

Manual 13



# Clay Masonry Cleaning Manual

We represent the clay brick and paver manufacturers of Australia.

Our purpose is to make sure clay brick is recognised as the pre-eminent building material by leading architects, developers, builders and property owners.

We're here to promote great home and commercial design using clay brick and pavers.

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# Introduction

This manual 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 and the need for subsequent cleaning.

Simple precautions will help avoid staining and disfigurement and are always preferable to later cleaning.

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

## Section 1: Design and construction

Consideration should be given during design and construction to the following matters 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 of 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. 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 10 mm beyond the wall face at the underside of the sill or coping. Sills should be angled to properly shed water.

Where downpipes have not been installed water from the guttering should be diverted away from the brickwork.

### 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.

### Mortar additives

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

- Air-entraining agents such as Bycol or similar used to improve the workability of mortar. Its overuse creates a highly porous mortar that is easily eroded during cleaning.
- Water modifying agents such as Dynex or similar, 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.

## Section 2: Cleaning mortar residues

- Up to ten percent of naturally-occurring clay in bush sand is useful in enhancing the plasticity of the mortar. However clay content around 15 percent is detrimental to the mortar as excessive shrinkage will occur, creating cracks within the mortar and at the mortar/brick interface.
- Sugar used as a mortar retarder is not recommended as it creates a hard mortar surface that inhibits the absorption of acid, thereby preventing the softening and dissolution of the cement when cleaning mortar residue (the use of sugar in mortar does not comply with the relevant Codes and Standards).

### 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 calcium stains 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 which may have collected on it being splattered onto the wall.

### A clean start

The cleaner the bricklayer leaves the wall the easier the cleaning task will be. 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

#### Safety requirements

All acids and proprietary cleaners are dangerous. Users are required by law to:

- Obtain a copy of the manufacturer's Material Safety Data Sheet (MSDS) for every chemical used in the conduct of their work and to only use the product in accordance with the instructions in the Material Safety Data Sheet.

In particular you are reminded that hydrochloric acid is classified as a corrosive S6 poison. All steps should be taken to comply with the requirements for its use in the Material Safety Data Sheet.

To avoid personal injury users should always:

- Wear all necessary safety equipment detailed in the Materials Safety Data Sheet including but not limited to goggles or face mask, gloves, and protective clothing as advised.
- Pour acids into water – this avoids splashes of highly concentrated acid onto the operator.



Typical wall after brick laying

- If an acid or proprietary cleaner is splashed onto the skin, it should be immediately swabbed with clean water or more effectively with a solution of bicarbonate of soda and water that will neutralise the acid. Medical attention should be sought with respect to any injury arising from the use of chemicals. Chemical spills are required to be treated in accordance with the advice contained in the Material Safety Data Sheet.
- For transport and environmental care of such chemicals, users should refer to their State regulatory authorities.

## 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**.

The recommended maximum strength for light coloured clay bricks is 1 part acid to 20 parts water, and 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 particularly for bricks manufactured in Queensland. Their raw materials naturally contain large amounts of iron oxide, sometimes just 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 adhered to strictly.

## 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:

### Saturate the wall

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 upon 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.

Failure to completely saturate the wall is 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.

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. 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.

## Acid application

Apply the acid solution and leave to stand on the wall to allow the chemical action to take place, this could take up to 3 to 6 minutes, however for bricks manufactured in Queensland and Western Australia a lesser time is advised or secondary staining can occur.

### Hose off

If the acid is left on the wall too long it can be absorbed into the brickwork and may cause staining.

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 affect the timing of the hosing off. Generally two to six square metres should be treated at a time.

## Procedure for hand cleaning

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 an important part in cleaning new masonry. Don't expect acid and/or water alone to remove large particles of hardened mortar.
3. Mask and otherwise protect adjacent materials such as metal, glass and wood, as recommended by product manufacturers.
4. Care should be taken to identify and remove any vanadium staining on the brickwork prior to applying the solution of hydrochloric acid, as it may turn the vanadium black and make it more difficult to remove. For further information regarding removal of vanadium stains refer to Section 3.
5. Thoroughly wet the face of the wall with clean water. All areas to be cleaned must be saturated as well as masonry areas below.
6. Use a brush or spray to apply the acid solution to the saturated wall. Start cleaning at the top of the wall. Cover a small area.
7. Allow the solution to remain on the wall for sufficient time for the reaction to take place. This could take up to 3 to 6 minutes. Then scrub vigorously with a scrubbing brush. Scrub bricks not joints.
8. Rinse thoroughly as small areas are being cleaned. To slow evaporation, work ahead of sunshine. These ideal conditions allow walls to dry soon after being washed, permitting the operator to observe if all stains are being removed before moving too far ahead.

