



CBPI cleaning clay masonry

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code of practice



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introduction

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This code covers the cleaning of clay masonry only and should not be applied to other masonry materials.

In addition to detailing cleaning methods, guidance is given on design and construction techniques to minimise staining. Simple precautions such as these are preferable to later cleaning.

The methods detailed here are based on practices successfully implemented over many years. However tests to determine the most effective technique should always be conducted before undertaking any cleaning or stain removal process.



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design and construction

Consideration should be given during design and construction to avoid or minimise clay masonry cleaning problems.

Bricklaying

Mortar extruded from masonry joints during laying should be cut off with a trowel. In this way a clean cut can be made with little smearing on the unit face.

On completion of laying and joint tooling, mortar smears on the work face should be removed by dry brushing.

Wet sponging of the mortar joints is a common practice with smooth face bricks. Although this creates a smoother joint finish it smears a cement-rich mortar film over the brick face, that often develops into staining.

Cleaning cavities

Cavities can be cleaned by hosing at the end of a day's work. Temporarily leave bricks out at the wall base to enable mortar to be hosed clear of the cavity.

Take care to ensure that mortar does not set on masonry below the base of the cavity and that calcium carbonate stains do not occur. This is best done by thoroughly hosing the masonry below.

Concrete droppings

Masonry supporting reinforced concrete slabs and beams is frequently disfigured by droppings and spattering from the concrete pour. If these deposits are allowed to set it is sometimes impossible to rectify the damage. Protection is best achieved by covering the walls with plastic sheeting. Where this is not done, any deposits on the wall must be thoroughly hosed off before they set.

Copings, sills, weathering

Stormwater should be shed so as to clear the masonry immediately below. Copings and sills should project at least 30 mm beyond the wall face.

In-built elements

In-built elements should slope away from masonry. The soffit of major elements such as balconies should be provided with a drip mould. It is desirable for all roofs to be provided with sufficient overhang to protect the wall below.

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Mortar additives

Some mortar additives if used incorrectly may create problems during the brick-cleaning process, examples being:

- Bycol, an air-entraining agent used to improve the workability of mortar. Its overuse creates a highly porous mortar that is easily eroded during cleaning.
- Dynex, a water modifying agent used to retard the absorption of water from the mortar into the brick, is extremely difficult to remove from the brick if left on for more than one to two weeks.
- Clay: up to five percent of naturally-occurring clay in bush sand is useful in enhancing the plasticity of the mortar. However clay contents around 15 percent are quite detrimental to the mortar, as excessive shrinkage will occur creating cracks within the mortar and at the mortar/brick interface.
- Sugar is used as a mortar retarder. Its overuse creates a hard mortar surface that inhibits the absorption of acid thereby preventing the softening and dissolution of the cement.

Paint overspray and splashing

Extreme care is needed to avoid paint and timber stains being splashed onto masonry. Dried paint is extremely difficult to remove, therefore prevention is the best cure.

Rain interruption

When rain interrupts bricklaying – or is expected overnight – protect the top of the newly laid wall with plastic sheeting.

See also *Insoluble white deposits* in [Section 3](#).

Retaining walls

The rear face of retaining walls should be waterproofed by such methods as cement rendering, coatings of Cemstick, use of a plastic sheet membrane or bituminous coating. This will prevent the migration of soluble salts through the wall. Proper drainage should also be provided behind the wall.

Scaffolding

Scaffolding planks should be laid at least 150 mm clear of the wall, allowing mortar droppings to fall clear instead of building up on the plank and disfiguring the wall. At the end of each day's work – or when rain interrupts work – the plank nearest the wall should be propped on edge to prevent mortar on it being spattered onto the wall.

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A clean start

The cleaner the bricklayer leaves the wall the easier will be the cleaning task. The majority of mortar residues and smears should be cleaned before they set. However, in most cases some additional cleaning will be required to completely remove the mortar residue.

Acids – the basics

Acid concentrations and cautions

The traditional masonry cleaning chemical is hydrochloric acid, (also known as muriatic acid or spirits of salts). Its main function is to put Portland cement into solution, that is, dissolve the cement in the mortar mix. It has few other uses and in many stain situations **should not be used**. Hydrochloric acid is a corrosive S6 poison and care must be taken when using it. If acid is splashed onto the skin it should be immediately swabbed with clean water, or more effectively, with a solution of bicarbonate soda and water, that neutralises the acid.

