# Control of Dampness

SPAB Technical Advice Note

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# Contents

Most forms of deterioration that affect old buildings in the United Kingdom are attributable to the presence of excessive moisture. Dampness promotes timber decay, the corrosion of metals and even structural collapse. It mobilises soluble salts that harm masonry and increases frost damage. Damp fabric also reduces thermal efficiency. Dampness inside buildings spoils plasterwork, decorations and furniture, and creates conditions that are uncomfortable or harmful to the health of occupants.

This Technical Advice Note explains the nature and causes of dampness together with its diagnosis, control and prevention in buildings predating c1919. Despite dampness problems being commonplace, their cause is frequently misdiagnosed and ineffective remediation undertaken. Unnecessary treatments are often carried out, including the insertion of damp-proof membranes to create barriers to moisture. Action to address basic maintenance or lifestyle issues is usually more appropriate, as well as measures that respect the need for old buildings to 'breathe'.



**Cover image:** Dampness problems are commonly misdiagnosed. Rainsplash, as shown here, is incorrectly stated to be rising dampness in many cases. Photo: SPAB

# 1 Introduction

The term ‘dampness’ is used in the context of buildings to refer to the presence of excessive moisture that, if not addressed, may harm them or their occupants (see figure 1).

The source of this moisture can be either liquid water or water vapour in the air. Buildings remain dry when water from various ‘moisture sources’ (for example, moist, warm air rising out of a bath) is balanced by its dissipation via ‘moisture sinks’ (such as good ventilation for a humid bathroom) or storage in ‘moisture reservoirs’ (for instance, absorbent materials). If this equilibrium is upset, however, buildings may become damp.

To understand how this equilibrium arises in older buildings, it is necessary to consider first the way they are built (see figure 2). Pre-c1919 buildings are typically of ‘traditional’ construction. They tend to have solid walls, and sometimes solid floors, built using ‘breathable’ materials that allow the free passage of moisture.[1] These include stone, soft brick, unfired earth, lime-based mortars and plasters, and limewash. They take in more moisture than their modern substitutes but allow it to evaporate readily when conditions become drier.

**Figure 1:** Dampness can lead to serious deterioration if left unattended, as with this cottage that was later demolished as a result. Photo: Douglas Kent

As well as being of traditional construction, many older buildings are vernacular (indigenous) in nature so possess features adapted for the local climate. The UK’s maritime climate means that pitched roofs to shed water quickly are usual, generally with gutters and downpipes or otherwise generous overhanging eaves.

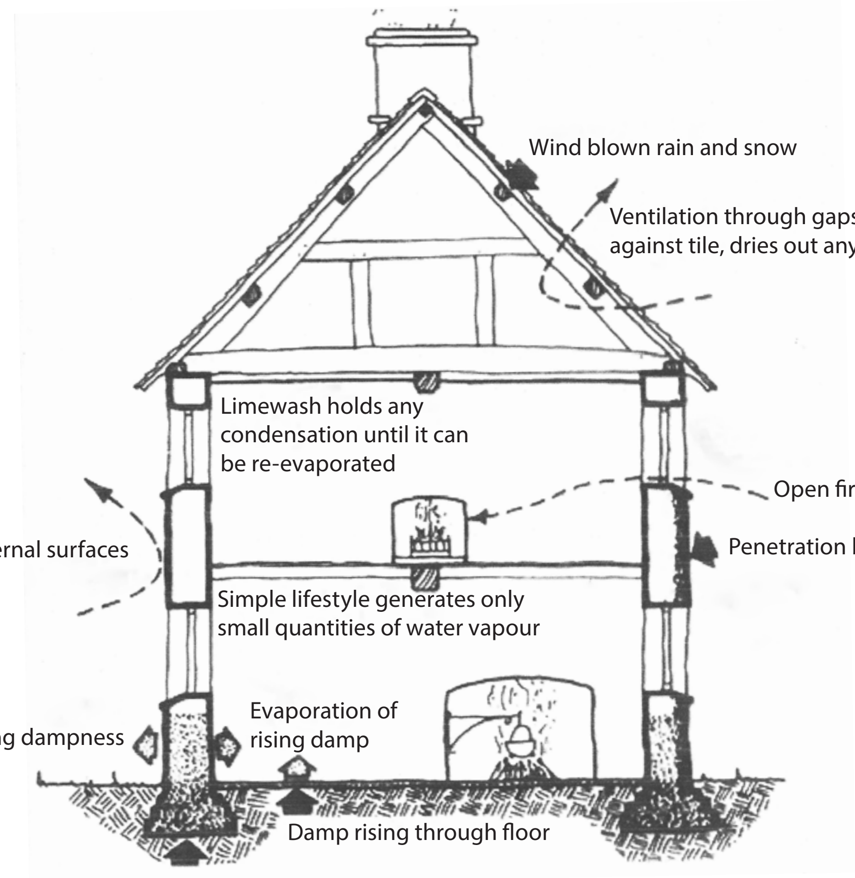


**Figure 2:** The movement of moisture through a traditionally constructed building. Illustration: SPAB

During rain, a certain amount of moisture deposited on the outer face of a solid wall will be taken in by capillary action and seep slowly inwards. The vapour permeability of the building fabric will enable this moisture to be drawn back to the surface and evaporate when the rain has stopped, before it can reach the inner face, although extra protection is sometimes required.

