

ISSUE 633 **BULLETIN**



## REMOVING PAINT COATINGS

February 2019

- Regular maintenance will extend the life of an exterior paint finish, but it will not prevent long-term deterioration.
- Repainting should be carried out before the paint begins to deteriorate, particularly for timber substrates.
- This bulletin describes the options for exterior paint removal and updates and replaces Bulletin 314 *Removing paint coatings from houses*.

## 1. INTRODUCTION

**1.0.1** Exterior paint finishes protect the underlying substrate from water penetration while also being a decorative finish. Exposure to ultraviolet (UV) light, atmospheric pollutants and weathering, and substrate movement or dampness will, over time, cause the paint to fail.

**1.0.2** Regular maintenance, including washing and repainting, is required to keep the paint finish in good condition and maintain the water resistance of the coating. Annual washing should be carried out to remove dirt, salt spray, moss and mildew growth.

**1.0.3** This bulletin describes the options and techniques for exterior paint removal and important health and safety considerations. It updates and replaces Bulletin 314 *Removing paint coatings from houses*.

## 2. WHEN TO REPAINT

**2.0.1** Repainting should be carried out when the paint finish:

- becomes chalky – that is, rubbing a finger over the paint leaves a white residue
- begins to show initial signs of failure such as peeling, flaking, blistering or cracking.

**2.0.2** Repainting is typically required every 7–10 years, but the actual frequency depends on a number of factors:

- Indication of failure seen as cracking at the edges of weatherboards where the paint coating is thinner and at joints, mitres and board ends where moisture has been able to penetrate the timber through the end grain.
- Environment – the amount of rain washing the surface receives.
- Orientation – the amount of UV light the painted surface receives.
- Cleaning frequency – how often the surface is cleaned to remove a build-up of dirt, salts, moss and mildew.
- Colour – some darker colours will cause greater

thermal movement of the substrate due to heat absorption. However, the addition of infrared reflective pigments can reduce this effect.

- Quality of past surface preparation.
- Quality of the paint.

## 3. ASSESSING EXISTING PAINT CONDITION

**3.0.1** Before repainting, assess the condition and adhesion of the existing paint finish and identify the type of paint used.

### 3.1 TESTING PAINT ADHESION

**3.1.1** Test for paint adhesion by pressing a strip of adhesive tape firmly over a clean section of paint and pulling the tape away. Alternatively, using a sharp knife, score a cross-pattern over a small section of paint, press a strip of adhesive tape firmly over the cross-pattern and pull the tape away. The test tape procedures can be used to map the extent of the paint deterioration.

**3.1.2** If paint flakes come off with the tape, the paint should be removed.

**3.1.3** If paint failure is in small areas only, clean and sand the areas of paint failure (priming/sealing any raw surface exposed) before repainting. Always apply a primer to exposed wood or other raw substrate immediately after sanding to prevent substrate degradation.

**3.1.4** Where paint is firmly attached, clean the surface with a brush and detergent. If the paint has a gloss finish, use a mildly abrasive cleaner to clean the surface. Rinse off before repainting.

### 3.2 DETERMINING PAST PAINT USAGE

**3.2.1** Before starting preparation, identify the existing



Examples of paint failure.

paint used to determine the best preparation methods and compatibility with the new paint system.

**3.2.2** Paints are generally classified according to the solvent used to dissolve or disperse the other components used in paint formulations. These are waterborne paints or solventborne paints.

**3.2.3** Test for the type of paint used:

- Dip a cotton ball in either rubbing alcohol (isopropyl or ethyl alcohol), methylated spirits, an acetone-based nail polish remover or a lacquer thinner.
- Rub the soaked cotton ball over a small, inconspicuous section of the paint surface.
- If paint comes off onto the cotton ball, it is waterborne. If there is no evidence of paint on the cotton ball, it is solventborne.

**3.2.4** It is also advisable to test for the presence of lead. The use of white lead in paint was officially banned in New Zealand in 1979, although it was not used for many decades before that. Older paint coatings may still have layers of paint containing lead. Red lead-based paints are very seldom found but may still be present in very old houses. They can be identified by the distinctive orange/red colour.

**3.2.5** Testing for lead-based paint can be done by a specialist testing company. Alternatively, the presence of lead-based paint can be tested by using a sodium sulphide solution available from pharmacies and hardware and paint stores:

- Prepare a weak solution [about 5% by weight] of sodium sulphide in water.
- Use a sharp knife to cut into the paint film at an angle to expose all layers of paint.
- Place a drop of the solution onto the exposed layers
- If any layers turn black, lead may be present and a specialist testing company should be employed.

