

CARE & MAINTENANCE

Care, Maintenance & Repair of Pitched Roof Coverings and Wall Claddings.

A guide to the care, maintenance and repair of concrete tiles, clay tiles and metal profiled sheet used on pitched roofs and wall claddings

BS 5534 & BS 8000-6 Profiled Sheet Roofing and Cladding

A Guide to Good Practice, NFRC & HSE - HSG 33 & INDG 284

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INTRODUCTION

It is acknowledged that all roofs require some level of maintenance during their lifetime, even if it merely involves the removal of wind-blown debris from valleys and gutters.

Sometimes access to a roof is required in order to maintain other building elements e.g. windows and chimneys. Consequential damage to the roof or wall cladding can also compromise the integrity of the roof covering, leading to water ingress and loss of safety of the roof element.

This document contains guidance to enable designers, contractors and building owners to identify specific maintenance and repair items that can affect roofs and walls clad with concrete tiles, clay tiles or metal profiled sheet and to implement appropriate design and maintenance measures. Before commencing to replace the roof covering or wall cladding, or carry out any structural alterations to the roof or walls, the designer or installer should refer to the current Building Regulations⁽¹⁾ and their requirements.

When correctly installed in accordance with the recommendations of BS 5534⁽²⁾ and BS 8000 – 6⁽³⁾, or the NFRC Guide to Good Practice for Profiled Sheet Roofing and Cladding⁽⁴⁾ a completed roof or wall clad with concrete tiles, clay tiles or metal profiled sheet should give trouble-free performance for the guaranteed life of the product without the need for extensive maintenance or repair.

To achieve the full benefits of a roof or wall clad with concrete tiles, clay tiles or metal profiled sheet there are a number of standard procedures which should be drawn to the attention of the building owner or maintenance operative, when occupying the completed building.

Both concrete and clay roof and wall claddings should be treated as fragile and basic precautions should be taken to avoid access to the roof by window cleaners, chimney sweeps, aerial installers etc., without the correct use of crawling boards, roof ladders or access platforms. Although metal profiled sheet coverings can be fully walkable when correctly installed all Health and Safety Regulations still need to be followed. Failure to use adequate access equipment can damage fragile tiles and fixings and may be in contravention of Health and Safety Regulations.

1 Care & Maintenance

Minor maintenance of roofs is important to maintain optimum performance of the roof. Minor maintenance involves carrying out regular visual inspections of the roof, usually twice a year, in the Spring and Autumn. However, as a minimum visual inspection should be carried out by suitably experienced persons at least once per year and always after severe storms⁽⁵⁾. It is a condition of the product guarantee for Redland metal profiled sheet that inspection and minor maintenance is carried out once every year.

Inspection of the roof should always start from the inside of the building. Is there any internal evidence of roof leakage or problems? The location of internal evidence of dampness can be used to pinpoint any serious problems that exist. Such checks should be carried out prior to the exterior inspection.

Where practicable, roofs from the outside should be inspected from the eaves or gable ends, avoiding the need to traffic on the roof. When access to the roof surface is essential then appropriate roof traffic equipment (crawling boards, roof ladders etc.) must be used unless it has been established that Redland metal profiled sheet has been installed at the correct batten spacing to provide full walkability.

Any leaves and debris should be removed from valleys, gutters, and drain pipes, and any moss or lichen growths that restrict the flow of water off the roof slope (See section on Mosses and Lichens). Gutter joints should be inspected for defective sealant or loose bolts.

Check that there are no loose ridge, hip or other components and the function of any roof space ventilation components is OK. Clear any grilles or apertures to ensure adequate air flow into the roof void. Normally dry-fixed components should be maintenance-free if correctly installed, however, mortar bedded ridges, hips, verges and valleys can be susceptible to cracking of the mortar and hence possible displacement of the components if they are not mechanically fixed. It is important therefore that mortar bedded roof details are carefully checked as part of the visual inspection of the exterior.