Various traditional methods exist to give walls extra protection from the rain with little hindrance to evaporation. These include the application of lime render, comprising roughcast (or harling) in more exposed regions, with limewash.[2] Slate-hanging is an alternative seen in the south-west and tile-hanging in the south-east. Weatherboarding is associated with the south-east and parts of East Anglia. Good weatherings are important, too, such as projecting cills, stringcourses, hood moulds and pentice boards (see figure 3). Internally, solid walls can be lined with lath and plaster on timber battens to create an air gap that reduces the likelihood of moisture penetration.

Most pre-c1919 buildings were built without damp-proof courses (DPCs) or damp-proof membranes (DPMs) to act as barriers to moisture in walls and floors respectively. Moisture will rise to some degree as it is drawn by capillary action into the pores of permeable materials, such as brick or stone, that are in contact with damp soil. This is usually not a problem where the construction can 'breathe', allowing evaporation.

The absorbed moisture will rise in a wall to a height at which there is a balance between the forces of capillary rise and that of gravity and evaporation. This height will vary somewhat with the time of year, wall thickness, pore size and the level of the water table in the ground. Flagstone or brick floors used to be laid directly upon the bare earth and the moisture that rose through these floors would be carried away by ventilation (see figure 4). Additionally, the hygroscopic nature of many traditional building materials means they absorb small quantities of moisture from the air when it is humid and rerelease it under drier conditions.

Old buildings are not inherently damp. Before central heating was commonplace, they were heated by open fires that drew in large quantities of air through loosely fitting windows and doors. Generally, this high rate of ventilation would have quickly evaporated 'structural moisture' from the breathing fabric internally while such moisture on external wall surfaces would be driven away by the wind. There was, therefore, in theory, an inherent equilibrium.

In practice, this equilibrium may be upset for various reasons with the consequence that liquid water persists for long enough to adversely affect the physical structure of materials, or that relative humidity increases to a detrimental level of 70% or higher. Where dampness exists, it should not be ignored. Although a decision may be taken not to carry out any remedial work, this should only be made after the dampness has been investigated carefully.

This Technical Advice Note considers next the sources and symptoms of dampness, along with its causes (sections 2 and 3). Understanding these is an important prerequisite for diagnosing, controlling and preventing dampness problems (sections 4 to 7).

**Figure 3:** Traditional architectural details, such as pentice boards, function to protect buildings from the rain.
Photo: Douglas Kent

**Figure 4:** Traditional solid floors allow the ready evaporation of below-ground moisture from their surfaces.
Photo: Douglas Kent

# 2 Sources and Symptoms

## 2.1 Types of dampness

There are different types of dampness. They are classified according to their source and the distinction between them is important to understand because each requires different treatments. The sources of dampness fall into two main categories:

- From liquid moisture: This includes rainwater penetration, below-ground moisture and plumbing leaks. Flooding is beyond the scope of this guidance.[3]
- From the air: This covers condensation, high humidity and dampness due to hygroscopic salts.

## 2.2 Rainwater penetration

Rainwater penetration refers to the ingress of rainwater at various points in the external envelope of a building. It can occur directly through roofs, chimneys and openings, such as windows and doors. It can also happen indirectly, for example, via spillage from a blocked or leaking gutter or gulley through an external wall or ground floor. Rainwater penetrates buildings by various mechanisms, for example, gravity, wind pressure and capillary action.

Rainwater penetration usually produces well-defined damp patches or leaks. The dampness may evaporate in a few days but will reappear after a period of heavy rain. The symptoms of rainwater penetration internally include stains and peeling paint on ceilings, external walls and chimney breasts. Outside, signs of rainwater penetration may be dark patches that appear after rain, especially on the more exposed parts of a building, such as chimneys, parapets and south-west or west-facing walls, as well as near gutters and downpipes. Patches of green algal growth externally are also commonly attributable to rainwater penetration. (See figures 5a and 5b.)

## 2.3 Below-ground moisture (including rising dampness)

Below-ground moisture problems relate to the entry of groundwater into a building. This may take place laterally, for example, through a cellar wall under hydrostatic pressure. Alternatively, moisture may enter via upward movement through the bases of walls or floors. This is often due to capillary action, where the result is termed 'rising dampness'. Rising dampness is usually much less of a problem than commonly supposed. It may extend only 10 to 50 mm above the internal floor level in walls, though can rise to 900 mm or higher, depending on the external ground levels, masonry type, water table level and evaporation rate. (See figure 6.)

The symptoms of groundwater moisture in a building include moist patches on floors and damp floor perimeters. The level of the water table can vary but in general the dampness is more constant than that arising from rainwater penetration. Contaminating salts may be seen as white deposits or feathery crystals. On walls, the effects of rising dampness exhibit a sharp


5(a)


5(b)

**Figures 5:** Common symptoms of rainwater penetration. **(a)** Water staining internally. **(b)** Green algal growth externally.
Photos: Douglas Kent

**Figure 6:** Rising dampness exists but is rarer than commonly supposed. Photo: Caroline Rye

change from wet to dry or a 'tidemark' stain on finishes. They can also include peeling paint, rotten skirting boards, and possibly mould and an accompanying musty smell.

## 2.4 Plumbing leaks

The escape of liquid water inside a building from water supply or waste water systems will cause dampness or localised flooding. This may arise where tanks, pipes, valves, radiators, sanitary fittings and appliances, such as washing machines, develop leaks. Dripping overflow pipes for WC cisterns are a further source. (See figures 7a and 7b.)

The symptoms are localised stains, sometimes with a fan-like pattern, and a presence of moisture that is unrelated to the weather. Plumbing leaks may be associated with mould growth, as well as decay in ducts or voids (although this will frequently not be immediately visible) and can, therefore, result in severe decay if there has been even a slight but long-term problem. Leaks can sometimes be heard or noticed because of higher than usual water bills.