**3.2.6** See section 11 for information on how to remove lead-based paint safely.

## 4. PREPARATION

**4.0.1** The life of a paint finish is dependent on good preparation and the application of a quality paint system.

**4.0.2** Good preparation includes:

- removing dirt, chalking, moss and mould
- removing all poorly adhered paint – for example, where there is flaking, peeling or blistering
- sanding to remove rough and sharp edges and existing paint defects so they are not visible through the new paint
- washing or rinsing off the dust after sanding to leave a clean surface
- priming any raw substrate exposed
- checking areas where there will be contacting surfaces such as opening windows and doors to ensure that they will not bind or stick after repainting
- checking that new paint will be compatible with the existing – sanding and applying a primer undercoat before painting may solve any potential problem.

**4.0.3** In the past, oil-based paints continued to harden and become brittle with age so it was necessary to remove existing paint from time to time before repainting. As modern paints consist of formulations that do not continue to harden, there is no need to remove existing paint before repainting unless the condition of the paint requires removal.

**4.0.4** The exception to this is older weatherboards and trims that were preprimed. The early primer paints used in the prepriming process were formulated to be very quick drying, which means the primer continues to harden. In some situations and depending on the condition, the existing paint may need to be removed before repainting.

## 5. OVERVIEW OF PAINT REMOVAL METHODS

**5.0.1** Ways to remove paint are:

- application of heat – hot-air gun, infrared heat
- chemical paint strippers
- mechanical – scraping and sanding
- water pressure
- wet blasting, which requires adding a fine aggregate into the water stream or spray.

**5.0.2** Paint removal methods must be appropriate for the surface from which paint is being removed. Total paint removal is not possible for all substrates because of the porous or textured nature of the surface such as concrete masonry, cement plaster, brick, fibre-cement and the like. At best, all loose or flaking paint should be removed.

**5.0.3** Removal back to a bare surface is feasible with some timber surfaces but not possible with a surface such as rough-sawn timber.

## 6. APPLICATION OF HEAT TO REMOVE PAINT

**6.0.1** Paint can be removed using heat applied with a hot-air gun or infrared paint removers.

### 6.1 HOT-AIR GUNS

**6.1.1** Hot-air guns use air heated by an electric element and blown onto the surface to soften the paint. Commercial models can be effective for larger areas of paint removal and are most often used to remove paint from timber surfaces such as weatherboards and from metal. Hot-air guns make film-forming finishes soft and sticky and makes their removal harder.

**6.1.2** Hot-air guns:

- operate at a lower temperature than a naked flame but there is still a risk of igniting dust or paper-based wall underlays that get exposed to the heat
- may struggle to soften thicker coatings
- can scorch the surface
- may be affected in windy conditions
- will crack glass where the hot air gun is held too close.



#### 6.1.3 When using a hot-air gun:

- place a heat-resistant drop sheet on the ground below the paint removal area to catch the scraped paint
- connect the hot-air gun to a power lead through an earth leakage device
- aim the gun to the paint surface and move it along, taking care not to hold it on one spot for too long as it may scorch the timber
- as the paint softens and bubbles, scrape the paint off using a paint scraper.

## 6.2 INFRARED REMOVAL

**6.2.1** Infrared heat paint removers generate a low-temperature [100–200°C] deep heat that penetrates the wood and draws the moisture and resins in the wood to the surface. This breaks the bond between the wood and the bottom layer of paint or varnish and enables the removal of multiple layers at a time. Unlike other paint removal methods (heat guns, chemical paint strippers and so on), infrared heat does not damage the wood surface and makes cleaning up much easier.

## 7. CHEMICAL STRIPPERS

**7.0.1** Chemical stripping solutions soften the paint to allow it to be scraped off. They can be used to remove paint from a range of substrates, but the stripper should be checked for compatibility with the substrate.

**7.0.2** There are two types of chemical strippers:

- Alkaline strippers are extremely aggressive. They typically consist of sodium hydroxide [caustic soda], which is suitable for most solventborne and some waterborne paints. Water can be used to clean the stripped surfaces.

- Solvent-based strippers are based on benzyl alcohol blended with hydrogen peroxide and can be used to strip solventborne paints, but they are less effective with waterborne paints. Stripped surfaces must be cleaned with an appropriate cleaning solution. Advice about the correct solution should be stated on the stripper container.