For Redland metal profiled sheet roofs contact Redland Technical Solutions for a copy of the detailed Inspection and Maintenance recommendations to be carried out annually. It is important that these checks and maintenance are carried out to ensure the integrity of the roof surface and fixings are not compromised by corrosion. Check also for missing foam fillers or evidence of damage by birds.

2 Access Equipment

2.1 LADDERS

Ladders used for access at eaves level should not rest against the gutter and should be blocked out to clear the gutter and made secure at the top. Access should extend to project not less than 1.07 m above the landing point.

Care should be exercised when working near metal or open valleys so as not to damage the side coverings. GRP prefabricated valley trough units are vulnerable to breakage and should not be eased or levered.

All roofs clad with concrete tiles and clay tiles should be treated as fragile, and extra care must be taken if it is necessary to traffic them. Suitable packing material should always be provided between roof ladders and the actual covering material to prevent breakage, e.g. foam rubber.

It is not advisable to traffic roofs clad with proprietary thin-leading edge resin bonded slates such as Cambrian Slate, which may require special protection against damage. It is recommended that the manufacturer is consulted for guidance before gaining access to a roof clad with such products.

2.2 SAFETY HOOKS

Safety hooks are proprietary devices which are fixed directly to the roof or building structure and to which safety ropes or harnesses are attached by roofing or maintenance contractors.

These are subject to Health & Safety legislation and should comply with EN 517⁽⁶⁾

2.3 ROOF WALKWAYS

Proprietary devices which are fixed to the roof structure or as part of the concrete, clay or metal roof covering may be used for access in order to stand or walk during inspection, maintenance or repairs to elements or parts of the building structure which penetrate the roof covering.

These devices may be required by Health & Safety legislation and should comply with EN 516⁽⁷⁾

2.4 WORKING PLATFORMS

Where small areas of roofs are to be accessed for repair or maintenance, a working platform must be provided at eaves level. Mobile access platforms are only permitted in these circumstances. All mobile tower platforms should be constructed to the requirements of BS 7171⁽⁸⁾ (power operated) or BS 1139-3⁽⁹⁾ and BS 1139-5⁽¹⁰⁾ (mobile working towers).

2.5 SCAFFOLD

Where roofs are to be extensively repaired or re-roofed, a working platform in the form of an independent tied scaffold conforming to BS 5973: 1993⁽¹¹⁾ should be constructed. For other work, a catch barrier must be provided at the edges of the roof (eaves, verges) and constructed in accordance with this Standard.

Ensure that all roof inspections and roofing works are carried out by competent persons in accordance with Health and Safety Regulations⁽¹²⁾

3 Repairs

All repairs, re-covering and maintenance of concrete and clay tiled roofs and walls should conform to:

- Current Building & Health & Safety Regulations (1 &12)
- British Standards - BS 5534(2) and BS 8000 - 6(3)

Depending on the size of the repair or area of roof to be inspected, access to the roof can either be temporary or permanent.

Any broken or defective tiles should be replaced with a sound matching unit and not covered over superficially with any other material or coating. If extensive repairs are required, sectional or complete recovering should be considered. The use of proprietary surface coatings applied to weatherproof the complete roof externally or internally, is not generally recommended and Redland should be consulted on the suitability of any proposed surface treatments.

Ridge and Hip Fittings can be replaced individually and re-fixed using recommended fixings where required.

4 Repair Procedures

4.1 UNDERLAY

Repair any large-scale tears, holes or cuts in the underlay by cutting a slit above the hole and placing a sizeable piece of material large enough to fit under and lap onto the underlay around the hole by at least 150 mm. Secure under the battens or fix to the adjacent rafters using felt nails. For smaller-scale tears or holes proprietary repair tapes can be used. Please consult Redland Technical Solutions for more information.