## 2.5 Condensation

Condensation is the release of water that occurs internally when air comes into contact with colder building components so is cooled to its dewpoint temperature and can carry less moisture as vapour. Condensation is, therefore, dependent upon the temperature of surfaces and the humidity of the surrounding air.

Condensation commonly affects rooms where a large amount of moisture is produced, such as kitchens, bathrooms and bedrooms. It is also found in areas where ventilation is inadequate, particularly in lofts, subfloor voids and chimney flues.[4] Wardrobes and cupboards built against external walls are often badly affected, as well as room corners and walls behind furniture or pictures. North-facing walls are particularly prone to condensation problems. Condensation is an intermittent form of dampness. It is usually worse in rainy weather but is not dependent on rain.

The condensate will form tiny droplets of moisture on hard, shiny surfaces, for example, glass, metal or plastic-based paint. Because single-glazed windows commonly provide the coldest surface inside a room or space in winter, condensation usually forms on these first – with the glazing acting effectively as a dehumidifier. (See figure 8.)

7(a)

7(b)

**Figure 7:** Plumbing leaks associated with: **(a)** Defective pipework above a kitchen unit **(b)** Overflowing WC cistern. Photos: Douglas Kent

**Figure 8:** Condensation forms on the coldest surfaces first, such as windows or their surrounding reveals. Photo: Douglas Kent

**Figure 9:** Black spot mould is commonly associated with condensation. Photo: Douglas Kent

**Figure 10:** Hygroscopic salt deposits can be a sign of a current or past rising dampness problem. Photo: Douglas Kent

**Figure 11:** Decay of floor structures can result from high humidity in voids below. Photo: Douglas Kent

There may be accompanying rot in softwood window frames. Where windows are double-glazed, condensation often occurs on the adjacent plaster reveals instead. At other times of the year, surfaces such as stone flags at ground level or the lower part of ground floor walls may be affected.

Condensation on porous surfaces, as with lime plastered walls, is characterised by diffuse areas of moisture. It is often accompanied by black mould on wallpaper and plaster, and white spot mould on timber in voids (see figure 9).The acidic condensate formed within chimney flues will attack mortar and can carry tarry deposits through the brickwork into the building to stain wallpaper or plaster.[5]

Interstitial condensation – as opposed to surface condensation - occurs within building elements, such as walls. Water vapour exerts a pressure that causes humid air to move through permeable building materials towards drier air on the other side, usually the outside. Interstitial condensation results when the temperature of the diffusing water vapour falls below its dewpoint within the construction. The resulting dampness will reduce the thermal insulation value of the building fabric, in turn increasing the risk of condensation on the internal surface.

## 2.6 Hygroscopic salts

This form of dampness is linked to hygroscopic salts, such as chlorides and nitrates, that absorb moisture from the air when it is humid. Some salts are so hygroscopic (or 'deliquescent') that they dissolve in the moisture they absorb. Additionally, as salts cycle through their liquid and crystal phases in response to humidity fluctuations (ie between deliquescence and drying), recrystallisation within the pores of masonry leads to its damage.

Prolonged rising dampness can leave a wall contaminated by hygroscopic salts carried up from the ground (see figure 10). Their presence will keep moisture levels high even after the rising dampness itself has been eliminated. Hygroscopic salts can also be deposited within chimney flues from combustion gases and will remain long after flues have been disused, causing dampness on plasterwork around chimney breasts.

The symptoms of dampness due to hygroscopic salts will be increased moisture levels when conditions are muggy. Salt concentrations may be evident in locations where evaporation occurs but deposits are not always visible.

Efflorescent salts, usually sulfates, also occur in damp buildings. Efflorescence indicates that water has passed through a material, leaving white or off-white salty deposits. Efflorescent salts, while unsightly, are seldom hygroscopic so do not absorb moisture from the atmosphere.

## 2.7 High humidity

Exceptionally high levels of relative humidity alone can result in dampness, especially under suspended timber ground floors but also in cellars. Wood is hygroscopic so its moisture content varies with the temperature and humidity of the surrounding air. In a normal, dry living environment, the moisture content of timber will generally be between approximately 9 and 16%. Where it exceeds 21%, timber becomes susceptible to fungal decay. The symptoms of dampness resulting from high humidity, therefore, are decayed floor structures, though dry rot fungal decay can also travel across masonry without harming it. (See figure 11).

# 3 Causes

## 3.1 Understanding the problem

It is important to understand the causes of dampness problems, as well as their signs and symptoms, because this will help when it comes to implementing effective control measures. Addressing the cause of dampness is always preferable, where possible, to dealing merely with the symptoms.

## 3.2 Poor maintenance and damage

Neglect (especially where access for maintenance is difficult), deterioration and vandalism are commonly associated with rainwater penetration. (See figures 12a and 12b.) Problems will be most acute during prolonged spells of heavy rain.

Leaves, moss and dirt can build up quickly in gutters and hopper heads, obstructing the free passage of water and causing leakage or overflow. Leaks from parapet and valley gutters are particularly serious because the spaces beneath tend to be warm, poorly ventilated and contain the bearings of the roof trusses. In these conditions, water from blocked or defective parapet/valley gutters can give rise to severe fungal growth.