The recommended maximum strength for light coloured clay bricks is 1 part acid to 20 parts water. The recommended maximum strength for all other clay bricks is 1 part acid to 10 parts water.

Note: This point must be strictly adhered to for bricks manufactured in Queensland. Their raw materials contain large amounts of iron oxide, usually below the surface. The use of acid solutions stronger than 1 part acid to 20 parts water can dissolve these particles and create iron oxide staining. Removal of these stains is treated in [Section 3](#).

Proprietary masonry cleaning solutions are available. The manufacturer's recommendations must be strictly adhered to.

Safety precautions

All masonry cleaning acids are dangerous. To avoid personal injury:

- Wear goggles, gloves and protective clothing
- Always pour acids into water – this avoids splashes onto the operator
- If acid is splashed onto the body, wash with clean water and if possible, neutralise with a mixture of bicarbonate of soda and water.
- The manufacturer's instructions and safety precautions must be strictly adhered to if proprietary cleaning products such as Noskum are used.

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Cleaning – the basics

Cleaning techniques may involve high-pressure water jet equipment or hand methods. Both are detailed later in this section. Whatever technique is used, the following requirements must be observed to ensure that additional staining problems are avoided:

Clean soluble salt deposits first

Soluble salts on the brickwork must first be removed, as hydrochloric acid will not eliminate them and may make their removal more difficult. Generally these salts are either efflorescence – a white ‘fluffy’ deposit – or vanadium salts – a green or yellow stain that is encountered most commonly on cream and light coloured clay bricks. Their removal is detailed in [Section 3](#).

Test areas

Testing in one or more small areas is the safest way to determine the correct chemical solution and technique to remove mortar residues. This must occur well before final cleaning as it will usually not be possible to assess the effectiveness of the test clean until the masonry dries.

Saturate the wall

Failure to completely saturate the wall is in itself a major cause of cleaning stains. Cleaning solutions containing dissolved mortar particles will be drawn into a dry masonry wall, causing further staining. Furthermore saturating the wall keeps the acid solution on the face of the masonry where the mortar smears are present.

The brickwork must be thoroughly wetted by hosing before any acid solution is applied and kept wet ahead of the acid application. The area to be cleaned must be saturated as well as all brickwork areas below. The hose should be trained on the wall until the brick suction is exhausted.

If the wall appears to be drying on the surface, reapply water until ready to apply the cleaning solution. Recommended acid strengths are based on application to a saturated wall and it is a myth to consider that pre-wetting “weakens” the acid.

Note: This point must be strictly adhered to for bricks manufactured in Queensland. Their raw materials contain large amounts of iron oxide, usually below the surface. Failure to saturate the wall allows acid solutions to react with the iron oxide and create iron oxide staining. Removal of iron oxide stains is treated in [Section 3](#).

Leave to stand

The acid solution must stand on the wall for about three to six minutes to allow the chemical action to take place.

Hose off

It is extremely important to thoroughly hose off the wall as the work proceeds. The acid solution and debris cleaned off the wall must not be allowed to dry on the wall. Weather conditions, location of the masonry and the suction of the bricks will effect the timing of the hosing off. Generally two to six square metres should be treated at a time.

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High-pressure water jet cleaning

High-pressure water jet cleaning can be used on clay masonry but the following precautions must be taken so that the bricks and the mortar joints are not damaged by the process.

Caution: Test clean a sample area to determine the effectiveness of the cleaning compound and the technique, and to check wall for possible damage caused by the system.

1. Allow mortar to harden. Cleaning with high water pressure should not start before mortar is at least three days old.
2. Remove all large mortar particles with hand tools – a wooden paddle, brick or chisel – before applying water or cleaning solutions. This ‘pre-cleaning’ is important when cleaning new masonry. Don’t expect acid and/or water alone to remove large particles of hardened mortar.
3. Mask or otherwise protect adjacent materials such as metal, glass and wood, as recommended by the product manufacturers.
4. Saturate the wall with clean water. All areas to be cleaned must be saturated, as well as masonry areas below.
5. When the brick suction is exhausted, apply the appropriate cleaning solution, starting at the top of the wall. The solution may be applied to the wall with a masonry cleaning brush, soft broom or low-pressure (40 psi maximum) sprayer.
Applying acid solutions under high pressure is not recommended. The practice is harmful to the operator, to adjoining property and can drive the cleaning solution further into the masonry than is necessary for surface cleaning, possibly causing further staining.
6. Allow the cleaning solution to remain on the wall for three to six minutes.
7. Wash the wall with high-pressure water from top to bottom so all dissolved mortar particles will be completely flushed from wall surfaces. The force of the water jet on the wall should be a maximum of 7000 kPa (approximately 1000 psi) to prevent damage to the masonry units or mortar.

