ Whitewash

Until the availability of pre-mixed oil-based exterior paints, building exteriors were primarily white-washed. Whitewash consisted of a mixture of lime, water, with a little linseed oil.

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Calcimine, a type of modern water-based paint, produces the same appearance as traditional whitewash. Today's whitewashes however have a different texture in comparison to earlier whitewashes.

### Clear Coat Finishes

Glazes originally consisted of an oil and turpentine mixture. Today, they are also made using a water base and can be applied by brush to stimulate the deep finish of heritage paints. A heritage professional should be consulted to distinguish between the need of a glaze or high-gloss enamel for your project.

### Selecting Your Paint Colour

Regardless of the type of project the design guidelines listed below should be followed when selecting paint colours:

#### 1. The paint colours should be appropriate

Exterior paint colours are often chosen to accentuate the traditional building material. The chosen colours should be appropriate to the style and period of the property, and respectful of the neighborhood. Colours can be determined from paint samples (see "Paint Samples and Documentation" below,) Heritage Conservation District (HCD) studies, historical research and examples, and historical colour palettes.



Illustration: Commercial structure - Stone Crock Bakery, St. Jacobs, Woolwich Township (Amanda Sherrington, 2013)



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Illustration: Residential structure – Governor’s House, City of Kitchener (Amanda Sherrington, 2013)

**Note:** The colour palettes depicted above were taken from appropriate examples within the Region of Waterloo. Although a building may not possess a technically perfect colour palette, it can achieve a compatible colour contrast between architectural features. In choosing colour palettes, it is recommended that you select from colours identified with the help of paint samples, historical research and/or professional advice. Use sound judgement as each project is unique.

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### 2. Maintain architectural integrity

Ensure that your exterior colours hold a relationship in both hue and value, as to not segregate different features of your home. The colours should unite your home's features, and remember that any paint scheme will be dominated by the primary exterior wall colour.

Lighter colours will best reflect shadows on your home, which add intricate value to the façade. You can also choose a darker colour to hide surface imperfections, and choose lighter colours to highlight broader surface areas of interest.

### 3. Colour to instill balance of proportions and details

Visual unity and balance is achieved by an even distribution of colour that complements your home's features and height.

### 4. Don't over-do it with accent colours

Since stronger colours will fade more quickly, save these accents for small details. Do not use too many colours. A selection of dark, medium, and light colours was typically applied to buildings built before 1915. Your home will require less painting that way, especially if you grow tired of the accent colour.

## Paint Samples and Documentation

Before you start a painting project, document the existing form, material, and condition of the painted surface for future reference. To do this, collect samples of paint from each exterior or interior surface. Samples should be taken in the form of chips of peeled paint, and can be feathered to show underlying tones (see Image 3). These should be analyzed and saved for future reference, along with any documentation provided (photographs, drawings, and notes). Use a high-powered magnifier or microscope at 30x to 100x magnification to examine the layers of paint and help distinguish between primer and finish colours. The finish colour can often be identified by traces of dust on its exterior surface. Distinctions between varnish and paint layers may not be apparent, however.

Although this sampling technique is not 100% accurate, it can help inspire your rehabilitation project or guide your restoration efforts. Keep in mind that since colour does fade, it is recommended that you try to match your paint sample with a historical colour palette. Colours, techniques, and varnishes manufactured and sold today may not comply with those previously applied in your home, so select a colour as similar as possible.

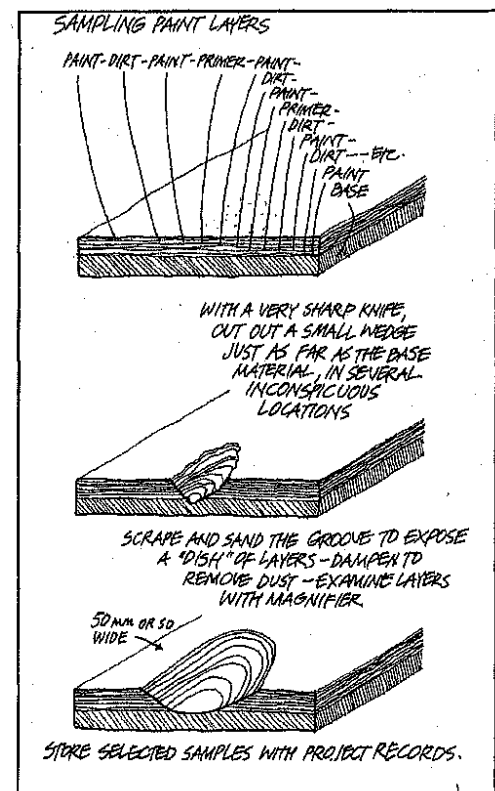


Image How to sample paint layers  
(Fram, 2003, p. 165)