Cracked hopper heads or downpipes, especially where the crack may be undetected against the wall, are another source of dampness in walls. A downpipe will often become choked with leaves, causing water to back up the pipe and spurt out of the joints or cracks onto the adjacent wall. Such concentrated and continued


12(a)


12(b)

**Figure 12: (a)** Rainwater penetration due to missing gutter. **(b)** Damage from lead theft. Photo: Douglas Kent

**Figure 13:** Moss growth can compound problems arising from rainwater penetration. Photo: Douglas Kent

wetting is likely to erode mortar joints, corrode fixings (potentially leading to further failure), promote moss growth externally, which prolongs the dampness by retaining moisture, and may also lead to frost damage. (See figure 13.)

Defective drains or gulleys, or leaking water pipes can add considerably to the moisture-load of the ground in proximity to the base of walls. Often problems of rising dampness are caused by failures of this nature rather than the presence of ground water per se.

Driving rain can penetrate even a thick wall through weak points, such as cracks and open joints. Roofs, chimneys and parapets, normally being the most exposed parts of a building, are particularly susceptible to rainwater penetration. Something as straightforward as a displaced tile or defective flashing or mortar fillet can cause significant damage. Water may also be drawn by capillary action through cracks in leadwork.

## 3.3 Inappropriate methods and materials

Traditional and modern buildings handle moisture in different ways and mixing the two types of construction can cause dampness. Unlike older, traditional construction with solid walls and floors that rely on the need to 'breathe' to stay dry, modern buildings are normally built with cavity walls and floors that employ 'vapour-closed' materials of low permeability, for example, ordinary Portland cement. They depend on excluding water with barriers and moisture breaks. The two types of construction are like overcoats and raincoats respectively. Old buildings usually become damp when barriers to moisture are added. New buildings, on the other hand, become damp when such barriers fail.

Any impervious covering, such as linoleum, vinyl etc, laid over a solid ground floor in contact with the ground will become soaking wet underneath and problems may also follow the installation of a DPM. Water trapped under the floor could be forced up the walls and, where there is no DPC, cause rising dampness there. The installation of a DPM in the floor of a cob, wychert, clay lump or other earth-walled building can increase dampness in the walls to such a degree that they collapse.

Attempts to seal walls (for example, with dense plasters, polyvinyl acetate (PVA) or impervious paint) will impede the evaporation, trapping moisture or displacing it elsewhere, and can lead to spalling or powdering of surfaces.[6] (See figures 14a and 14b.) The use of impermeable plastic-based materials for decoration and repair also results in more humid internal environments and tends to encourage condensation.

14(a)

14(b)

**Figure 14:** Traditional, solid walls can suffer from dampness and deterioration where inappropriate impermeable finishes are used, such as: **(a)** Plastic-based paints. **(b)** Bitumastic products. Photos: Douglas Kent

Modern cement renders and pointing are brittle, of low permeability and tend to crack easily as walls undergo small thermal or structural movements (see figure 15). Water commonly streams down the surface of such render and is drawn into fine cracks by capillary action where it becomes trapped. Consequently, moisture may build up behind the render and eventually find its way to the inside face.

Using hard cement renders, vapour barriers or impermeable thermal insulation on walls also increases the likelihood of interstitial condensation. Cement renders hinder the evaporation of moisture in the wall from the external surface. In certain solid walls at specific times of the year, moisture bound within the wall fabric may evaporate from both the external and internal wall faces. For these walls, the inclusion of a vapour control layer (VCL) close to the internal wall face will restrict the amount of moisture accessing the surface for evaporative purposes and may cause moisture to accumulate in the masonry of the wall. This is also likely with internally insulated walls that incorporate a VCL.

Other inappropriate work includes the stripping of lime render from buildings – a practice long-opposed by the SPAB and which lead to its early nickname of the Anti-Scrape Society.

## 3.4 Reduced ventilation

Compared to their modern counterparts, older buildings require greater ventilation to remove structural moisture from their breathing fabric, in addition to the water vapour generated by the activities of their occupants. Even though old buildings are often overgenerously ventilated, excessive draughtproofing and the installation of double-glazing has contributed to an increase in condensation problems in recent years. Ventilation levels should not be reduced excessively (to below 0.4-0.5 ach).[7]

Chimney flues can become damp through condensation because modern boilers and closed stoves draw in considerably less air than open fires. The warm humid flue gases rise slowly and are likely to condense on any part of the flue which is exposed or has poor thermal insulation. Disused flues may also suffer from condensation if they are closed off without adequate ventilation at the top and bottom.

Experience shows bitumen-coated fabric on the outside of roofs or spray-on coatings underneath prevent proper inspection, hinder the reuse of slates or tiles and, by reducing ventilation, increase the risk of timber decay. They are a false economy, and cases have been reported of serious damage resulting to the structure. These treatments can adversely affect the mortgageability of properties.

The blocking up of subfloor vents may lead to condensation problems and serious timber decay in the associated voids.

## 3.5 Modern lifestyles and use

Our modern, more sedentary, interior lifestyles have changed the moisture equilibrium in old buildings. Internal room moisture is increased by cooking and washing activities (such as drying laundry, boiling kettles and bathing) that can distribute more moisture into rooms.

Condensation may occur in a thick-walled or solid-floored building of high thermal capacity,

**Figure 15**: Hairline cracks resulting from the inappropriate use of cement render on traditionally constructed buildings can admit moisture via capillary action. Photo: Douglas Kent

**Figure 16:** The use of moisture-generating bottled gas heaters is best avoided in thick-walled, solid-floored buildings. Photo: Douglas Kent

such as a church, if it is heated intermittently, particularly where moisture-generating flueless bottled gas stoves and heaters are used. (See figure 16.) The heating installation does not have time to warm the surfaces above the dewpoint temperature, so moisture from the already warmed air condenses on them. (A rapid change from cold to warm, humid weather can produce a similar effect.)