The force with which a water jet strikes the wall is a function of the flow in the hose, pressure, nozzle type and the distance from the nozzle to the wall. A straight or zero degree water jet should never be used. A spray angle of 15 degrees – a fan jet – will allow the operator to concentrate the pressure on the bricks and not on the joints. The jet should generally be 500 mm from the wall and never closer than 300 mm for localised patches.

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cleaning mortar residues

8. Any lumps or smears remaining after initial treatment will require another scrape, followed by wetting, acid treatment and pressure cleaning. The patience of double cleaning on difficult stains will be rewarded with a first class finish. It also eliminates the risk of eroding bricks or joints, the main objection to the water-blast cleaning method. The gun must be kept moving; surface abrasion will occur if it pauses in one spot.
9. Pressure cleaning should be carried out in 'runs' from the top of the wall down, to rinse down debris during cleaning. The width of a run is usually 1 to 1.2 metres, and should only be as wide as the operator can clean while keeping full control of the pressure gun.
10. When all cleaning is finished, go back and rinse loose sand and dirt from the eaves, walls and windows. Also check if any areas need a small touch up, now that the walls are drying out.

Warning: If the mortar joints or the bricks are being damaged, either the pressure is too high or the water jet is too close to the wall.

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Damage to mortar joints caused by high-pressure cleaning

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Hand cleaning procedure

Hand cleaning was the most widely used method of cleaning clay masonry walls prior to the advent of the high-pressure water jet equipment. This method is very appropriate for small jobs or where the use of high-pressure water jet equipment may cause further problems.

1. Wait for mortar to harden. It is possible to start cleaning 24 to 36 hours after completion of masonry work, depending on the type of brick and the weather (drying) conditions.
2. Remove all large mortar particles with hand tools – a wooden paddle, brick or chisel – **before** applying water or cleaning solutions. This ‘pre-cleaning’ is important when cleaning new masonry. Don’t expect acid and/or water alone to remove large particles of hardened mortar.
3. Mask or otherwise protect adjacent metal, glass, wood, etc. surfaces as recommended by the product manufacturers.
4. Saturate the wall with clean water. The area to be cleaned must be saturated as well as all masonry areas below.
5. Use a brush or spray to apply the cleaning solution to the saturated wall. Start cleaning at the top of the wall. Cover a small area.
6. Allow the solution to remain on the wall for three to six minutes (or as recommended on the label) before scrubbing vigorously. Scrub bricks not joints.
7. Rinse thoroughly as small areas are being cleaned. To slow evaporation, work ahead of sunshine. These ideal conditions allow walls to dry quickly after being washed, permitting the operator to observe if all stains are being removed before moving too far ahead.

Cleaning internal brickwork

Using hydrochloric acid to clean mortar deposits on internal masonry requires special care. The work should be done before the building is enclosed to ensure maximum ventilation and exhaustion of acid fumes.

Frequently this procedure is not followed and the masonry is cleaned at the completion of the building, making it impractical to use large quantities of water. The result can be acid fumes flowing from the masonry for some time after occupation, attacking metal door furniture, light fittings, steel furniture, exposed metal grid ceilings and other metal components.

In addition to early cleaning, the following procedures are recommended when cleaning internal brickwork:

- Use a proprietary cleaner containing an acid inhibitor that reduces fumes from hydrochloric acid. **OR**
- After washing down, apply a neutralising wash consisting of 250 grams bicarbonate of soda to 4 litres of water. Leave this on the wall. If acid fumes are suspected to be coming from the wall, test using litmus paper. Moisten a strip and apply it to the wall. If the blue paper turns red, acid is present and a neutralising wash should be applied.

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3 stain removal

The correct identification of stains on brickwork is the first essential step in the removal process. Testing on one or more small areas is the safest way to determine the correct chemical solution and technique to remove a particular stain. This must take place well ahead of final cleaning as it will usually not be possible to assess the effectiveness of the test clean until the masonry dries.