### Maintenance and Repair of Wooden Painted Surfaces

All required maintenance and repairs of the surface, including any intricate woodwork, should be undertaken prior to painting. Refer to the Region of Waterloo's Practical Guide: Windows, Shutters & Doors for instructions on maintaining and removing paint from your wooden windows, shutters and doors.

As mentioned above, in order to best conserve the history of your property previous paint applications should be retained or documented. The paint should be completely removed only when the surface displays continuous patterns of deep cracks, extreme blistering, or bare wood.

The charts below outline the most appropriate remedy for various paint conditions. They were created with the aid of the National Preservation Services' Preservation Brief #10, "Exterior Paint Problems on Historic Wood," and Ken Marchtaler's "Paint," published in "Your Old House Series #1."

#### No paint removal required:

Condition	Cause	Remedy
<b>Organic Matter or Grime</b>	It is common for organic matter to adhere to a painted surface, especially where it is protected (i.e. eaves). This is not a problem unless grime is painted over.	Grime can be hosed down or washed with a solution of detergent and water. Inspect the area after it has completely dried to assess if re-painting is necessary.
<b>Mildew Growth</b>	Mildew is caused by fungi that feed on the nutrients within the paint film. Fungi prosper in moisture and warm climate, particularly in damp and shaded areas. Mildew can be distinguished from dirt, as it will turn white with a drop of household bleach.	First alter the environment in which mildew can thrive. To clean, apply a solution of one cup non-ammoniated detergent, one quart household bleach, and one gallon water. The solution should be scrubbed over the affected area with a medium soft brush before being rinsed off with a garden hose. When repainting the area, choose a mildew-resistant paint.
<b>Excessive Chalking</b>	Chalking is caused by the disintegration of the resin in the paint film due to ultraviolet (UV) rays. When moderate, chalking is the optimal way for paint to age since the chalk will rid the surface of stains and dirt when washed off to provide a clean surface for re-painting. When in excess, however, the chalk can imbed into previous layers of paint to create streaking and inhibit bonding of new paint.	To avoid future excessive chalking, ensure the surface is properly primed before painting, and do not spread the paint too thin.  If chalk appears after wiping your hand on the surface, clean the surface with a solution of ½ cup of household detergent to one gallon of water with a medium soft bristle brush. Rinse with a garden hose and let it dry before recoating with a non-chalking paint.

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<b>Staining</b>	<p>Staining can be caused due to:</p> <ol style="list-style-type: none"> <li>1) Oxidation or rusting of metal features (iron, steel, copper, etc.)</li> <li>2) Chemical reaction between moisture and natural extractives in wood (red cedar or redwood)</li> </ol>	<p>First, locate the source of the stain.</p> <ol style="list-style-type: none"> <li>1) Sand the metal feature by hand, coat with a rust-inhibitive primer, and paint with two layers of finish</li> <li>2) Wash colour extractives with a solution of 1-1 denatured alcohol and water and rinse thoroughly. Apply a stain blocking primer after the area has dried.</li> </ol>
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### Limited paint removal required:

Condition	Cause	Remedy
<b>Crazing</b>	<p>Crazing, recognized by its jagged surface cracking of the top layer, is caused when the old paint layers are no longer flexible enough to respond to the wood's contracting/expanding.</p>	<p>Sand the surface, mechanically or by hand, before repainting. A new coat will protect the surface from moisture penetration. The hairline cracks may still be visible.</p>
<b>Inter-coat Peeling</b>	<p>Peeling is caused by the layers' inability to bond, most likely due to poor preparation before paint application.</p>	<p>Ensure that the surface is void of any salts or impurities before painting. Always sand the surface for best paint adhesion. Apply oil-based paint on oil, and latex paint on latex. To ensure bonding of different paint, always apply an oil type primer (for oil and latex paint) before the top coat.</p>
<b>Solvent Blistering</b>	<p>Blistering is caused when solvent-rich paint dries too quickly when applied in direct sunlight. Un-dried solvents are trapped underneath the dried paint film, eventually creating blisters. To discern between solvent and moisture blistering, cut open a blister. If the underlying paint layer can be seen, it is likely solvent blistering, while it is probably moisture blistering if the wood is revealed.</p>	<p>Scrape and sand the surface, mechanically or by hand, before repainting. Ensure that the surface is not in direct sunlight to enable it to dry properly.</p>
<b>Wrinkling</b>	<p>Wrinkling is caused when the top layer dries before the layer beneath it. Common errors:</p> <ol style="list-style-type: none"> <li>1) paint layer is too thick</li> <li>2) the first layer (most likely a primer) was still wet when the top coat was applied</li> <li>3) the paint applied in high temperatures</li> </ol>	<p>Scrape and sand the surface, mechanically or by hand, before repainting. Ensure that each layer beneath has dried before applying a new coat of paint.</p>



### Paint Removal Required:

Condition	Cause	Remedy
<b>Peeling</b>	When peeling paint reveals bare wood, there is an excess of interior or exterior moisture collecting behind the paint layer. The paint is no longer able to bond with the surface, which usually begins as blistering, since the wooden surface swells due to the excess of moisture.	The moisture problem will need to be resolved before re-painting, since any future coats will not adhere to the surface otherwise. After locating the source(s) of moisture, let the wood dry before scraping off damaged paint with a putty knife. Sand the surface, mechanically or by hand, before priming and painting.
<b>Cracking/ Alligating</b>	Cracking and alligating are advanced stages of crazing. If the crazing is not attended to, moisture penetrates the surfaces and the wood will swell. Cracking will continue parallel to the wood grain, eventually extending into the wood, at which time the paint will also flake.	If the cracking and alligating have not progressed to the wood's surface, scrape and sand, mechanically or by hand, the affected paint layers. The paint will need to be completely removed if it has begun to flake. The paint can be removed by abrasive, thermal or chemical methods. Prime the wood within 48 hours of paint removal, and paint.

## Safety Precautions

### Lead-based Paints

If your home was built before 1960, it most likely contains one or more layers of lead-based paint. If it was built and painted between 1960 and 1990, although unlikely, your home may contain a small amount of lead-based paint on certain interior surfaces. For more information on lead-based paint and safety precautions, please refer to the Region of Waterloo's Practical Guide for Asbestos, Mold & Lead Abatement.

### Volatile Organic Compounds (VOCs)

Certain architectural coatings, such as oil and alkyd paints, wood stains and varnishes contain a high quantity of organic chemicals hazardous to the environment and our health called volatile organic compounds (VOCs). VOCs have been used in paints for their effectiveness in controlling the paint's thickness, ease of application and drying time. They can unfortunately present health hazards with extended exposure, especially in interior spaces. These products have been heavily regulated following the Government of Canada's introduction of the 2010 VOC regulations requiring paint compliance on limited VOC levels.

Health Canada recognizes 2-butanone, oxime, to cause reversible damage to the tissue lining the nose. To avoid health hazards associated with VOCs, you should always apply paint in a well-ventilated area and read the manufacturer's safety and application instructions. Although VOCs are not worrisome in paint that has dried, their use in interior spaces should be limited.

## Paint Removal Methods

It is recommended that historic/original paint and finishes, including stencilling, marbling, and graining, be preserved during restoration efforts to conserve your home's heritage character, and minimize damages done to the underlying layers of paint and base material. Previous layers of paint could be helpful to you and future owners for analysis.

It is possible, as described below, to remove deteriorated paints and finishes to the next underlying layer using the gentlest possible method of paint stripping or cleaning. If replacing deteriorated paint, replace in kind where there are surviving prototypes, and match the new work to the old in form and detailing. It is important to be prepared before beginning a painting project.

