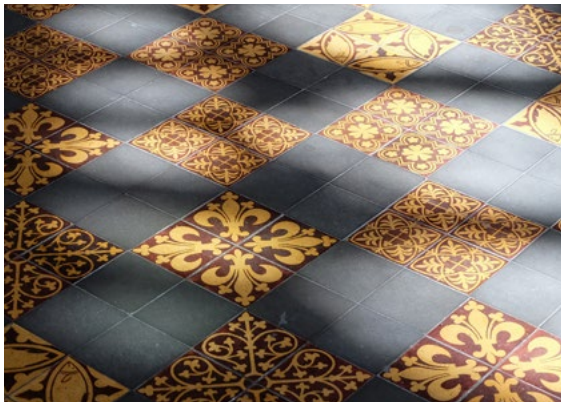
Caring for old floors

Advice from the SPAB

S·P·A·B

Contents



Images, top to bottom: wooden floor at the Old Post Office in Tintagel, Cornwall (Kate Griffin), Canons Ashby kitchen with Elizabethan flagstone floor (National Trust Images/Andreas von Einsiedel), tiled floor at St David's Cathedral in Wales (Kate Griffin), brick floor at St Mary's Cawston, Norfolk (SPAB).

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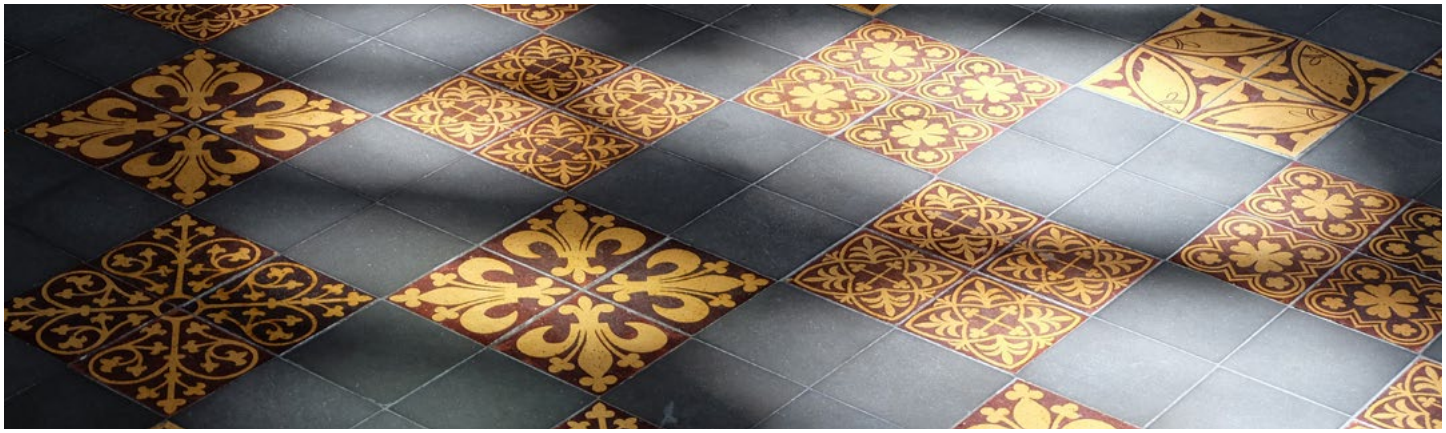
This downloadable booklet is a version of the SPAB's Technical Pamphlet 'The Care and Repair of Old Floors' by Adela Wright.



History at your feet: care and repair of old floors

The SPAB (Society for the Protection of Ancient Buildings) is Britain's oldest heritage organisation. Co-founded by William Morris and Philip Webb in 1877, today it is a campaigning charity offering informed practical advice and assistance to owners of older buildings and those who work with them. The SPAB has members in all parts of the country and active regional groups. If you find the following information helpful, why not consider becoming a member to help us spread the message of gentle conservation.

This pamphlet (based on an original SPAB document written by Adela Wright, RIBA) has been produced as part of the SPAB's History at Your Feet campaign to make people aware of the importance of old, original floors.

The SPAB believes that floors contribute enormously to the 'spirit' of a place. The patina of time caused by centuries of wear and tear, daily use and gradual settlement are essential components of a space's presence and unique atmosphere. The floors of old buildings are often worn, discoloured, and out of true level. Yet these imperfections can make their own important contribution to the interest, beauty and historic value of a structure.

Floors are where we make a direct physical connection to a space, following in the footsteps of those who – throughout the centuries – have gone before us. The grooves, undulations, imperfections and scratches are the 'ghosts of time'. The SPAB believes that once you make a significant intervention to an old floor you remove something vital to a building's heart and story.

Yet obliteration of ancient fabric is happening with alarming frequency. Work is undertaken under the guise of 'improvement' with little or no regard given to the aesthetic or historic value of a floor and its importance to the integrity of a building or place.

The SPAB fears that a vital 'step' is being missed by homeowners, architects, builders and planners who, often unwittingly, proceed without first taking note of the significance of the materials, literally, beneath their feet. Any decision to replace them, apply surface treatments, or alter their levels should not be taken without careful consideration, particularly as most old floors are not difficult to maintain.