## High pressure water jet cleaning

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

**Caution:** Turbo or rotary head attachments damage brickwork and are not recommended.

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

Allow mortar to harden. Cleaning with high water pressure should not start before mortar is at least three days old.

1. Remove all large mortar particles with hand tools – a wooden paddle, brick or chisel – before applying water or cleaning solutions. This 'pre-cleaning' is an important part in cleaning new masonry. Don't expect acid and/or water alone to remove large particles of hardened mortar.
2. Mask and otherwise protect adjacent materials such as metal, glass and wood, as recommended by product manufacturers.
3. Care should be taken to identify and remove any vanadium staining on the brickwork prior to applying the solution of hydrochloric acid as it may turn the vanadium black and make it more difficult to remove. For further information regarding removal of vanadium stains refer to Section 3.

4. Thoroughly wet the face of the wall with clean water. All areas to be cleaned must be saturated as well as masonry areas below.
5. When the suction of brick is exhausted, apply the appropriate cleaning solution, starting at the top of the wall working in small areas. The solution may be applied to the wall with a masonry cleaning brush, soft broom or low pressure (maximum 40 psi) 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 to allow the chemical reaction to take place, this could take up to 3 to 6 minutes, however for bricks manufactured in Queensland and Western Australia a lesser time is advised or secondary staining can occur.



Damage to ironed mortar joint



Damage to bricks caused by incorrect use of high pressure water jet cleaning

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 maximum pressure at the pump should be kept low, around 7000 to 8000 kPa (1000 to 1200 psi), to prevent damage to either the masonry units or the mortar.

The concentration of power with which the water jet strikes the wall is a function of the flow in the hose, the pressure, the type of nozzle 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, called 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.

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. The gun must be kept moving: surface abrasion will occur if it pauses in one spot.

Turbo head water jets are not recommended as there is a high potential for damaging the bricks and/or mortar by the concentrated force of the water.

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 objections to the water-blast cleaning method.

9. When all cleaning is finished, go back and rinse loose sand and dirt from the eaves, walls and windows. Once the walls begin to dry, check to see if any further cleaning is required.

**Caution:** 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.

**Caution:** Before cleaning dry pressed bricks the manufacturers advice should be obtained as the use of high pressure water cleaning is not recommended.

## 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 65 grams of Sodium Bicarbonate per litre 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.

Quite often stains occur on brickwork from the failure to follow correct cleaning procedures when removing mortar residue. Stains are aesthetic blemishes and do not affect the structural adequacy of the brickwork and are generally easily removed.

The correct identification of stains on brickwork is a first 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.

# Section 3: Stain removal

## Acid burn (Iron oxide stain)

This is a yellow, orange to brown rust-like stain. It is most obvious on cream bricks but can similarly occur on darker coloured 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 on the face of the brick and can also leach into the mortar joint.

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.
- Too often the acid solution is not given sufficient time to act properly, usually resulting in the operator increasing the acid strength.

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. Window sills and corners require particular attention with pre-wetting as the water readily runs off instead of being absorbed.



Acid burn on face brick work



Acid burn on light coloured bricks

## Removal technique for acid burn

### Phosphoric acid

1. The application strength and duration will vary. As a guide, use a mixture of 1 part phosphoric acid to 6 parts water.
2. Apply by brush or spray to the dry wall and allow to stand until the stain disappears, usually within 30 minutes, but it can be up to 24 hours.
3. More than one application may be required.

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.

### Oxalic acid

1. Use a solution strength of 20 to 40 grams per litre of water.
2. The method of application is the same as for the phosphoric acid treatment.
3. More than one application may be required.
4. Neutralise the oxalic acid by applying a solution of 15 grams of Sodium Bicarbonate per litre of water. Do not wash off.



## Calcium stains

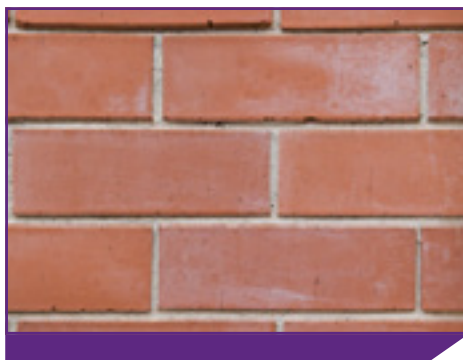
Calcium stains appear as almost a milky film on the brickwork. These hard white deposits are invisible when wet but insoluble in water, unlike efflorescence which is water soluble.