**7.0.3** Chemical strippers are either brushed or sprayed onto the painted surface using a low-pressure airless spray system. The low-pressure spray system means the velocity of the spray droplets is low, but they should be used with caution, particularly on windy days to avoid blow-back onto the operator's face and body. The stripper gel is left on the paint for 15–60 minutes to allow it to soften before being scraped off.

**7.0.4** Where possible, where a chemical paint stripper has been applied, cover the area with tinfoil. This can only be done with doors and window sashes that have been removed and laid flat. The tinfoil slows the rate of drying of the stripper, which therefore has time to fully act on the paint. The stripper gel and paint can be scraped off once the paint has softened.

**7.0.5** Once the paint has been removed, the surface must be thoroughly washed down to remove or neutralise any chemical residue. If residue is left behind, it may affect the adhesion of the new paint.

**7.0.6** Chemical-resistant drop sheets should be laid on the ground below the area of paint removal. The decomposed paint must be collected, sealed in rubbish bags and disposed of appropriately.

#### 7.0.7 Chemical strippers:

- are messy to use
- are hazardous, particularly to skin and eyes
- should not be used on or close to aluminium or glass
- may affect some substrates
- can have an internal pressure build-up in containers if incorrectly stored – for example, if the location is too warm – so keep your face clear when opening a container of stripper
- are suitable for use with paint containing lead.

## 8. SCRAPING

**8.0.1** A wide range of paint scraping tools are available. Typically, they are used in conjunction with a hot-air gun or chemical stripper to remove the softened paint. However, some scraping tools are designed to physically scrape the hardened paint from the surface.

**8.0.2** Scrapers for use with a hot-air gun or chemical stripper tend to have a wide flat blade to lift the paint from the surface.

**8.0.3** Scrapers designed to remove hardened paint have a cutting head fitted with tungsten carbide blades, so they can shave off old paintwork. They are available with an adjustable depth of cut so they can strip any thickness of paint and are shaped to suit a range of profiles. They can be safely used to remove lead-based paint as they create no dust. Some types can be fitted with diamond-tipped blades to remove paint from flat concrete, steel and fibreglass/gelcoat surfaces. They are generally used only for commercial work as they are expensive.

### 8.1 HAND SCRAPING

**8.1.1** Hand scraping of hardened paint is slow and not

suited for paint removal from large areas unless the paint is already loose or flaking.

**8.1.2** When using a hand scraper:

- do not gouge or chip the substrate
- do scrape against the timber grain
- do replace blades regularly.

### 8.2 MECHANICAL SCRAPING

**8.2.1** Mechanical scrapers generally consist of wheel-type, rotary wire brushes. They are not recommended for use for house paint removal as they are harsh on timber and will damage galvanised metal roofing.

**8.2.2** Angle grinders are also a type of power scraper, but they are unsuitable for paint removal from most building surfaces as the coarse grinding action will damage the substrate.

## 9. SANDING

**9.0.1** Sanding can be done by hand or by power sanders, depending on the task and area to be sanded.

**9.0.2** Sandpaper is available in different grit sizes – the larger the number, the finer the grit. To remove paint, begin by using a coarse grit and follow this with a finer grit to create a smoother finish.

**9.0.3** When sanding, replace sandpaper regularly as the heat generated during sanding softens the paint and the paper becomes clogged, particularly with waterborne paints.

**9.0.4** All sanded surfaces should be rinsed with water or wiped down with a damp cloth to remove sanding dust.



Immediately seal or prime exposed raw material after sanding to prevent the substrate degrading and then repaint.

## 9.1 POWERED SANDERS

**9.1.1** There are a range of powered sanders, each designed for a specific task:

- **Belt sanders** have a variety of belt sizes and widths and typically come with an attached dust bag. They can be used for large, flat areas of paint removal, are suited to heavy work and are generally faster than other types of sanders. They must be kept flat on the surface for an even finish and to prevent gouging.
- **Orbital sanders** have a vibrating pad to which sandpaper is attached. They can be used in any direction and are best suited for removing thin paint coats or feathering edges of peeled or previously scraped paint. They can also be used on slightly curved surfaces, but they cannot get into corners.
- **Oscillating multi-tool sanders** are lightweight and only suitable for small areas of sanding. The triangular shaped pad and sandpaper is suitable for sanding crevices, tight corners and areas that are hard to get at.
- **Electric drills** can have a range of different sanding attachments fitted including disc sanding pads and drum sanding attachments. They are lightweight and generally unsuitable for removing paint from large areas but can be used to sand curved surfaces. They should be used with care because the high speed of the drill and the relative difficulty of controlling the sander mean it is easy to score and damage the substrate. Wire brush or abrasive disc attachments are not recommended for paint removal.