4.2 BATTENS

Defective battens should be replaced for a minimum of two rafter spacings to ensure adequate fixing. Always cut back to the centre of the rafter and nail the end. Never allow battens to be unsupported.

4.3 PLAIN TILES

The damaged tile can be removed by blocking up the neighbouring tiles with a timber wedge, and by sliding it out with the nibs clearing the top of the batten. Any nails should be removed using a slate ripper or zax.

The replacement tile can then be inserted back into position using the same technique in reverse. If a method of mechanical fixing for the replacement tile is required then consult Redland Technical Solutions for a method statement.

4.4 INTERLOCKING TILES

The damaged tile can be removed by first easing it up slightly, so that it is possible to slide it out with the nibs clearing the top of the batten. Timber wedges and a flat trowel will facilitate this procedure. If the damaged tile is nailed, then the neighbouring tiles should be lifted to expose the nail, which should be extracted carefully using a slate ripper or zax. The replacement tile can be inserted using the same procedure in reverse.

Isolated replacement concrete tiles which require fixing should be mechanically fixed. A detailed method statement for both flat tiles laid in broken (half) bond and profiled tiles laid in straight bond can be obtained from Redland Technical Solutions. A suitable stainless steel screw with sealing washer can be used to secure both the head and tail (as appropriate depending on degree of fixing required) of the replacement tile to the battens below.

If all the damaged tiles are clipped, and for aesthetic reasons stainless steel screws are not considered acceptable by the building owner, it may be necessary to strip back the roof to the nearest verge or valley/hip in order to re-clip the replacement tiles.

For lightweight resin-bonded slates such as Cambrian Slate a Cambrian Slate Repair Kit can be purchased from Redland for replacement of isolated broken slates.

4.5 FITTINGS

Ridge and Hip tiles can be replaced individually and re-bedded and fixed with new mortar and/or mechanically fixed where required. Ensure the correct mix is used (typically 3:1 sharp sand/cement) complying with BS 5534⁽²⁾ and that all fittings are pre-soaked prior to laying.

Valley tile replacement may necessitate stripping out adjacent tiles in order to replace existing valley tiles. Ensure any replacement tiles adjacent to the valley are re-fixed by clips and/or nails.

5 Roof Tile Security

Tile 'chatter' in high winds is an unavoidable phenomenon associated with most roofing tiles. The sound, which can be heard within the building, is caused by the tails of the tiles or slates being lifted and then dropped by the wind forces.

Unfortunately the problem is often highlighted in roof designs where there is living accommodation in the roof space. Forms of roof construction can amplify the sound created by the movement of the tiles/slates where the ceiling is fixed directly to the rafters.

Single lap tiles can be particularly prone to chatter in high winds because the tails of the tiles are more vulnerable. These tiles only overlap each other by, for example, 75mm, leaving the remaining surface exposed. The use of tile clips may help to minimise the magnitude of chatter, although it should be remembered that clips are principally designed to prevent the tiles from being dislodged in high winds and are not intended as a cure for tile chatter. Experience shows also that tile chatter is often exacerbated if the nails used to fix the heads of tiles are not driven home properly.

Double lapped tiles and slates are less prone to chattering in high winds because they overlap each other by over half their length, although movement can still sometimes occur, particularly if the nails have not been driven home sufficiently.

Sometimes the problem is restricted to a small area of roof. Natural or artificial features nearby, or a roof feature such as a chimney or dormer windows, can affect wind speed or create turbulence causing uplift in a particular roof area. If such a localised area can be identified then it may be possible to secure the tails just in these areas using clips (for single lapped tiles).

The use of a suitable butyl adhesive can be considered for lightweight resin-bonded slates such as Cambrian Slate, although care should be taken to ensure that butyl strips do not block interlocks and anti-capillary channels etc. and compromise the slates' ability to shed water.

In extreme circumstances it may be necessary to drill through the tail of the tile and then fix into the batten of the course below using stainless steel screws or ring shank nails and sealing washers. If this course of action is proposed, then specific advice should be obtained from the manufacturer.