Additionally, where patios, paths and other hard surfaces are laid up to walls, inadequate drainage or rainsplash commonly soaks them.

Moisture movement can increase when central heating is first installed or turned on after the summer months: sometimes soluble salts are drawn to the wall surface that crystallise. The effect can be cyclical with salts going back into solution when the internal relative humidity rises and then being redeposited.

## 3.6 Poor workmanship and detailing

Rainwater penetration can be caused by poor workmanship. An example is where roof tile laps are reduced by stretching the gauge during retiling to economise on materials. This will increase the chances of moisture penetration, including as a result of wind-driven rain or ingress by melting snow on roof slopes.

Poor detailing can also cause dampness. Cold spots from gaps in insulation are conducive to condensation. Roofs on porches or extensions may be of inferior quality, with poor weatherings and rainwater disposal.

**Figure 17:** Diagnosis of a dampness problem is sometimes, but not always, obvious. Photo: Douglas Kent

# 4 Diagnosis

## 4.1 Methodical investigation

An accurate diagnosis of the type and cause of a dampness problem is essential if it is to be treated effectively. It is alarming, however, how often this stage is skipped or a problem misdiagnosed. This can lead to unnecessary and expensive 'remedial' work that damages the building fabric, notably through some irrelevant solution for a non-existent rising dampness problem (see section 4.3).

Sometimes the diagnosis may be self-evident, (see figure 17); frequently, however, it is less obvious and needs investigating. Applying staged remedies can help to accurately diagnose the cause of dampness. Before embarking on extensive work, therefore, the first step may entail nothing more than basic maintenance, such as clearing a blocked gulley, to see if it addresses the problem or further action is needed.

It might be necessary to employ an appropriate independent specialist to diagnose a dampness problem. It is strongly advisable to seek advice required with diagnosing a major dampness problem separately from quotations for work to address it. Taking such advice first (for example, from a chartered building surveyor or other appropriately qualified individual) will prevent vested commercial interests giving rise to recommendations for more work than is strictly necessary (which can occur when a remedial treatment contractor is asked to both diagnose and resolve dampness). Free surveys are also best avoided.

In the SPAB's experience, mortgage lenders can demand unnecessary damp-proofing work during house purchases. Although mortgage valuers have a duty to follow a trail of suspicion, some simply pass all responsibility onto remedial treatment contractors with a vested commercial interest encouraging over-specification. It is worth challenging any diagnosis you believe is questionable and, if necessary, seeking a second opinion in writing from an independent chartered building surveyor or consultant (note, not contractor). The SPAB may be able to advise you on suitable names.

A methodical step-by-step approach is advocated, as described in sections 4.2 to 4.5.[8]

## 4.2 Step 1: Visual inspection

The human senses must not be undervalued because the sight, feel and smell of dampness can often provide adequate information. Be very wary of tasting deposits to determine the presence of salts, however, because hazardous chemicals, such as entachlorophenols, were used in the past to treat areas of decay. The starting point is to check for the symptoms discussed earlier in section 2, taking into consideration the date the property was built, whether it is unoccupied or unheated, the occupancy type, exposure and recent weather, dampness duration, location, colour and shape of patches, stains, mould and salts.

A careful inspection of the roof, parapets, parapet and valley gutters, and abutments should be made, especially exposed horizontal surfaces and areas likely to collect water. Water from leaks can run down rafters or, more occasionally, the underside of the roof to appear inside the building some distance away.

It is often instructive to observe the performance of the rainwater disposal system below the roof during heavy rainfall. The rainwater head, gutters and downpipes that appeared to deal adequately with average rainfall can fail under heavy and prolonged periods of rain. There have been occasions when dampness has been due to the failure of downpipes which had been embedded at an earlier date within walls. The inspection of gulleys during rain can also reveal blockages.

The height of ground levels and condition of external wall faces should be examined carefully. Pay particular attention to the pointing, which can be very vulnerable to water penetration. Traditional lime mortars tend to absorb moisture and release it later. Modern cementitious mortars often permit water penetration through hairline cracks on the perimeter of, and within, the pointing material. Joints in protruding elements such as parapets are particularly vulnerable, especially if not covered (for example, with lead sheet or slate).

## 4.3 Step 2: Electrical moisture meters (EMMs)

Diagnosis sometimes requires more scientific approaches than the sight, feel and smell of dampness. Dampness can be hazardous long before it is detectable by human senses and electrical moisture meters help to establish the presence and amount of moisture scientifically. (See figure 18.)

Using electrical moisture meters to plot the distribution of moisture can give very helpful clues about its source (Table 1). Electrical moisture meters are also particularly useful for detecting changes in the moisture content of materials.

Rising dampness is widely misdiagnosed on the basis of high electrical moisture meter readings alone. Elevated readings occur frequently in old buildings that are not unduly damp, due to salt deposition from evaporation associated with a previous dampness problem, or the presence of certain timber preservatives, foil-backed wallpaper or carbon-containing materials (for example, in breeze blocks or black wallpaper coatings); or they can indicate another problem altogether, such as penetration from rainsplash or condensation.

If rising dampness exists, there will be visible indications too, such as an accompanying tide-mark.

Various accessories are available for use with EMMs, for example, hammer electrodes that can be helpful when measuring the moisture content in joists without lifting floorboards.

## 4.4 Step 3: Detailed investigation

An in-depth investigation is likely to be required to help build up a better picture of a dampness problem if steps 1 and 2 have not enabled a diagnosis.