**9.1.2** When using power sanders:

- use a light touch and avoid pressing the sander into the timber
- try to work on a large area at a time
- regularly replace the sandpaper
- keep the sander moving constantly to prevent gouging or creating wave patterns in timber
- when sanding thick paint, begin with a coarse sandpaper such as 30 grit, then follow with a finer sandpaper (60 or 80 grit)
- use a finer sandpaper for soft timber.

## 9.2 HAND SANDING

**9.2.1** While hand sanding is not the primary method of removing larger areas of failed paintwork, it is used in conjunction with other removal methods to:

- provide a smooth surface finish
- smooth the rough edges of existing paint such as around localised areas of flaking
- feather the raised edges of existing paint
- improve adhesion of the new paint coat to the substrate or an existing sound paint finish.

**9.2.2** Hand sanding can be a dry or a wet process, and different sandpapers are required for each. Wet sand reduces the amount of dust created. Solventborne paints can be sanded more readily with dry-use sandpaper whereas waterborne paints tend to quickly clog dry-use sandpaper, so it is better to use wet and dry paper.

**9.2.3** To remove paint, begin by using a coarse grit such as 60 or 80. Follow this with finer grit such as 120 or 180.

## 10. WATERBLASTING AND STEAM CLEANING

**10.0.1** Waterblasting is not a recommended paint removal method and will not generally remove paint that is well adhered to the substrate. However, it can be used for removing loose or flaking paint from hard exterior surfaces such as profiled metal, concrete and brick.

**10.0.2** Waterblasting must not be used on:

- weatherboards – the pressure can drive water through gaps between the boards and around window sashes and will also damage soft timbers such as cedar
- modified cement plastered finishes – the pressure can damage the finish coat
- soft claddings such as an acrylic plaster – it will erode the plaster.

**10.0.3** Steam blasting softens paint so that it can be scraped off more easily. It is more effective on waterborne than solventborne paints.

## 11. REMOVING LEAD-BASED PAINTS

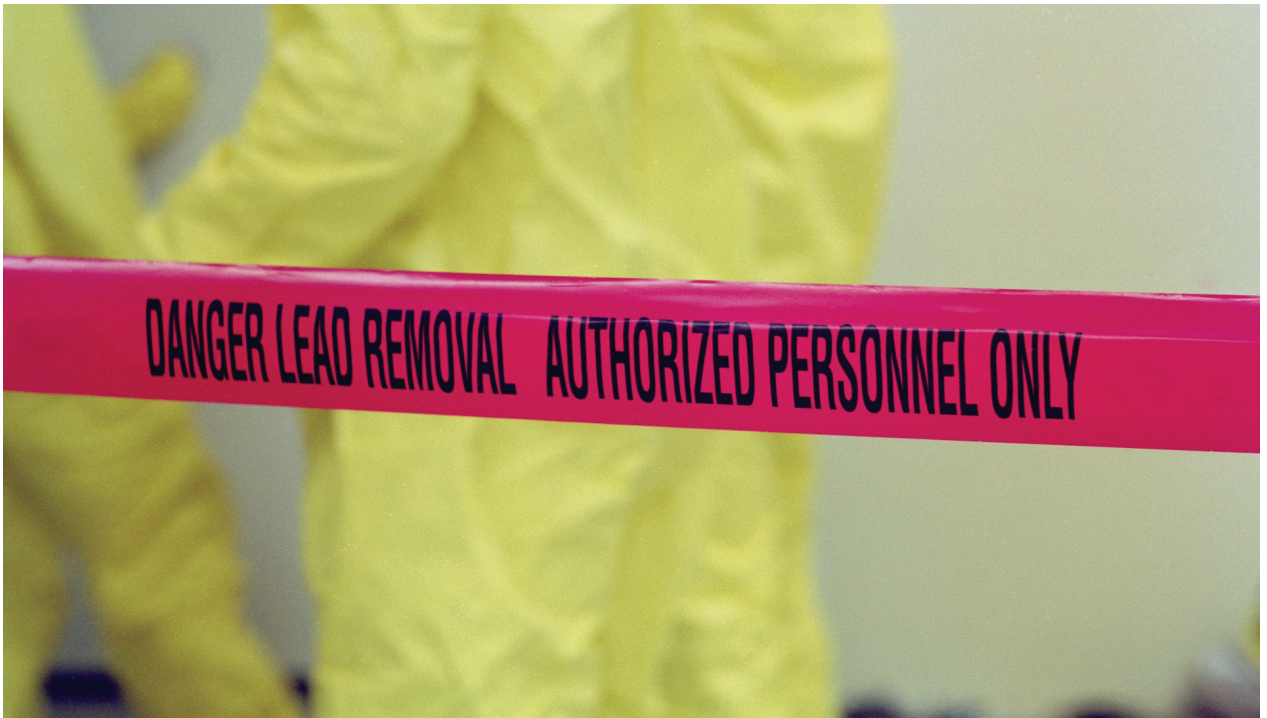
**11.0.1** The removal of paint containing lead is a potential health hazard for the person removing the paint and for building occupants and neighbours, particularly children. Lead fumes, dust or paint fragments can be breathed in or swallowed and will accumulate in the body. Over time, this can result in brain damage and be fatal.