Banner image: Victorian tiles at St David's Cathedral in Wales. Credit: Kate Griffin.

Introduction to caring for old floors

The primary aim in caring for an old floor should be to maintain its appearance and prolong its life. Strange as it might sound, the 'do nothing' option has a track record of being cheap, pragmatic and effective in the long term and should not be ignored.

- Surface soiling should be removed before it becomes impacted
- Moisture should be controlled
- Aggressive chemicals, seals and other inappropriate coating should avoided

Alterations to floors in an old building may require Listed Building Consent and anyone thinking of alterations or major work should contact their local conservation officer for advice.

DAMP PROOF MEMBRANES AND SOLID FLOORS

Advice is often given that damp problems in old floors at ground or basement level can be solved by inserting a damp-proof membrane (DPM) under the existing floor covering. This solution is commonly suggested because standard practice in the construction of a new building is to include a membrane within the floor thickness which is linked to a horizontal damp-proof course (DPC) designed to prevent moisture rising within the thickness of the walls, inside or outside.

However, in an old house lifting and then relaying an old floor on a new DPM can cause more problems than it solves. Restricting the amount of moisture that can evaporate through the floor may adversely affect the moisture content at the base of previously dry walls, partitions and chimney breasts. This is because the introduction of a horizontal membrane can displace and concentrate moisture – now unable to evaporate over the whole surface – to the edges. Many old walls at the edge of DPMs can seldom be effectively treated retrospectively against rising dampness. Particular problems occur in very thick walls, walls without regular coursing, ungrouped rubble-covered walls and walls built of earth, clay, chalk or flint. The SPAB rarely endorses the insertion of DPMs and DPCs in older, traditionally constructed properties, both because of the potential

Banner image: Bristol Cathedral. Left: Strata Florida, Ceredigion, Wales. Credit: Kate Griffin.

of damage to historic fabric and because intervention is usually unnecessary.

The SPAB's experience is that many dampness problems are related directly to construction defects or interventions, which have undermined the previous breathing potential of the floor or rooms. Initially, with any dampness related problems, thought should be given to common potential problems: faulty guttering, downpipes and drains; external ground levels; adequacy of ventilation and mis-diagnosis of condensation as rising dampness, and the use of rubber-backed wall-to-wall carpets which have acted as a membrane and held moisture back. In the last case, and also after constructional defects have been resolved it may take some time for the floor to dry. The testing of drains and soakaways to establish where they run and their condition is also important.

The environmental changes caused by re-laying old brick, stone or tiled flooring above a new membrane can affect the appearance and durability of the floor. Salt contamination, in the form of a white sediment, originally absorbed from subsoil, may migrate to the surface. These salts may, in turn, absorb moisture from the air and create a damp floor. Regular brushing may become necessary to reduce the deposit. There are also cases where residue of cement, from a newly laid cement screed above a DPM have migrated to form an unacceptable film on the surface of an old floor which can be difficult to remove. In addition, a concrete floor and DPM can prevent moisture caused by spillage or floor washing from draining away or being absorbed naturally into the ground.

Improving site drainage around exterior walls will sometimes help to alleviate conditions caused by a high watertable by reducing the moisture content immediately adjacent to building fabric and thus avoid the need to disturb a floor. Old floors have often survived well due to a stable environment. The humidity within some flooring materials, such as stone, brick, chalk and limewash, if left undisturbed, may vary according to the weather and a little damp can often be an asset as it may help prevent 'dusting' of the surface. Old floors must be allowed to 'breathe', preferably downwards as well as upwards.

If all other solutions have been tried and have failed and the decision is taken to lift and relay the old flooring on a concrete slab, great care should be taken as it should be recognised that damage to the original materials is likely to occur. If insulation is to be laid it may help to reduce condensation but the material should be carefully chosen to ensure moisture decay resistance and sufficient compressive strength. In certain projects the whole floor has been photographed and drawn with each slab numbered and stone type noted. Only after this was the floor lifted. The floors are often subsequently re-laid on a sand-lime base to allow water trapped in the new concrete slab to evaporate and each stone is re-laid in its original location.

Image left - a blocked downpipe at Albrighton St Mary. Credit: SPAB.

Floor waxes and old floors

Polish will help to protect a surface from grit, grime, water and stains. But a heavy build-up of polish will inhibit the floor's ability to 'breath' which can hasten decay. It will also increase the risk of slipping. Highly polished surfaces, and those which seal the surface, were rare before the 19th century. The term floor wax covers a wide range of both natural and synthetic materials. The three main types in used today can be classified as:

- Traditional solvent-based floor wax
- Proprietary solvent-based floor wax
- Water-based emulsion floor wax

Most are available in liquid or paste form.

TRADITIONAL AND SOLVENT-BASED FLOOR WAXES

These are made from beeswax and turpentine, and retain their flexibility, allowing a floor to breathe and any moisture present to evaporate. Early polishes consisted of pure beeswax melted with hot irons or in a bain marie, to ease application. The addition of turpentine dissolves the wax and dispenses with the need to soften by heating.