Salt tests can provide valuable information and be undertaken on site using an analysis kit or use made of a laboratory service. Typical results of salts testing are given in Table 2.


**Figure 18:** Electrical moisture meters have a role to play in diagnosing problems when used in the correct hands.
Photo: Douglas Kent

| Dampness Source | | Distribution of meter readings |
|---|---|---|
| For liquid moisture | Rainwater penetration | Usually tail off sharply |
| | Below-ground moisture | Tail off sharply with height |
| | Plumbing leaks | Normally localised |
| For moisture from the air | Condensation | Tail off gently |
| | Hygroscopic salts (for example, due to a previous dampness problem) | Usually tail off fairly sharply above and below the area of salt deposition unless there is a continuing source of moisture. |

**Table 1:** Electrical moisture meter readings[9]

| Dampness Source | | Salts present |
|---|---|---|
| For liquid moisture | Rainwater penetration | No salts typically (possibly sodium chloride near coasts) |
| | Below-ground moisture | Nitrites and generally chlorides – important clue |
| | Plumbing leaks | Chlorides & possibly nitrates |
| | Other | Chlorides from urine or sea water |
| For moisture from the air | Condensation | No salts (hence mould) |
| | Hygroscopic salts | Chlorides, nitrates or ammonium sulfate (cf efflorescent salts – usually sulfates) |
| | High humidity | No salts |

**Table 2:** Salt test results[10]

Relative humidity and dewpoint can be ascertained with instruments such as the whirling hygrometer. The use of other equipment can also be helpful, including infrared cameras for mapping moisture. These detect temperature differences. Wet areas will usually have a different temperature to dry ones, due to, for example, evaporative cooling. Wooden or metal 'listening sticks' or stethoscopes can be used in other situations to detect plumbing leaks.

## 4.5 Step 4: Further testing and monitoring

In some cases, it will be necessary to carry out more advanced forms of testing to diagnose the cause of a dampness problem. Such tests include the use of carbide meters or the gravimetric (oven-drying) method. They are time-consuming and intrusive but can help avoid unnecessary and harmful work by, for example, determining whether a wall is significantly damp within its thickness.

Some monitoring of the internal environment within a building may also be beneficial. Modern data loggers, which are more versatile and less expensive than their earlier counterparts, have the advantage of providing a longer-term picture of conditions than a one-off assessment, so can assist, for instance, in determining seasonal effects or building performance in relation to lifestyle.

# 5 Work in General

## 5.1 Conservation approach

The demands of conservation impose additional considerations when working on an old building. In particular, a number of overriding principles should be borne in mind when tackling a dampness problem, in addition to the specific control measures described later (section 6) for the different forms of dampness.

The SPAB exists foremost to promote 'conservative repair'. For the Society, the value of an old building lies in its antiquity because of the feelings this evokes. It believes that the special interest of old buildings is best protected by maximising the retention of their historic fabric while minimising any disturbance affecting the overall essence.

The SPAB's view is that conservative repair is achieved by adhering to the following key principles:

- carry out work essential to the long-term well-being of an old building:
- employ compatible methods and materials and;
- obtain sound information about the history, construction and condition of an old building, as well as user needs, before making any serious interventions.

Any intervention needs to be carefully considered to minimise disturbance of historic fabric and aesthetic impact while ensuring that defects are attended to in a way that allows for future repair and maintenance.

Listed building consent may be required from the local planning authority for work that exceeds like-for-like repair – if in doubt, consult the conservation officer. It is a criminal offence to carry out work that needs listed building consent without obtaining it beforehand.

## 5.2 Essential work

It is essential to address the cause of significant dampness in order to cure it, although if this is not feasible (for example, due to access difficulties) the alternative is to manage it by treating the symptoms. Where dampness is transient or insignificant, it may be too minor to require further action. The remedy might be more damaging than the defect.

A conservative approach should be adopted that prioritises repair in situ over wholesale replacement or modifications, justified only where absolutely necessary. The inappropriate installation of DPCs to combat rising dampness accounts for much unnecessary work on old buildings (see section 4) and can also be highly damaging (see section 6.3.4). It is sometimes undertaken to obtain guarantees; be wary about these, however, because they are often loaded with 'get-out' clauses and may have no insurance backing. The right approach coupled with good workmanship is the best warranty.

## 5.3 Appropriate methods and materials

The most effective solution for a dampness problem may well be to take measures to help an old building 'breathe'.[11] This entails encouraging the moisture to evaporate quickly and easily, rather than trying to restrain it.[12,13] It will normally involve the use of traditional methods and materials, such as lime-based plasters and vapour permeable paints, rather than their modern substitutes. Limewash is ideal for the purpose because it is more tolerant of dampness and extremely permeable. A soft distemper can sometimes be an alternative but is unsuitable on walls that remain damp.

Where impervious materials have been used, they should ideally be removed but this may not be possible without causing further damage, so a compromise may be necessary.

Any builder employed to carry out measures to address a dampness problem should be experienced in work on old buildings, including the use of appropriate methods and materials.

Persistent dampness will encourage the growth of various kinds of mould on internal decorations and moss on external stonework. This may be removed by washing and brushing, or by use of vinegar and water, and the affected area treated with a proprietary fungicide designed for this purpose. It is not a permanent cure unless the source of dampness is eliminated.

## 5.4 Good information

It is strongly advisable to obtain advice from a suitable independent specialist familiar with working on old buildings and vital to investigate the underlying causes of dampness problems before attempting to control them (see section 4). In particular, be wary of anyone who suggests the insertion of a retrofit DPC based merely on the results from an electrical moisture meter.