Copper and bronze stains

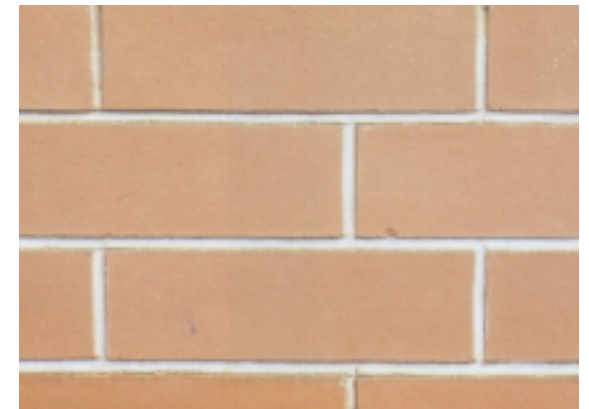
Water running off bare copper or bronze onto masonry will produce green or bluish-green stains.

Removal techniques

Recent copper and bronze stains can be removed using the techniques set out for manganese stains in this section. A poultice may be necessary for stains:

- Dry-mix one part ammonium chloride and four parts powdered talc.
- Mix into a stiff paste by adding ammonia water (household ammonia).
- Apply this over the stain and allow to dry.

Several applications may be necessary.



Efflorescence before and after cleaning

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Efflorescence

Efflorescence is a powdery and sometimes 'fluffy' deposit that forms on the surfaces of porous building materials such as masonry units, mortar and concrete. The temporary appearance of efflorescence is common on new masonry.

- The formation of efflorescence requires three conditions:
- The presence of soluble salts.
- Excessive amounts of water entering the masonry.
- The evaporation of water as the masonry dries out, depositing salts on the surface.

Soluble salts that appear as efflorescence can enter the wall from various sources:

- The masonry units, cement or sand.
- The atmosphere may carry sea spray in coastal areas, or sulphur acids in industrial areas.
- Salt-bearing ground waters or garden fertilisers may be drawn into masonry below the damp-proof course. If damp-proof courses are faulty, salts from ground waters may pass into the higher levels of the wall.

Any situation that allows excessive amounts of water to enter the wall is likely to promote efflorescence. The most common causes are:

- Poor copings and flashings
- The failure to protect new brickwork when rain interrupts bricklaying
- Poor storage of masonry units on site. Before units are placed in the wall they can absorb ground salts and excessive water in the stockpiled masonry, and can mobilise latent salts if they are present in the masonry.

Persistent efflorescence may be a warning that water is entering the wall through faulty copings, flashings or pipes.

Removal techniques

Most efflorescence will naturally disappear over time, however brushing with a stiff dry brush can accelerate its removal. The use of a dust pan or vacuum cleaner to collect the salts after brushing is recommended as this will prevent salts from re-entering the brickwork or any porous paving materials below.

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Graffiti

This is difficult to remove, particularly if it has aged. Old paint deposits will probably require a combination of removal techniques.

Removal techniques

- 1. Fresh aerosol paint**
Use a commercial paint remover.
- 2. Oil-based paints or enamels**
Burn off and follow with scraping and wire brushing.
- 3. Dried paint**
 - a) Flood the stained area for a few minutes with a paint remover of the methylene dichloride type.
 - b) Scrub to loosen the paint film.
 - c) Flush with water to wash away the loosened paint.
 - d) Scrub with scouring powder until the stain is removed.
- 4. Poultice method**

If these methods do not remove all traces of the paint, it will probably be necessary to apply a poultice:

 - a) Mix a strong solution of sodium hydroxide (caustic soda) in an inert base such as diatomaceous earth.
 - b) Apply to a depth of about 5 mm, and leave on the wall for at least 24 hours before hosing off.

Grime

These stains arise from long-term airborne deposition. Grime is worst in industrial areas with heavy pollution problems. Special cases can arise, for example from bird fouling or proximity to railway lines.

Horizontal surfaces such as ledges, sills and raked masonry joints are the worst affected areas.

Removal techniques

Scrubbing with a fibre or soft bronze bristle brush and a liquid detergent is usually effective. Steel wire brushes should not be used, to avoid rust staining from broken bristles.