Tins of beeswax and pure turpentine polish are now available widely. (If you are interested in finding out how about home-made polish SPAB Information Sheet 13 Beeswax Polish gives you a step-by-step guide). This traditional polish can be used on all types of wood and is particularly suitable for open-grained wood such as oak and pine (also used for furniture and panelling). It feeds timber and will prevent excessive dryness. Thin coats can also be applied to timber floors and some other natural types of flooring, such as stone flags. In all situations where a new finish is to be applied a test should be carried out first on the material to which it is to be applied.

APPLICATION OF BEESWAX AND TURPENTINE POLISH

Polish should be applied rarely and sparingly but frequent dry buffing will help to protect the floor and keep the surface free from dirt. Once an acceptable coat has been established a further overall coat may only be necessary about once a year. New applications should be restricted to areas subject to use and wear to avoid a build up of wax elsewhere on the floor. Excessive wax can trap dirt, darken floors and form a slippery surface.

Application is with a soft cloth, brush or electric polisher. Warming the polish eases the operation and helps to force the wax into crevices. Adequate ventilation will help to dry the polish.

Banner image: Avon Tyrell, Hampshire. Credit: SPAB.

A liquid polish can be used for cleaning a waxed floor prior to adding extra polish to an existing polished surface. On the rare occasions when it is necessary to remove existing polish, white spirit can be used.

PROPRIETARY SOLVENT-BASED FLOOR WAXES

These are made from synthetic materials, using waxes such as paraffin dissolved in solvents such as white spirit. Most of these waxes are derived from petroleum and contain additives such as silicone, designed to increase water repellency qualities and to form a hard glossy finish. As a result the breathability qualities of an old floor are impaired and the non-slip advantages of using a traditional polish may be reduced. The deterioration and 'wearing' qualities of these polishes can be unattractive and the polishes are often difficult to remove.

Solvent vapour, i.e. from white spirit and to a lesser extent turpentine, constitutes a health hazard. Ample ventilation should be provided during application. Solvents also pose a fire risk.

WATER-BASED EMULSION FLOOR WAXES

The solvents in solvent-based floor waxes can dissolve certain 20th century synthetic floor finishes and as a result many types of water-based emulsion waxes were developed from the second quarter of the 20th century. These now satisfy the needs of most new flooring materials. They contain emulsified resins and polymers. The early waxes, such as carnauba in water emulsion polishes, have now been largely replaced by materials of synthetic origin although they are still classified as 'wax'.

The aim of manufacturers now is to develop a product with an increased or instant gloss on drying, thus reducing the need for manual polishing and buffing. The coatings are effective on most modern synthetic floorings. They provide a hard surface, are easy to maintain and are non-flammable.

These types of floor waxes are designed for floors that are absolutely dry and laid above a concrete sub-floor with a damp-proof membrane. They are not suitable for finishing old flooring materials or for floors that have been treated with solvent-based polishes as any traces of remaining wax will affect the efficiency of the water emulsion coating.

Water-based emulsions can introduce moisture into old floors with damaging results. They mad raise the grain and introduce dirt into timber. Their use to 'seal' timber is controversial. Seals can break down in areas of heavy traffic, such as doorways, which may result in staining.

Timber floors

Medieval floorboards were predominantly oak, and were riven, axed, or pit-swan in widths of up to 450mm or more, which varied in a single floor. The boards tended to be laid parallel to, and rebated into, the upper edges of heavy floor joists which were laid flat (i.e. contrary to the later practice of 'joists on edge'). Elm boards, typically 300mm wide, were common in the 17th century and softwood came into general use in the 18th century, a time when floors began to be wholly or partly carpeted. Tongues and grooved boards appeared in the 1820s.

The value of old floor boards is not always recognised. Whole planks are often replaced where it would be possible and much less destructive to piece-in sections of the same species of wood, matching the grain. Where a boarded floor is of historic interest, but is beyond repair, new boards can sometimes be laid above the old as a means of retaining the original floor as part of the archaeology of the building. However, careful thought needs to be given as to how the new floor level will affect adjacent architectural features such as doors, skirtings, architraves, thresholds, hearth stones etc.

Some timber floors slope and creak. These 'defects' often occurred at an early date and may have adapted to movement in a building that has long since stabilised. But the following defects could be a cause for concern:

- Structural failure due to the removal of posts of partitions of lower floors.
- Inadequately supported joists
- Insect attack and rot, particularly in beam ends embedded in walls.

Old floor boards can be repaired *in situ* but salvaged boards, that have become distorted, can rarely be forced back into position if replaced on new or repaired joists. Warped boards can seldom be reversed. A sloping floor that has reached an uncomfortable state can sometimes be improved by fixing tapered firring pieces to the top face of existing joists.

Images: Banner - Chastleton House, Long Gallery. Credit National Trust Images/ Nadia MacKenzie. Above - Old Post Office, Tintagel, Cornwall. Credit Kate Griffin.

This may enable boards that have not become too distorted to be re-laid nearer to level.

Squeaking floorboards may be caused by one board rubbing against another or by loose boards. The problem can sometimes be alleviated by inserting a screw through boards where they pass over joists. The use of screws for this purpose should be limited to the minimum necessary as they can be visually obtrusive. The use of timber plugs or pellets can reduce the visual impact of screws but can make lifting at a later date more difficult.