**Figure 19:** Vapour permeable paints, such as soft distemper, should be used when redecorating traditional solid walls.
Photo: Douglas Kent

**Figure 20:** Trace heating cables may be used to prevent the build up of snow and ice in gutters.
Photo: Douglas Kent

# 6 Control

## 6.1 Context

This section describes the specific measures that can be appropriate for addressing different types of dampness. When implementing these measures, the overarching principles described earlier (section 5) should be heeded.

## 6.2 Controlling rainwater penetration

### 6.2.1 Roofs and abutments

Roof tiles or slates may become cracked or displaced as a result of decayed fixings or movement in the supporting structure. Individual units can be replaced but at a certain stage in the life of any roof it will need stripping and recovering.

Flashings and mortar fillets should be kept in good order at abutments with for example, chimney stacks. Modifications are sometimes justified. When renewing mortar fillets or mitred hips, it is often prudent to introduce concealed lead soakers as additional protection against moisture ingress. Mortar fillets, though, should not automatically be replaced completely with lead flashings. Roofs with inadequate eaves, overhangs or insufficient oversailing verges should be adjusted when the coverings are renewed, particularly where jeopardising earth or timber-framed walls.

### 6.2.2 Chimneys

Modifications, such as the installation of caps to chimney stacks, may be necessary to protect redundant flues from driving rain while still maintaining ventilation. Where an existing flue remains in use, old parging absorbs water but new impervious linings may convey this rapidly to the interior. The problem is often water driving through the thin sides of stacks and then running down the outside of liners.[14]

### 6.2.3 Gutters, downpipes and gullies

Rainwater fittings should be cleared of leaves, particularly after the autumn leaf fall, as well as moss and debris (such as broken tiles), and the system checked for defects. Be extra vigilant after adverse weather and occasionally check rainwater disposal during heavy rain. It can be advantageous to fit plastic leaf guards to gutters or wire balloons above downpipes. Leaf guards still admit pine needles and are sometimes easily dislodged, and material left to gather around wire balloons may cause blockages.

Defects in rainwater disposal systems require making good promptly, possibly in conjunction with modifications where these are visually acceptable, such as the introduction of overflow pipes above hopper heads; where of lead, look for signs of cracking and repair damaged sections. Periodic redecoration of ironwork is required to inhibit corrosion.

Ensure rainwater fittings are adequately sized and correctly detailed. The size of rainwater fittings may need to be increased to cope with more intense rainfall attributed to climate change. Eaves gutters supported by too few brackets can sag and overflow while excessive swan-neck arrangements may increase the frequency of blockages.

Over-sized and over-fixed lead linings may suffer fatigue. Snow should be cleared from parapet and valley gutters with wooden or plastic shovels to prevent moisture seeping through joints (minding personal safety). Alternatively, electric heating tapes can be provided to keep gutters free of snow (see figure 20). Duckboards may also be installed for this purpose but need to be very carefully detailed if they are not to increase maintenance problems. The bottoms of rainwater pipes are preferably terminated with a shoe to facilitate access for clearance and maintenance, rather than taken into the ground. It is advisable to form backs to gulley surrounds (for example, with vertically embedded slates) to stop water running into the bases of walls. At ground level, improved drainage (including better surface falls) helps reduce rainwater penetration of wall bases.

### 6.2.4 Walls

Deeply eroded mortar joints in walls, copings and window cills should be raked out and repointed, normally using a lime-based mix (without cement). It may be beneficial to remove cementitious pointing, where this will not cause more harm. Associated grouting (ie use of liquid mortar) can be required to prevent ongoing moisture penetration problems in exposed areas where voids exist within the cores of solid walls.[15] Damaged cornices, string-courses and other projections designed to throw water away from the walls should also be repaired or, if missing, reinstated. Lead can be used to protect these vulnerable elements and create (or recreate) a drip.

With timber-framed buildings, infill panels of lath or wattle and daub (a mixture of lime, cow dung, etc pressed in a plastic state in between wattles and staves) are efficient if kept in good repair. Traditional daub mixes expand when wet, thereby closing the joints. Old panels should be patched with the appropriate traditional materials, which are daub, lime/hair plaster and limewash. If a panel is missing or beyond repair it can be renewed with, where needed, the addition of thermal insulation.[16] Rainwater penetration in old timber framed buildings usually occurs at the joints between the infill panels and the framing. Cracks at the edges of infill panels should be made good with daub, lime/hair mortar or oakum.[17] Cracks and decay in timber frames should not be filled with cement mortar as this will retain moisture and encourage decay. The use of mastic in such situations is also inadvisable.

Limewash is commonly the most appropriate finish for walls. It will reduce rainwater penetration through them because of its ability to absorb water and fill cracks. In exceptional cases, the water-resistance of limewash might be increased, perhaps, for instance, by incorporating linseed oil or magnesium stearate to offer better protection from the weather.[18]

Where rain seriously penetrates an exposed wall, the reinstatement of a lime render or use of traditional slate- or tile-hanging, weatherboarding etc might be considered. Partial treatment at first floor level (including any gables) may be more acceptable aesthetically, though, than a wholesale covering. Some circumstances may justify the installation of a ventilated dry lining system internally instead. These remedies have historic precedent but cannot be used if the appearance of a wall face must remain unaltered.

Colourless water-repellent solutions should normally be avoided on old buildings.