**11.0.2** The following precautions should be taken when removing lead-based paint:

- Wear an effective properly fitted toxic-dust respirator and protective clothing.
- Use drop sheets to collect and remove all dust and paint fragments.
- Place collected dust and paint fragments in sealed rubbish bags, and consult with the local authority regarding disposal.
- Keep doors and windows closed to prevent dust entering the house.
- Use only equipment fitted with a dust catcher or high-efficiency particulate absorption (HEPA) filter vacuum attachment.
- Keep children and pets away from the area, and remove pets' food and drinking bowls.
- Wash your hands and face before eating food or smoking.
- Change out of contaminated work clothes and wash hair and skin thoroughly when finished for the day.
- Do not wear contaminated work clothes in the car or at home.
- Wash work clothes separately from other clothing.

**11.0.3** The recommended methods of removing paint containing lead are:

- wet scraping – use a plastic drop sheet with raised edges to collect the water and scrapings
- a chemical stripper – lead dust may still be present so wet sanding should be used after the chemical stripper



- wet sanding
- heat gun with a low-temperature operation
- dry power sanding with a HEPA vacuum attachment.

**11.0.4** When removing paint containing lead, **DO NOT** use:

- dry sanding
- water blasting
- torch or open flame burning
- abrasive blasting.

## 12. HEALTH AND SAFETY

**12.0.1** There are health hazards associated with all methods of paint removal, so precautions must be taken and personal protective equipment should be used. Working-at-height rules may also apply.

**12.0.2** Always wear an appropriate dust mask or respirator, safety glasses and protective clothing when removing paint.

**12.0.3** For paint removal:

- using a hot-air gun – wear a half-face respirator suitable for use with metallic fumes
- using a chemical paint stripper – wear full personal protective equipment including a properly fitted chemical respirator, overalls and gloves for full skin protection
- by sanding or scraping – wear a suitable dust mask.

**12.0.4** Respirators should meet the requirements of AS/NZS 1716:2012 *Respiratory protective devices*.

**12.0.5** Wear earmuffs when using any power tools.

**12.0.6** Follow general safety precautions:

- Power leads used outside must be connected through

an isolating transformer or an earth leakage device.

- Use drop sheets to collect paint debris. If the paint is being removed with a hot-air gun, the drop sheets should be fireproof.
- Do not eat, drink or smoke while removing paint, and wash hands before eating, drinking or smoking.
- Wash contaminated work clothing separately from other clothing.

**12.0.7** Using chemical strippers

- Before beginning, read the instructions on the chemical paint stripper use.
- Practise using the paint stripper on a scrap piece of painted timber to see how it works [preferably with the same paint finish but this may not be possible].
- Avoid contact with skin and eyes. Immediately rinse off any splashes of paint stripper onto the skin with water. If paint stripper comes into contact with the eyes, treat immediately following the manufacturer's instructions and seek medical help.
- Avoid contact with PVC gutters, downpipes, claddings and doors and windows as the stripper will destroy the PVC.

**12.0.8** Using a hot-air gun:

- Before beginning, read the hot-air gun instructions.
- Practise using the hot-air gun on a scrap piece of painted timber to see how it works [preferably with the same paint finish but this may not be possible].
- Avoid contact with skin, and avoid touching blistering and peeling paint as it will be very hot and can cause burns.

## 13. STANDARDS

AS/NZS 1716: 2012 *Respiratory protective devices*

AS/NZS 2311: 2017 *Guide to the painting of buildings*



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