Early ground floor boarded floors were often laid to rough joists laid directly on earth or over older floors of plaster, brick or stone, often one above the other, an arrangement that could encourage decay due to excessive dampness. Later boarded floors were laid on joists supported above the ground on brick piers or sleepers walls leaving a void usually with provision for ventilation at the perimeter. It is important to ensure that air bricks or other means of venting such voids are kept free of rubble, earth and plant growth and that contact between timber and damp walls is avoided.

CLEANING FLOORBOARDS

Hardwood floors should be washed rarely and only when absolutely necessary. Minimal quantities of water should be used on timber, particularly softwood floors, to prevent raising the grain, expansion, warping and possible damage to ceilings below. Washing timber floors can also set off fungal decay.

Water should be cold or warm (not hot). A little neutral pH soap can be added to the water but traces should be removed by rinsing. The bucket system of washing, rinsing and mop drying boards, working over a small area at a time, will speed up drying. If scrubbing is really necessary the brush should not be too wet and scrubbing should be in the direction of the grain.

Polished floors should not be washed but cleaned with liquid wax (natural solvent-based wax with more turpentine than beeswax). Unpolished floors can be cleaned, prior to an initial application of wax polish with turpentine.

Some 19th century housing manuals advocate regular sweeping using a non-abrasive powder, slightly damp sand, or tea leaves to remove dust and dirt. Fine sand and Fuller's earth helped to retain the colour of unpolished wood. Fuller's earth is a clay-like product consisting of hydrated silicates, such as calcium and magnesium, which absorbs oil and grease. A mop or woollen cloth (lint free) soaked in a mix of paraffin and vinegar in equal proportions, can remove dust on polished floors. These treatments were effective and are still used today. Proprietary sweeping powders are available for both softwood and hardwood floors. But some of the sweeping compounds contain oil and other ingredients that could stain a floor.

The SPAB does not advise the use of sanding machines on timber floors. Not only is there loss of original surface, toolmarks and patina, but sanding machines often cut across and through the grain. In the latter case, especially with older pine,

Above image: staircase at Knole, Sevenoaks. Credit: SPAB.

the process can destabilise the surface.

Sanding can also produce a reduction in thickness of boards, leaving them too thin to carry loads; subsequent sanding will only exacerbate this problem. Sanding, if thought necessary, should be done by hand and carried out by someone with experienced in the use of hand-held sanders. Before starting, existing nails should be carefully 'punched-in' as sanding can make them razor sharp.

Any cleaning or removal work proposed should only take place after sample / trial areas have been carefully carried out. Care should also be taken that early painted decorative schemes, found particularly to the underside of floorboards where originally exposed, are not removed. Such schemes are valuable evidence on the history of a building.

POLISHING (SEE ALSO SECTION 3. FLOOR WAXES AND OLD FLOORS)

Timber floors were seldom polished to a high gloss prior to the 19th century. Clean, unpolished hardwood floors can be as beautiful as a polished floor.
Pure beeswax polish in liquid or paste form should be applied sparingly and only to worn areas once the overall coating has been established. A heavy build up can make a floor slippery, attract dust and may inhibit the timber's ability to breathe. Excess polish can be removed with white spirit. Polish should be allowed to dry before buffing, or dry polishing, using a hand mop or machine.

Tenacious spots will sometimes respond to rubbing with a cloth or plastic dish scourer dipped in liquid wax polish. Wire wool should be avoided as fragments can become lodged in the timber leading to rust staining on contact moisture.

Although linseed oil is often used to feed timber it is not good practice to apply it to floors (and rarely elsewhere). It absorbs dirt and dust and will discolour a surface over time.

Left image: the underside of wooden floorboards at Gladstone's Land, Edinburgh. Credit: National Trust for Scotland

Natural stone floor

Flagstones were produced from hard, dense and durable stone that could be split easily. Although generally riven, some were sawn or dressed. Stone types include a wide range of sandstones, hard limestones, marbles, slates, granites (mainly sawn and used from the 19th century) and other igneous rocks, usually obtained from nearby quarries. Overall sizes tended to be up to a metre square, but smaller slabs were more economical and easier to lay. Thicknesses varied according to the type of stone. Most were bedded directly on well-rammed earth or chalk. Hard freestone (stone that could be worked in any direction) was also set on edge to form pitched paving which made a tough floor able to withstand heavy wear in kitchens and outbuildings.

Flagstones are still being produced in a few quarries. The SPAB or the Stone Federation can advise on current sources. Most flagstones were surface dressed and edged on one side only, but occasionally it is possible to reverse a badly decayed slab and replace it worn side down. Remember, though, that wear on flagstone floors usually relates to years, perhaps centuries, of footfall and is therefore an appealing reminder of the building's history. The moisture content of flagstones tends to change seasonally. A little moisture in winter can be beneficial in minimising the surface powdering in summer. Laminations in the stone will sometimes splinter, slabs may crack and an uneven bed is common, but it is usually preferable to accept these defects rather than disturb a floor. Cracks can be repaired with lime mortar if thought really necessary.