Most 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 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:

- 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 the cement or hydrated lime in the mortar.
- 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.



**Typical calcium stain from wet sponging mortar joints**



**Calcium stains leaching from adjacent concrete balcony**

## Removal techniques for calcium stains

The application of Noskum or an equivalent product (e.g. hydrochloric acid, refer to page 6 Acid concentrations and cautions) 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 some 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 or its equivalent is used.

## Vanadium stains

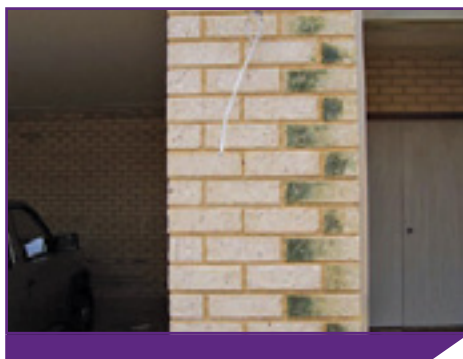
Light-coloured clays often contain vanadium salt that are generally colourless, but under certain conditions may appear as a yellow, green or reddish-brown discolouration of the brick.

It is essential that any vanadium salts evident prior to the removal of mortar residue be removed, as the hydrochloric acid may turn the salt black and become difficult to remove.

Vanadium stains are often generated by the use of too strong a concentration of hydrochloric acid during the initial cleaning process, or from excessive water penetration.

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.



**Vanadium as a green stain on light coloured bricks**



**Vanadium stain not removed prior to hydrochloric acid application**

## Removal techniques for vanadium stains

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.

### Sodium hypochlorite

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

### Oxalic acid

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

1. Mix 20 to 40 grams oxalic acid per litre of water (preferably hot).
2. Apply to the stained bricks without pre-wetting.
3. Neutralise the oxalic acid by applying a solution of 15 grams of Sodium Bicarbonate per litre of water. Do not wash off.

### 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. Extra care should be taken when using highly corrosive solutions such as these.

### Proprietary cleaners

These are general purpose cleaners that rapidly remove the stain. The manufacturer's instructions and safety precautions must be followed when using a proprietary cleaning product.

## Efflorescence

Efflorescence is not a stain, it 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.

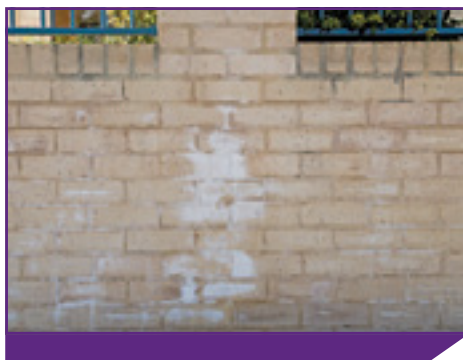
The soluble salts that appear as efflorescence can enter the wall from various sources:

- Mortar components, particularly cement.
- Soil or fill in contact with the wall.
- Sea spray in coastal areas.
- Masonry units, however this is not a common source.

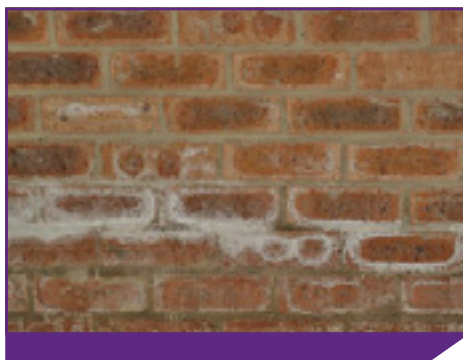
Any situation that allows excessive amounts of water to enter the wall is likely to promote efflorescence. The most common causes are:

- 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.



**Efflorescence as seen on brick faces**



**Efflorescence from ground salts**

## Removal techniques for efflorescence

Most efflorescence will naturally disappear over time, however its removal can be accelerated by brushing with a stiff dry brush. 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.

After brushing and cleaning up, an absorbent cloth (wrung out until damp only) can be used to pick up any residue. Frequent rinsing of the cloth in fresh water is advisable. Rinsing brickwork with water will only cause the salt to be reabsorbed into the bricks and reappear when dry.