Large jobs are usually carried out by specialist cleaners using high-pressure water and dry or wet sandblasting. Test cleaning should be carried out before the final cleaning technique is adopted.

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Insoluble white deposits

Insoluble white deposits appear as almost a milky film on the brickwork. These hard white deposits are invisible when wet and insoluble in water, unlike efflorescence that is water soluble. Commonly these stains arise from products of the setting reactions of Portland cement and bricklaying sand containing clay. The combination of clay from the mortar with calcium and silica residues from the cement form calcium silicate that produces the insoluble white scum. Calcium silicate is white and highly insoluble in most acids.

Kaolin, a clay mineral present in most bricklaying sands, can also form a hard deposit. It is insoluble in most acids except hydrofluoric acid. Staining can occur in any of the following ways:

- The most probable cause is incorrect hydrochloric acid cleaning. When too much acid and too little water are used, the products of the reaction between the acid and the mortar are absorbed into the brick faces instead of being washed clear of the wall.
- When newly laid masonry is unprotected and saturated by rain, lime is put into solution either from Portland cement or hydrated lime in the mortar. The solution takes in carbon dioxide from the atmosphere and precipitates calcium carbonate, a whitish stain that is disfiguring and not easily soluble in hydrochloric acid. Frequently new masonry is marred by bands of this calcium carbonate staining, confined to three or four courses of masonry.
- By the interaction of lime leached by water from concrete elements or cement rendering.
- By the wet sponging of mortar joints that smears a cement-rich mortar film over the brick face. In this case it is often better to follow the hydrochloric acid cleaning immediately with a treatment of Noskum or an equivalent product to reduce the potential of staining.

Removal techniques

The application of Noskum or equivalent at full strength will usually remove these stains. In some cases, the reaction is immediate and should be followed by vigorous scrubbing. In others, the cleaning solution should be allowed to stand for four to six minutes prior to scrubbing.

A small test area should be used to determine the appropriate treatment technique. More than one chemical application may be required. The wall should be rinsed thoroughly after each treatment.

Note: The manufacturer's instructions and safety precautions must be followed when a proprietary cleaning product such as Noskum is used.

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3 stain removal

Iron and welding spatter

Where unprotected steel is built into masonry, unsightly rust stains will result on both bricks and joints. Similar stains will occur if welding is carried on too close to masonry.

Removal techniques

Phosphoric acid

Mix a solution of one part phosphoric acid to three parts water. This acid will fade mortar containing iron oxide pigments. After removal neutralise the wall with bicarbonate of soda solution, leaving it on the wall.

Oxalic acid

Mix a strong solution of 500 grams oxalic acid to four litres of hot water. After removal, neutralise the wall with bicarbonate of soda solution, leaving it on the wall.

Proprietary cleaners (Noskum or equivalent)

Noskum and equivalent products are effective in removing these stains. After removal, neutralise the wall with a bicarbonate of soda solution, leaving it on the wall.

Note: The manufacturer's instructions and safety precautions must be followed when a proprietary cleaning product such as Noskum is used.

Iron oxide stains (acid burn)

This is a yellow to brown rust-like stain, varying from a light to deep brown stain on cream bricks. Iron oxide stains frequently result from the incorrect use of hydrochloric acid on clay masonry.

This stain is commonly called 'acid-burn' because the reaction between hydrochloric acid and iron oxides in the brick and/or mortar sand causes the formation of iron oxide or rust.

The most common causes of incorrect hydrochloric acid cleaning leading to iron oxide staining are:

- Failing to thoroughly pre-wet the wall and keep it wet ahead of the cleaning operation.
- Failing to thoroughly hose down each four to six square metres of the cleaned area.
- Using a hydrochloric acid solution stronger than 1 part acid to 20 parts water on light coloured bricks or stronger than 1 part acid to 10 parts water on other bricks.

Pre-wetting and frequent washing off is designed to prevent undue penetration of the acid into the brick and mortar where further reactions and staining often occur. Too often the acid solution is not given sufficient time to act properly, usually resulting in the operator increasing the acid strength.

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3 stain removal

Removal techniques

1. Phosphoric acid

Mortar containing iron oxide colouring pigment will be lightened by this treatment. To maintain a uniform appearance treat an entire wall or keep the phosphoric acid clear of the mortar.