Laminations as a result of separation along the bedding planes in Purbeck marble and Blue Lias stone floors can be repaired by slurry grouting. Once method to fill the voids can be to lightly flush out the void with clean water and then inject a slurry of lime putty and cottage cheese (for its casein or glue content) to help re-adhere laminations on the top of stone flags. Water content in the slurry should be the minimum necessary to produce a flowing / pouring consistency with minimal shrinkage.

Images: Banner - Chapel at Lytes Carey, Somerset. Credit: Kate Griffin. Left - Elizabethan flagstone at Canons Ashby, Northamptonshire. Credit: National Trust Images/Andreas von Einseidel.

Many flagstone floors have survived because the joints between the slabs have never been pointed and moisture has been allowed to evaporate freely through the open joints.

Dense mortar pointing may change this pattern and trap dampness into a previously dry floor. Where existing mortar joints to a limestone floor have decayed they may be repointed with a pozzolanic gauged lime-putty and aggregate mix, or hydraulic lime and aggregate mix. Joints between sandstone flags can occasionally pose a problem, with deterioration of the flagstone in the joint zone, due possibly to chemical interactions between lime and some sandstones, where moisture is present. Sometimes dry-jointing with a coarse well graded sand swept into the joints without lime is appropriate.

Voids can sometimes appear under solid floors. These can arise because of the collapse of buried features or the shrinkage of clay under a floor (sometimes leaving a gap of up to 50mm). The slabs can then act as a beam until one fails and a hole appears. Churches with crypts have this problem and it has been reported at Westminster Abbey. These voids can often be filled with dry sands / aggregate or a weak lime based grout without raising the floor. This ensures that ground bearing is reinstated without damaging the floor or, particularly in the case of churches, damaging underlying archaeology. Where this defect is thought to be serious, the advice of a structural engineer experienced in the repair of historic buildings should be sought.

Undulations, voids under slabs etc. can all potentially create a pedestrian hazard. Health and safety issues occur most frequently in areas of high traffic. If there is a defect, such as a void under a slab, this should be remedied. However, with slight undulations these can be partially ironed out by the introduction of natural rush matting or other similar non rubber-backed* covering.

In frequently used areas appropriate free standing signage or temporary preferably ventilated timber boards and / or steps may be appropriate. Most flagstones require little maintenance other than daily brushing. Washing, using minimal quantities of clean water, is best restricted to infrequent intervals. It is difficult to prevent dirty water seeping into the slabs and open joints.

The addition of a little neutral pH soap may be necessary on very dirty areas but household soaps, washing powders, alkaline cleaners, bleach and abrasives should be avoided. Although clean water may remove dirt on limestone and marble, it can result in staining on sandstone. Sandstone floors require regular and gentle cleaning with a brush or broom and fine sand, in the traditional manner.

Image: Left - Cardigan Castle. Above - Roman Baths, Bath. Credit: Kate Grifin.

Many stains respond to a rub-stone or fine carborundum (see section 6. Marble). Scouring powder may accelerate erosion. Mechanical methods of redressing may expose a weak sub-surface.

Nineteenth-century housekeeping manuals refer to sour milk (unpasteurised) applied sparingly with a rag as a cleaning agent for stone floors. This can bring up a soft sheen and a degree of protection to the surface of fine-grained stone with an established patina. But it can also produce a dull milky stain on absorbent or damp stone. Tests should be made on a small trial area in the first instance.

Flagstones were rarely waxed in the past and most have developed a fine natural sheen. Not all stone slabs take well to a polish and a response test on a small trial area should be made prior to application on an untreated floor. Beeswax and turpentine polish should be applied rarely and sparingly. Subsequent maintenance may include dry rubbing or dry polishing with clean pads and an electric polisher: or a mop impregnated with a solution of paraffin and malt vinegar in equal proportions. Rubber scuff marks can usually be removed with a solution of water and white spirit in equal proportions. Deep stains may need poulticing and expert advice should be sought. Techniques utilised will depend very greatly on the stone type. Further advice and contacts can be suggested by SPAB. Sealing products will change the character and colour of a stone floor and give it a synthetic appearance. They may also inhibit the ability of a floor to breathe.

**Rubber backed mats and carpets should be avoided as they restrict moisture passing from the floor to the air and encourage the build-up of salts which may lead to the breakdown of the surface and of the stone, and staining.*

Image: St Baglan, Llanfaglan, Gwynedd. Credit: Friends of Friendless Churches.

Marble

True marble, a limestone originally crystallised or recrystallised by heat and pressure, was imported from Europe and used for floors dating from the Georgian period. The only true marbles in Britain and Eire are from Iona, Skye and Connemara, County Galway and have been little used in building. The English so-called marbles, used in flooring from an early date, should correctly be classified as hard limestone.

Marble is a vulnerable stone and great care should be taken before anything is done to it. If you are unsure, the SPAB may be able to suggest marble specialists. Particular care needs to be taken when washing a marble floor. Clean water can cause damage, and dirty water and oil can stain. The least harmful way is to restrict the amount of water used and leather dry the surface immediately after washing. Light hand spraying prior to hand washing may help to soften heavily soiled areas. Avoid household soap as any residues can make a marble floor very slippery. The addition of a little neutral pH soap may be necessary for very dirty areas. Alkaline cleansers, acids, bleach and abrasives may damage the surface.