### Thermal

This removal method is recommended for extensive paint removal. There are two main methods of thermal removal: for flat surfaces use an electric heat plate; and for solid decorative molding, balusters, fretwork, and "gingerbread" detailing use an electric heat gun. Do not use a blowtorch as you can ignite dust within the paint or wood.

### Chemical

This removal method is recommended for extensive paint removal. The method, consisting of solvent-based strippers or caustic strippers, should be used with caution, and the manufacturer's instructions read carefully, to take proper precautions against inhalation of toxic fumes and to limit damage done to the material's surface. Chemical removers also work well on smaller decorative features, window muntins, doors, exterior shutters, balusters, railings, and columns.

### Abrasive

Abrasive cleaning should only be resorted to after gentler methods have proven ineffective. This removal method can be extremely destructive and should be used only when it is necessary to halt deterioration or remove heavy soiling. It is applicable for flat surfaces without detailed features, for limited to extensive paint removal. An orbital sander or belt sander is recommended, operated by skilled individual. Rotary drill attachments, high pressure water blasting, or sandblasting are not recommended.

## Removal of Paint on Masonry

Before removing the paint on your masonry façade, consider the following:

### **Why was the masonry painted?**

Masonry might have been painted to help protect softer masonry, conceal deteriorating stone, protect the masonry from moisture, or imitate stone.

### **Will the removal of paint affect the heritage significance or image of the building?**

If the building has been painted for a long time, how will the removal of paint affect the building, the streetscape? If buildings were painted at the time of construction, or shortly thereafter, the paint could be considered historically important.

### **Will the paint removal methods damage the masonry?**

Identify, with the help of a conservation professional, which cleaning method is appropriate for the type of masonry and paint. Paint retention or removal can often be justified by the anticipated damage to the masonry. It is often best not to remove paint from masonry. Paint may, however, need to be removed to ensure a good bonding surface if there have been too many consecutive layers built-up on the surface.

## Graffiti Removal

The removal of graffiti should not be attempted by untrained professionals. Removal techniques will vary depending on the type of the surface and paint applied to it. Inappropriate removal methods can permanently damage the surface. Painting over graffiti is also not recommended, as it will damage the architectural character and material of your home or business.

## Paint and Metals

Metals, like masonry, vary in hardness and durability. It is important to cover ferrous metals to stop their quick oxidation and subsequent deterioration, and to uncover metals that are supposed to be uncovered, such as copper, bronze, and stainless steel. An architectural conservator should be consulted prior to any paint removal from metals as the removal method will depend on the type of metal and any paint previously applied. As well, the paint should be sampled to determine the composition of previous layers' (i.e. Was sand added for texture? Was the texture matte or gloss? Was the surface polychrome or marbled?).

Paint covering ferrous metals should always be kept in good condition to discourage rust. If the topcoat of paint does not show signs of deterioration or damage, it can be prepared for re-painting by lightly sanding the surface. A well prepared surface will protect the underlying paint and provide “teeth” for adhesion of new paint. Ferrous metals should be primed with a rust-inhibitive primer within a few hours

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of cleaning. Do not use any water, water-based chemical cleaners or high-pressure grit to clean ferrous metals. Architectural metal features that will be subject to heavy pedestrian use should be protected with a final lacquer or wax coating.

### Paint Removal on Soft Metals

To remove paint from metals, such as lead, tin, copper and zinc, use the appropriate chemical removal method. Abrasive methods are not recommended for soft metals as their finishes are easily scratched.

### Paint Removal on Hard Metals

To remove paint from hard metals such as cast iron, wrought iron and steel, use a wire brush or scraper. If the paint cannot be removed by hand, use very low-pressure dry-grit blasting (100psi). Alkaline compounds, such as methylene chloride or potassium hydroxide, can also effectively be used instead of abrasive blasting.

## Summary

This practical guide has described how paint will highlight and accentuate your home's exterior architectural features, while protecting the underlying surface material from the elements, specifically unwanted moisture penetration. As there is no paint removal method that is completely safe to you and the surface material, potential hazards and safety precautions should be well understood before undertaking work or hiring a professional.

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### Disclaimer

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