Protection should be provided to powder-coated fixtures, painted surfaces and concrete coloured with oxides, such as paths and roof tiles, to prevent discolouration by the phosphoric acid solution.

The application strength and duration will vary. As a general guide, use a mixture of one part phosphoric acid to four parts water.

- a) Apply by brush or spray to the dry wall and allow to stand until the stain disappears, usually within 30 minutes, but can take up to 24 hours.
- b) Wash off.
- c) Neutralise any remaining acid by applying a solution of bicarbonate of soda or washing soda. Do not wash off.

2. Oxalic acid

- a) Use a solution of 20 to 40 grams per litre of water.
- b) The method of application is the same as for the phosphoric acid treatment.
- c) Again it is essential to neutralise the brickwork.



Iron stains

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Manganese stains

A dark-blue brown discolouration may occur on bricks that have been coloured grey or brown by the addition of manganese during manufacture. The stain occurs most characteristically along the edges of the brick.

The problem with manganese stain is not so much the removal of the stain, as preventing its return in a short period.

Removal techniques

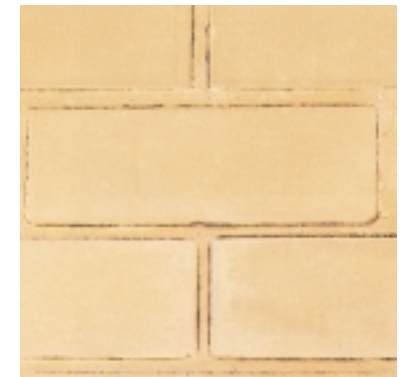
1. Acetic acid

Apply a solution of one part by volume of acetic acid (80 percent or stronger) and one part hydrogen peroxide (30 to 35 percent strength) to six parts water.

Warning: Extreme care must be taken in the use of this solution as the fumes generated can cause nausea. It should not be used in confined spaces.

2. Phosphoric Acid

Mix a solution using one part phosphoric acid to three parts water. This acid will fade mortar containing iron oxide pigments.



Manganese stains

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Oil, bitumen and tar stains

These stains generally arise from the actions of other trades or due to a lack of care in protecting materials in the structure. They usually require two treatments with a commercial emulsifying agent (degreasing solution).

Removal techniques

Mix an emulsifier with kerosene to remove the stain. Clean the kerosene off with the emulsifier only mixed with water.

Hardened oil must first be scraped off or free oil mopped up immediately with an absorbent material, such as paper towels. Wiping should be avoided as it spreads the stain and tends to force the oil into the masonry.

The area affected should then be covered with a dry absorbent material such as Fullers earth, hydrated lime, Portland cement or whiting and the procedure repeated until there is not further improvement. (The selection of the absorbent material will be a function of the colour of the unit and the acceptability or otherwise of materials being trapped within interstices in the surface.)

Steam cleaning with a hot 10 percent sodium hydroxide solution may also be used but there is a risk of bleaching.

A further method is to apply a poultice of naphtha or trichloroethylene to the stained area.

Organic growths

These are common where masonry is in contact with damp soil, such as flower boxes, retaining walls and in sunless spots.

Some control of organic growth can be achieved by the use of water repellents or clear sealers. Flower boxes and the rear of brick retaining walls should be cement rendered with waterproof mortar or covered with heavy duty plastic sheeting to prevent water seepage into the wall.

It is also advisable to render the top of these walls or provide a brick coping, ensuring that a good cross fall is provided to shed water rapidly.

Removal techniques

As much growth as possible should be removed by vigorous brushing with a bristle brush. For heavy growth, scraping and wire brushing may be necessary

After this dry cleaning, apply a proprietary weed killer or liquid chlorine. Leave on the surface for several days, brush off and clean with hot water and detergent.

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Smoke stains

These stains vary from minor conditions around domestic open fireplaces to major problems of cleaning of face masonry in fire-damaged buildings.

These chemical treatments may be supplemented by high-pressure water jet cleaning to scour the many small crevices on the masonry surface.

Removal technique

1. Minor stains

Minor stains can be removed readily with sugar soap, a highly alkaline mixture. Mix about 500 grams sugar soap with 2 litres hot water and apply liberally by brush. After the stains disappear scrub with a mixture of detergent and a household scouring powder containing sodium hypochlorite.

Noskum or equivalent products are also effective in smoke stain removal.