Mild but resistant stains (other than grease / oil) may respond to a poultice of attapulgite clay or acid-free blotting paper, moistened with distilled water, which is then covered with a plastic film and left for a few days before removal. Some organic stains can be oxidised or bleached out with a poultice of hydrogen peroxide (50% volume), the reaction being catalysed by the addition of a few drops of 35% ammonium hydroxide to the poultice.

Polish should be minimal to avoid the risk of creating a slippery surface. This is especially applicable to a marble staircase. Unpasteurised sour milk has been used as a cleaning agent, and will impart a slight lustre, but it is slightly acidic and any thick deposits on marble can stain. Response tests should be made in the first instance as it not suitable for all marble floors.

The formation of black and white marbles varies. Black is the harder marble and when the two are placed together they wear unevenly: they also accept different levels of polish. Vitrification and crystallisation processes for 'reviving' marble floors may introduce long term damage to an old floor. The fluorosilicates deposit an impermeable enamel coating on the floor. The stone is unable to 'breathe' and moisture is unable to evaporate, so these systems are best avoided.

Banner image: Bristol Cathedral. Credit: Kate Griffin.

Floor tiles

MEDIEVAL FLOOR TILES

These tiles were developed in monasteries during the first quarter of the 13th century and were used regularly in churches and other major buildings from the 14th century. Colours include an attractive range of brownish reds, yellows and pale oranges depending on local clay. Tiles can be plain or patterned and are usually square. Designs were usually formed by using and inset of a paler clay of a different composition which lightened in colour on firing. Tiles became thinner and patterns progressively more refined until the dissolution of the monasteries in the mid 16th century when production ceased in all areas except the West Country where they continued to be produced on a small scale until the 18th century. As a useful point of reference, the British Museum has a fine collection of tiles dating from the 13th to the 16th centuries. Significant numbers of these valuable tiles have survived and require expert advice on their care. Every effort should be made to retain them in-situ. If further tiles to fill in the gaps are considered really necessary, they should be plain, hand-made tiles of similar density and porosity to the existing tiles, which usually means burnt at a low temperature. These are now being made in a similar manner to those used during the medieval period.

VICTORIAN ENCAUSTIC TILES

The intricate designs of these tiles were produced by a burning-in process. Different coloured clays from many sources were skilfully blended by machine and fired under controlled conditions. The clay was pressed into shallow sinkings, bearing patterns on the face of the tiles. Tiles were also hand-painted. Decorations applied to cheaper and inferior tiles were produced with the aid of lithography prior to firing. These tiles were often hard and relatively impermeable with little ability to accommodate movement especially when bedded in hard mortar.

Quarry tiles, common from the 18th century are made of clay and water mixed to a plastic condition.

Images: Banner - Medieval tiles at All Saints Church, Icklingham, Suffolk. Credit: Peter Emina. Above - Victorian repairs to tiles at St Jerome, Llangwm Uchaf, Monmouthshire. Credit: Friends of Friendless Churches.

They were moulded in presses, by hand or machine, then fired in a kiln. The wearing qualities and appearance of the tiles varied in accordance to the composition of the clay and the firing temperature. Irregularities in shape and texture can be due to impurities on the clay or due to underfiring. Victorian tiles were widely used in all types of buildings but are becoming increasingly rare. They now have a scarcity value and need to be carefully conserved.

MAINTENANCE

Most tiled floors require little maintenance other than regular sweeping or vacuuming with a brush head to remove dirt and grit that might scratch the surface. Patterned tiles are more susceptible than plain to damage from cleaning. Surface dirt should be removed with minimal quantities of warm water. Tenacious dirt marks may require the addition of a little neutral sulfate-free detergent followed by careful rinsing. Household soaps may leave a slippery scum. Excessive washing, household detergents and scouring powder can remove glazing. Caustic soda or hydrofluoric acid may etch the surface. Polish is not advisable for tiles: it cannot be absorbed and will produce an unacceptably slippery surface. However, there may be a case for applying a little polish to worn quarry tiles, of no historic value, that have a porous and powdery surface, and a dry substrate. A protective coat of beeswax and turpentine polish will reduce the need for washing, provide marginal protection against grease and stains and improve appearance. Linseed oil can spoil the appearance of a tiled floor. It yellows when exposed to light and absorbs dirt which dulls and darkens the tiles. Linseed oil as a means of cleaning and nourishing tiles should therefore be avoided. Tiles were traditionally laid on a thick bed of lime mortar, a practice that continued until the first quarter of the 20th century. Lime mortar allows movement between the tiles and the screed. Hydraulic lime and cement-based mixes were used for bedding from the Victorian period. Where old tiles are bedded in hard Portland cement there is a risk of them cracking. Problems may arise where old tiles are re-laid on a new modern foundation together with a cement screed on a damp-proof membrane, concrete base and hard core.