## Graffiti and paint

These are difficult stains to remove, particularly if they have aged. Old paint deposits will probably require a combination of removal techniques.

### Removal techniques for graffiti and paint

#### Fresh aerosol paint

Use a commercial paint remover in accordance with the manufacturers' instructions.

#### Oil-based paints or enamels

Burn off and follow with scraping and wire brushing ensuring not to damage the brickwork.

#### Dried paint

1. Flood the stained area for a few minutes with a paint remover of the methylene dichloride type.
2. Scrub to loosen the paint film.
3. Flush with water to wash away the loosened paint.
4. Scrub with scouring powder until the stain is removed.

#### Poultice method

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

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

## Iron and welding spatter

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

### Removal techniques for iron and welding spatter

#### Phosphoric acid

1. The application strength and duration will vary. As a general guide, use a mixture of 1 part phosphoric acid to 6 parts water.
2. Apply by brush or spray to the dry wall and allow to stand until the stain disappears, usually within 30 minutes, but can be up to 24 hours.
3. More than one application may be required.

#### Oxalic acid

1. Use a solution strength of 20 to 40 grams per litre of water.
2. The method of application is the same as for the phosphoric acid treatment.
3. More than one application may be required.

#### Proprietary cleaners

These are general purpose cleaners that rapidly remove the stain. The manufacturer's instructions and safety precautions must be followed when using a proprietary cleaning product.

## 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.

### Removal techniques for oil, bitumen and tar stains

1. Treatment with a commercial emulsifying agent (degreasing solution).
2. Mix an emulsifier with kerosene to move 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, 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 diatomaceous earth, hydrated lime, or whiting and the procedure repeated until there is no 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.)

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

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 that should be left on the surface for several days. Brush off and clean with hot water and detergent.



## Smoke stains

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

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

### Removal techniques for smoke stains

#### Minor stains

Minor stains can be removed readily with sugar soap that is a highly alkaline mixture. Mix about 500 grams into 2 litres of 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.

#### Smoke-damaged buildings

The problems in fire-damaged buildings are usually complex, with widespread smoke stains and localised severe 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 or its equivalent is used.

#### Severely-affected areas

These may require a poultice treatment:

1. Use an inert filler material such as diatomaceous earth, mixed with sodium hypochlorite (bleach) to form a thick paste.
2. Apply to the stained areas by trowel or steel float to a depth of 5 mm.
3. Leave on the wall 24 to 48 hours before removal by hosing and scrubbing.

## Soil and grime

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

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 for soil and grime

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.

## 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.

### Removal techniques for timber stains

Normally timber stains will be removed by scrubbing with a solution of 20-40 grams oxalic acid per litre of 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 acid burn given in this section.

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

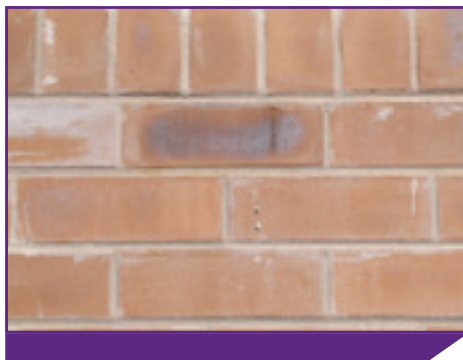
**Note:** The manufacturer's instructions and safety precautions must be followed when a proprietary cleaning product such as Noskum or its equivalent.

## 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 and is generally caused by excessive water penetration. In severe cases it may show as a stain across the face of the brick.

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

- Minimising water penetration into brickwork by ensuring all mortar joints are filled.
- Using ironed joints as they form a better weather-shield than other types.
- Ensuring copings at the top of the wall are effective.
- Covering all brickwork under construction during periods of wet weather.
- Insertion of effective damp proof membranes as brickwork progresses.



Signs of manganese staining

## Removal techniques for manganese stains

### Phosphoric acid

1. Mix 1 part phosphoric acid to 6 parts water.
2. Apply with brush or spray to dry wall.
3. Avoid splashing any adjoining metal surfaces.
4. Reaction can take up to 24 hours and more than one application may be required.

### Acetic acid

1. Mix 1 part acetic acid (80% stronger) with 1 part hydrogen peroxide (30 to 35% concentration) with 6 parts water.
2. Apply with brush or spray to dry wall.
3. Avoid splashing any adjoining metal surfaces.
4. Reaction should be almost immediate however more than one application may be required.

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