2. Smoke-damaged buildings

The problems in fire-damaged buildings are usually complex, with widespread smoke stains and severe localised staining where highly-combustible materials have burnt.

An initial treatment with sugar soap will remove some of the deposits. This can be followed by an application of sodium hypochlorite. The full strength chemical should be left on the wall for about 10 minutes before scrubbing and hosing.

General cleaning with Noskum or an equivalent product after these applications may complete the cleaning. **Note:** The manufacturer's instructions and safety precautions must be followed when a proprietary cleaning product such as Noskum is used.

3. Severely-affected areas

These may require a poultice treatment:

Use an inert filler material such as diatomaceous earth, mixed with sodium hypochlorite (bleach) to form a thick paste.

Apply to the stained areas by trowel or steel float to a depth of 5 mm.

Leave on the wall 24 to 48 hours before removal by hosing and scrubbing.

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Soil and dirt stains

Base courses of masonry are frequently disfigured with splashing from adjacent soil. These deposits should be removed as soon as possible.

Removal technique

Saturate the soiled area with water and scrub with a bristle brush and a solution of one cup detergent to five litres hot water.

Timber stains

These usually arise from water spreading tannin or resin stains on the wall, particularly from hardwoods. The stains are usually brown or grey and are present on both bricks and mortar. Timber stains can usually be avoided by ensuring that all timber, especially hardwood, built into or adjacent to masonry is primed or sealed prior to fixing.

Removal techniques

Normally timber stains will be removed by scrubbing with a solution of 120 grams oxalic acid to four litres hot water. Neutralise the wall after this treatment.

Where the stain is not removed by this solution, two other treatments can be used. One is to apply a bleaching solution containing sodium hypochlorite and allow it to dry on the wall. The other treatment is the same as that recommended for the removal of iron and welding spatter stains given in this section.

Noskum and equivalent products have also been found to be effective in removing these stains.

Note: The manufacturer's instructions and safety precautions must be followed when a proprietary cleaning product such as Noskum is used.

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Vanadium stains

Light-coloured clays often contain vanadium salt that may appear as a yellow, green or reddish-brown discolouration of the brick.

Vanadium stains are often generated by the use of too strong a concentration of hydrochloric acid during the initial cleaning process or by saturation of units prior to laying. Hydrochloric acid may turn the stains black and make them more difficult to remove. Therefore it is essential that any vanadium salts evident prior to the brick cleaning process be removed before hydrochloric acid is applied.

Vanadium stains are neither permanent nor harmful and do not indicate a defect in the brick. Vanadium stains in exposed areas generally wash off in time but their removal can be hastened by chemical treatment.

After the initial removal of vanadium stains, more water on the masonry – even that used in the cleaning process – may induce further efflorescing of the salts to the surface, depending on the amount within the brick.



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Removal techniques

A number of chemical treatments are available to remove vanadium stains. It is best to test the efficiency of these chemicals on a test area to determine the most suitable treatment to use.

1. Sodium hypochlorite

This is the active ingredient in household bleach and swimming pool chlorine and is an inexpensive treatment for mild cases of vanadium staining. Spray or brush sodium hypochlorite onto the stain without pre-wetting, allow it to stand until the stain disappears, then rinse.

2. Oxalic acid

This is probably the best-known chemical for the removal of vanadium stains. However if used it **must** be followed by a neutralising wash. This action is commonly omitted resulting in further serious staining. The correct procedure is:

- a) Mix 20 to 40 grams oxalic acid per litre of water (preferably hot).
- b) Apply to the stained bricks without pre-wetting.
- c) Neutralise the oxalic acid by applying a solution of 15 grams of washing soda per litre of water. Do not wash off.

3. Potassium hydroxide or sodium hydroxide (caustic soda)

Mix 150 grams potassium or sodium hydroxide per litre of water and apply to the stained bricks. Leave on the wall until the stain disappears, then wash off. A white residue may appear after this treatment and this should also be hosed off.

4. Proprietary cleaners (Noskum or equivalent)

These are general-purpose cleaners that rapidly remove the stain. Apply to dry brickwork. The stain should disappear almost immediately. Neutralise the wall by applying a solution of 15g of washing soda per litre of water. Do not wash off.

Note: The manufacturer's instructions and safety precautions must be followed when a proprietary cleaning product such as Noskum is used.

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