The new screed may contract on drying throughout the first year but moisture absorbed from the screed may cause the tiles to expand and, although the expansion is marginal, it may result in their lifting. Sulfates in the mortar bed may also be absorbed by the tiles which may accelerate decay. It is sometimes found necessary to cut out hard cement pointing from between and around soft hand-made tiles to reduce the rate of decay of the tile surface. In a case of a church suffering from seasonal rising dampness and a high water table, this was found to be necessary. The mortar was carefully cut out using hand tools and a soft lime mix with a well graded gritty sand, to produce a more open and porous 'matrix', was introduced. This will encourage channels for the evaporation of moisture and consequent damaging deposition of salts in the joints and not the tiles. It is hoped that this balanced approach will reduce the pressure of dampness rising up the walls and floor standing monuments.

Image: Ayshford Chapel, Devon. Credit: Friends of Friendless Churches.

Brick floors

Most early brick floors were bedded directly on the earth or over a layer of sand or clay on a bed of well compacted rubble. Most have acquired a protective and attractive patina over the years. Their surfaces are seldom level but this 'defect' will usually contribute to the aesthetic value of a room. Larger flooring units of clay materials, such as 'pamment' or flooring 'pantiles' are used in similar fashion. There is a strong argument in favour of retaining a brick floor with minimal disturbance.

Many old bricks are of non-uniform dimensions and of irregular thickness. It can be difficult to lift and reverse them and set them to the level on a renewed base. If the joints between bricks have not been filled with mortar it is usually an advantage to leave them so. This will allow any moisture present to evaporate through open joints instead of through bricks. However, where arrises (sharp edges) of bricks appear to be vulnerable to damage by heavy traffic there may be a case for pointing the joints. Where existing pointing needs to be repaired this should be done with weak lime mortar.

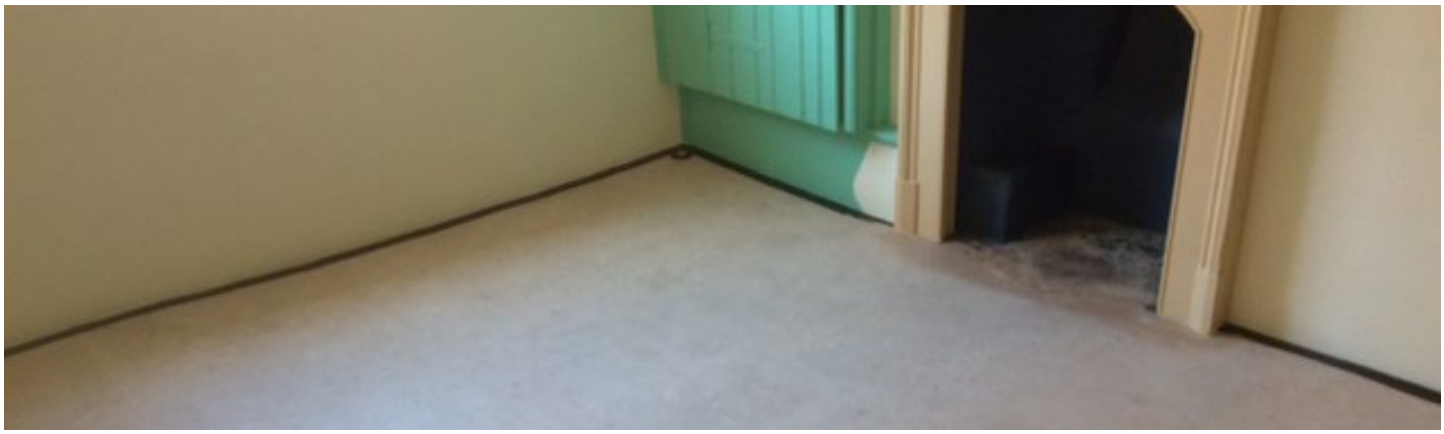
When there is no alternative and the floor must be re-laid, the bricks should be set close together on a bed of sand above well compacted hardcore (see also Section 5: natural stone floors).

Heavy silting on the surface can be difficult to remove without saturating the bricks and introducing moisture into the joints. Saturation can lead to efflorescence which can also be difficult to remedy. Surface dirt will usually respond to scrubbing with a bristle brush, using minimal quantities of warm water and a little sulfate free detergent.

Mechanical abrasive cleaning methods can scar the surface and destroy the surface 'skin' coating making the bricks more vulnerable to the absorption of dirt and erosion. Many old brick floors have worn to a smooth hard surface and do not require further treatment. Some may benefit from a little beeswax and turpentine polish which will help protect the surface. But a build up of wax will inhibit the breathing qualities of the brick and make the floor slippery. (See also Section 3).

Very small quantities of unpasteurised soured milk, applied with a rag and rubbed in to the brick, is an old method of providing some surface protection to bricks. The milk also imparts a slight sheen. This should first be used on a small trial area. (See also Section 5).

Banner image: St Mary's Cawston, Norfolk. Credit: SPAB.



Plaster floors

Plaster was a sound, warm, economical and fireproof means of flooring and as a lightweight material it was particularly suitable for finishing, mainly, upper floors. Many such floors continued in use and were still being maintained in some areas of Edwardian Britain. They are found particularly in the following counties: Staffordshire, Leicestershire, Worcestershire, Warwickshire, Northamptonshire, Herefordshire, Shropshire, Cheshire and Welsh Borders, Nottinghamshire, Derbyshire, Lincolnshire and parts of Yorkshire.