6 Maintenance Items

6.1 EFFLORESCENCE

Efflorescence is a general term used in the construction industry, to describe the white deposits found on building materials such as concrete roof tiles, paving blocks, clay bricks, calcium silicate bricks, mortar, concrete etc.

The term efflorescence covers a number of different phenomena and different forms of efflorescence can occur on concrete products as a result. With concrete roof tiles, subtly different reaction mechanisms at various stages of the production process and lifespan of the products can give rise to the formation of calcium carbonate, which appears on the surface of the tiles as a white haze. Efflorescence may sound like a complicated chemical phenomenon, but in reality, it is merely a superficial characteristic feature of good quality concrete roof products.

Efflorescence as found on concrete roof tiles is often categorised as 'lime bloom', which is a deposit apparent either in the form of white patches or as a more general lightening in colour. When the latter effect is seen, it is often misinterpreted as a fading or 'washing out' of the colour of the concrete.

Efflorescence forms more readily when the concrete tile becomes wet and dries slowly and therefore there are more occurrences during the winter. It is also generally only likely to occur in the early life of concrete roof tiles and materials installed for a year or more without experiencing lime bloom, are unlikely to be affected in the future.

Perhaps the most important factor for the specifier, builder and property owner is that the natural weathering process gradually removes efflorescence on concrete tiles. The white deposits will themselves gradually wash off and disappear due to formation of soluble bicarbonate by the action of rainwater (usually within one and at most two years). This natural removal restores the original colour of the product and in no way affects the product's impermeability, colour consistency or continuing strength growth with age.

For faster removal the white deposits can be dissolved with dilute hydrochloric acid and then washed off with water. A single treatment is usually sufficient. However, it is recommended that the work is undertaken by a specialist contractor to ensure the work is carried out safely with good results.

6.2 WHITE STAINING AROUND LEAD FLASHINGS

In rainy or damp conditions new lead sheet flashings will produce an initial, uneven mix of insoluble white carbonates and sulphates on the surface. The lead flashings take a long time before the surface becomes oxidised and chemically stable, so this process can continue for many years. This can be aesthetically unacceptable in some situations but, more importantly, the white deposits can be washed off by rain to cause unsightly staining on roof tiles below the flashings. These insoluble salts are also toxic to many organic materials so the white stains tend to persist and don't get masked by surface growths such as algae and lichens (it

is quite common to see this effect on concrete tiles where the tiles stay cleaner below lead flashings).

To avoid staining and also provide a pleasing appearance, a coat of Patination Oil should be applied to flashings as soon as practical after fixing. Preferably the oil should be applied no later than the end of the day's work since overnight rain can cause the white stain to develop.

Patination Oil should be applied evenly with a soft cloth and, in vulnerable locations such as mansard flashings, fixed over dark grey slates or tiles, it is important to oil under the lower edge of the flashings and between the laps. Clips along the edges of flashings should be turned over after the oil has been applied⁽¹³⁾.

If you do have white staining on roof tiles around lead flashings the deposits can be dissolved with acetic acid and then washed off with water (but avoid getting the acetic acid on the lead flashing itself or it will attack it). However because of the long potential timescale for formation of these lead salts then the treatment may need to be repeated with age (in other words it is often not a permanent prevention treatment). They also become more difficult to remove with age because of the UV induced surface break up with time, i.e. the salts get deposited within the surface itself.

If using acetic acid to clean the insoluble white deposits from roof tiles it should be borne in mind that there is also the question of potential contamination of ground water with soluble toxic lead salts from the treatment, i.e. they would go into the water drainage system. You should check with your local authority and water utility what prohibitions exist, as there may be environmental controls which are applicable.

7 Mosses & Lichens on Concrete, Clay or Metal Covered Roofs

The principal cause of the growth of mosses and lichens on pitched roofs is due to their rough surface which filters dirt out of rainwater. Decaying matter in the form of dead leaves which fall on to the roof, also tend to lodge on the surface. Spores and seeds of mosses and lichens are also blown on to the roof, or get carried there by the feet of birds, and sooner or later take root in the dirt and begin to grow. Inevitably, the surface of some concrete tiles that have a sanded or granule facing, are the first to attract moss growth.

Moss tends to flourish on roofs where trees are nearby and where there are shady, damp conditions. Steeper pitched roofs are less likely to support moss and lichen growth as they shed water more quickly than low-pitched roofs. By contrast, north facing slopes that remain damp longer may attract the growth of mosses and lichens.

The primary effect of moss on a roof is that it holds water. Thus, the flow of water into gutters is slowed down and the water is held on the roof in contact with the tiling for a much longer time. If the mosses and lichens affect the drainage of water down the roof and in valleys, abutment gutters and the interlocking drainage channels of the roof tiles, they should be removed.

Generally, most moss and lichen growths are not unsightly and in some circumstances can impart a mellow and pleasing weathered appearance to the roof. In normal circumstances, the growths are not deleterious to concrete. In circumstances where they are considered undesirable, there are several methods of removal.

7.1 METHODS OF LICHEN / MOSS REMOVAL

7.1.1 SPRAYING WITH TOXIC WASH

This is perhaps the least expensive, but very great care has to be taken. Any spray that is toxic to moss can also be dangerous to garden plants in the vicinity of the roof and perhaps to the plants in adjoining gardens. There is also the possibility of ill effects to animals and birds.

Toxic washes take a few days to be fully effective and should preferably be applied during a spell of dry weather, since rain may wash them off before they have had time to act. The action is hastened if thick growths are removed and the wash is well brushed in.

Normally, one treatment is sufficient to kill the growths but sometimes repeat applications are necessary. The dead growths will eventually weather off and disappear.

It is recommended that the toxic wash is applied evenly to the moss and lichens or other biological growths using a garden watering can or other non-pressurised spraying device, taking care not to spray up, but down the roof. It is **not recommended** that a **high** pressure jet of water is used since this can in many cases either cause mechanical damage to the roof tiles (and subsequent leakage) or undesirable changes to the appearance of the roof tiles

e.g. with granular finished concrete tiles it can remove the surface granular finish exposing the bare concrete.

Some toxic washes leave a residue which discourages subsequent growth, but even under favourable circumstances the residual effect is unlikely to last for more than 2 or 3 years.

A wide range of toxic washes are available, but care must be taken with regard to Environmental and Health & Safety Regulations⁽¹³⁾. A useful summary of some of these materials and their effectiveness can be found in BRE Digest 370⁽¹⁴⁾. Please consult Redland Technical Solutions for specific advice on suitable treatments.

7.1.2 COPPER WIRE

A more permanent answer to the problem of maintaining a clear roof can be obtained by trailing copper wires across the roof surface. These can be fixed at intervals up the roof slope, directly below the front edge of the tiles, so that with every shower of rain, the copper slowly oxidises in the atmosphere and provides the roof with a wash of biocidal copper salts which prevent renewed growth.

7.1.3 SCRAPING

This is certainly not recommended as it almost inevitably results in broken or damaged tiles and consequent roof leaks. In addition, it also leaves behind a trail of unsightly scrape marks which, however carefully the work is carried out, will have to be repeated in the future as the mosses and lichens return.

7.1.4 OTHER SURFACE TREATMENTS

After moss/lichens and other biological growths have been removed from the surface of roof tiles it is often tempting to consider the application of some post-cleaning surface coating, or treatment to retard the re-growth of biological organisms. **Great care and caution should be taken when considering such options.** Firstly, there is the issue of the durability of the coating/treatment itself when exposed to natural weathering. Secondly, not all surface treatments have a benign effect on the performance and durability of the roof tiles. Thirdly, such treatments in general can only slow down the new formation of moss, lichens, algae and other biological organisms – they are not a miracle cure. Finally, it should be borne in mind that most, if not all, tile manufacturers, Redland included, offer product guarantees regarding the durability of their tiles. The use of such surface treatments will invalidate these guarantees so unless similar guarantees are being offered from the supplier of the treatment most tile manufacturers would advise caution.