Gypsum plaster floors comprise a flooring layer that contains gypsum (calcium sulfate) as the binder mixed with aggregates such as crushed brick, burnt wood and coal particles. This layer is typically 35-75mm thick and placed on water reed or straw over timber joists.

A greater variety of aggregates is usually visible in gypsum plaster floors compared with modern concrete, especially after the surface has been wiped with a damp sponge. The presence of reed or straw bedding, a suspected pre-20th century date and signs of later repairs can all provide further clues to the existence of a gypsum plaster floor.

Various forms of deterioration can occur:

- Deflection and/or cracking (for instance, due to movement of joists, perhaps historically)
- Abrasion (especially in areas such as passageways)
- Later work (such as drilling or chasing for building services)

Holes and cracks can be filled with matching new mortar. Cracks should be carefully raked out first to a depth sufficient to provide a good key and the edges dampened to control suction. Eroded patches or larger sections of defective plaster (or damaging later cement) should be cut back, normally to their full depth, as far as the middle of the nearest supporting joist beneath sound material. Fresh plaster can then be laid on new bedding material secured by laths fixed to the joists. The bedding material can be dressed beforehand with lime putty if this was identified in the old floor.

Images: Banner - gypsum plaster floor. Credit: Sue Pickles. Left - laying a plaster floor. Credit: SPAB.

EXCESSIVE SALT EFFLORESCENCE

As moisture evaporates to the internal environment salts, which have been transported in the water can be deposited as a solid on or near the surface. In many historic floors this is not excessive and the salts can simply be brushed off. However, if there have been constructional defects, such as blocked gutters or broken drains, there can be a deposition of excessive quantities of salts until the moisture movement is reduced to normal levels after repair of the building's problems. Rooms where animals were housed, with urine soaking into the floor, or rooms where salted foodstuffs were stored may also have excessive salt contamination. In particularly severe salt-contamination cases poulticing may be necessary.

CHALK FLOORS

Many cottages in medieval England were floored with chalk in areas where the material could be easily obtained. There are also several references to these floors in buildings on moated sites. The addition of sour milk (unpasteurised) was an essential element in strengthening a floor subjected to heavy wear.

The chalk floor of the Medieval Great Hall of the Clergy House at Alfriston, owned by the National Trust, was renewed in 1998. Fine dusty chalk from a local quarry was laid and compacted to produce a smooth surface.

Large chalk aggregate at the surface was thought to be the reason for the failure of the previous floor. Thirty gallons of unpasteurised sour milk was poured over the chalk floor and left to soak in. An initial mould growth occurred, but this has subsequently died back. It took several months for the floor to solidify and harden but it has since withstood heavy visitor footfall.

EARTH FLOORS

Earth floors, well consolidated and protected with a layer of rushes or straw, continued in use on the ground floors of humble cottages until the 18th century. Clay mixed with fresh ox blood and ashes formed a surface that was hard enough to be polished. Where still in existence, these floors can be repaired by raking the surface and incorporating high calcium lime and flyash or hydraulic lime depending on the clay content of the earth floor. Many of the comments made in previous sections about not inhibiting breathing potential apply particularly to earth floors.

Writing in the 16th century Erasmus commented on the rush matting in English houses at the time: "The floors are commonly of clay, strewed over with rushes, under which lies unmolested an ancient collection of bears grease, fragments, bones, spittle, excrements of dogs and cats, and everything that is nasty."

Images: Left - Alfriston Clergy House, Sussex. Credit: SPAB. Above - tamping an earth floor. Credit: Becky Little.

The SPAB's top tips for old floors

1. Before undertaking any work to an old original floor, take time to really understand what you are dealing with in terms of age and condition, methods and materials.

2. Do not unnecessarily disturb a historic florr, for example, to put in a damp proof membrane simply because none exists already. Where not causing a genuine safety issue, the patina of time – wear and tear, undulation, fading – should be viewed as something to cherish and maintain. Try to retain features which contribute to the interest and continuity of a historic floor. This may include repairs and patches from earlier times.

3. When putting in new services care should be taken to minimise the intervention on historic flooring. Old existing ducts and the grouping of all services should be sought; this requires planning at an early stage to minimise the impact of any work. Surface mounting may be preferable to the disruption caused by lifting or cutting into historic floors.

4. Always carry out tests for any proposed cleaning or polish products to ensure that the results will be technically and aesthetically appropriate and not damaging to the floor. Follow any neutralising instructions, if given by the manufacturer, carefully. Before universally applying any product, leave the test area for a period to ensure no adverse long-term reactions occur. If maintenance cleaning / polishing is carried out by someone else it is important that they are given appropriate instructions on materials and methods.

5. If in doubt seek advice. The SPAB runs a technical helpline for anyone who has a query about the care and repair of a building. The free and completely independent helpline answers hundreds of questions every year from householders and building professionals. SPAB's helpline is staffed by specialists and is open from Monday to Friday between 9.30 am and 12.30 pm on 020 7456 0916.

Banner image: St David's Cathedral. Credit: Kate Griffin.