8 Maintenance Check-List

- Look for any interior evidence of roof leaks or dampness.
- Look for signs of any cracked or broken tiles caused by possible impact or wind damage.
- Inspect G.R.P. and metal valleys for deterioration and any damage to raking cut tiles and bedding mortar.
- Examine top edge and abutment metal flashings for damage and re-fix /re-dress as appropriate.
- Check bedding mortar for cracks caused by roof settlement or shrinkage. Re-bed ridge or hip fittings and mechanically fix if required.
- Clear all eaves / back gutters of leaves and other debris and check free flow of water to outlets.
- Cut back overhanging trees or foliage that may impair roof drainage or damage the roof covering.
- Clear all ventilation grilles and terminals of dust and debris that may block the ventilation path.
- Clear mosses and lichens that affect the free flow of water from the roof.

9 References

Reference	Description
1. The Building Regulations	The Building Regulations 2000 (England and Wales) A1/2 Structure - Section 3 Re-covering of roofs
The Building Standards	The Building Standards (Scotland) Amendment Regulations 2001
2. BS 5534: 2003	Code of practice for slating and tiling (including shingles) : Design
3. BS 8000-6: 1990	Workmanship on building sites – Part 6. Code of practice for slating and tiling of roofs and claddings
4. NFRC Guide to Good Practice	Profiled Sheet Roofing and Cladding, Third Edition, The National Federation of Roofing Contractors Publications Limited, 1999
5. BS 5427: Part 1: 1996	Code of Practice for the use of profiled sheet for roof and wall cladding on buildings
6. EN 517: 1995	Prefabricated accessories for roofing. Roof safety hooks
7. EN 516: 1995	Prefabricated accessories for roofing. Installations for roof access, walkways, treads and steps
8. BS 7171: 1989	Specification for mobile elevating work platforms
9. BS 1139-3: 1994	Specification for prefabricated mobile access and working towers
10. BS 1139-5: 1990	Specification for materials, dimensions, design loads, safety requirements for service and working scaffolds made of prefabricated elements
11. BS 5973: 1993	Code of practice for access and working scaffolds and special scaffold structures in steel
12. Health & Safety Regulations	Reporting of Injuries, Diseases & Dangerous Occurrences Regulations 1995
	Construction (Design & Management) (Amendment) Regulations 2000
	COSHH Regulations 1999
	Construction (Head Protection) Regulations 1989
	Health & Safety in Roof Work HSG 33

	Management of Health & Safety at Work Regulations 1992
	Working on roofs INDG 284 HSE
	Workplace (Health, Safety & Welfare) Regulations 1992
	Construction (Lifting Operations) Regulations 1961
13. The Lead Sheet Manual	A Guide to Good Building Practice, Volume 1 Lead Flashings, Lead Sheet Association, 1990
14. Environmental Regulations	Control of Substances Hazardous to Health (COSHH) Regulations 1999
	Public Health Act 1961
15. BRE Digest 370	Control of lichens, moulds and similar growths, 1992

These guidance notes consider some aspects of the work required to maintain and repair roofs and claddings consisting of concrete roof tiles, clay roof tiles, resin-slate tiles (such as Cambrian slates) or metal profiled sheet. Monier Redland Limited do not accept liability for any of the recommendations contained in this document. Monier Redland Limited's liability extends only to the supply of products in accordance with our terms and conditions of sale, and any relevant guarantees that apply to the project in question. It remains the designer & builders' responsibility, to ensure that all aspects of the remedial work comply with relevant regulations and codes of practice.

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