#### 6.2.5 Windows and doors

Paintwork and putty should be maintained to exclude moisture and prevent rapid deterioration of joinery. Some of the linseed paints now available offer good durability. Thermal movement and cracking in timber cills may be minimised by avoiding dark paint colours. When redecorating windows externally, paint 1 to 2 mm over the glass to prevent the entry of moisture at the glazing and putty interface. Ensure also that anti-capillary drips on cills do not become so clogged with paint that they fail to perform their function. Rather than using a modern sealant, gaps between window frames and walls may be pointed with lime mortar and finished with a fillet of sand and boiled linseed oil.

Where original cills have no projection to throw rainwater clear, it is usually possible to install lead, slate or tile below the frame to provide protection to the wall below.

Run-off on walls may enter openings other than doors and windows. For example, airbricks designed to ventilate subfloor voids and reduce condensation can provide pathways for penetrating dampness. This may be overcome by forming small slate or lead hoods above to act as drips.

#### 6.2.6 Replastering chimney breasts

The historic practice of incorporating cow dung into lime plaster applied in fireplaces or on chimney breasts can successfully prevent tar leaching through from old chimneys.

#### 6.2.7 Electrical services

Penetrations made for services through the building envelope should be detailed with care. At overhead cable entry points, the amount of water running down cables and potentially into a building can be reduced by looping them externally.

## 6.3 Controlling below-ground dampness (including rising dampness)

#### 6.3.1 Ground works/improved drainage

There are many types of works outside a building that will remove, redirect or reduce the water that is causing a problem. These can range from grubbing out plants, trees and shrubs adjacent to the walls through to lowering the immediate levels around the building to at least 150 mm below the ground floors inside to form 'dry areas'. It may be beneficial to improve the drainage adjacent to a building. (See figure 21.)The structural consequences of groundworks or improved drainage should be considered, however. Foundation failures can occur due to ground movement and change in the level of the water table. The archaeological implications of excavation close to old walls should also not be overlooked.[19]

French drains can, in certain circumstances, help control below-ground dampness by redirecting surface and subsoil water away from foundations.[20] Laid near a building, they may, for example, be an effective means

**Figure 21:** Improvements to drainage can help to overcome problems arising from below-ground dampness.
Photo: Douglas Kent

of intercepting surface flow from uphill or dispersing liquid moisture in a clay soil that is not free-draining. It is important to ensure that water in a French drain is directed away from the building. The drain should be inspected annually and for this purpose care should be taken to arrange for well-sited inspection chambers. There is a serious risk that the drain could otherwise become blocked, especially in clay soil, thereby forming a moat around the building and increasing dampness.

Open drains can be a better solution than French drains if evaporation of moisture from the bottom of walls is needed where surrounding ground levels have risen. In other situations, the use of 'hi-tech' alternatives might be appropriate. These include drainage composites, reduce or eliminate the need for a granular backfill material so cut construction costs. Alternatively, a geodrain barrier can be fitted to the exterior of the wall to drain it if access for the excavation is available. Where below ground services enter, care needs to be taken to avoid trenches picking up ground water and leading this into the building fabric.

### 6.3.2 Breathability and ventilation

Measures that help the fabric 'breathe', such as replacing hard cement render or pointing with a more suitable lime-based mortar, may be the best solution for controlling rising dampness in a traditionally constructed building. Conversely, applying water-proof renders and coatings, or repointing or re-rendering walls with a cement-rich mortar, can exacerbate dampness problems. Where a floor has a DPM that is displacing moisture into the bottoms of walls, this might be replaced with a 'breathable' construction. Alternatively, as a compromise, a 'breathing' strip for evaporation may be cut through the floor around the room perimeter and infilled with a material such as lime concrete or grated over.

### 6.3.3 Dry linings

It may sometimes be possible to provide a dry lining where the cause of below-ground moisture is hard to cure. This solution is not suitable where historic features, such as wall surfaces, cornices, skirtings, wall paintings, ends of beams and joists, will be masked. The limitations and detailing problems of dry linings, especially at windows, doors and other openings, are self-evident and inevitably adversely affect the appearance of historic interiors. Treatment of timbers in the existing wall where they are identifiable is also essential. This is difficult to achieve but unless it is there is a real danger of condensation leading to dry or wet rot in the cavity.

Panelling is the earliest example of this approach to dampness but is vulnerable to decay where there are high moisture levels unless adequately isolated and ventilated behind. Panelling can also inhibit evaporation of moisture from the wall. Modern practice is for dry lining to be of timber or metal framing with an air gap and VCL, and gypsum plasterboard (often incorporating thermal insulation). It is very important that the cavities formed by all these methods are ventilated but secure against rodents and timber is pretreated against fungal and insect attack, and isolated from the surface of the wall. Plasterboard on mortar dabs should not be regarded as dry lining as the dabs allow moisture to move from the backing to the surface.

Cellars that are seriously affected by below-ground moisture to the extent that water creeps through the joints in the walling are best left to drain naturally. If control of dampness is necessary in a cellar or where a wall extends below the water table, it may be possible to reduce moisture levels by providing drainage. This might necessitate forming a sump that can be kept dry by means of a float-operated electric pump, which needs to be regularly checked/maintained to ensure it is operative. This method is far more reliable than traditional tanking, which tends to be expensive and depends upon faultless workmanship.

Proprietary ventilated dry lining fixed directly on the wall (see figure 22) may be particularly relevant where there are high external ground levels or for cellars. A lime plaster can be retained though any wallpaper or gypsum plaster must be removed.

## 6.3.4 Retrofit damp-proof courses (DPCs)

There should be a strong presumption against inserting retrospective DPCs, which, inappropriately installed in a pre-c1919 building, can be damaging, ineffective and an unnecessary expense (see figure 23). DPCs may occasionally have a role, for example, where irreversible alterations mean an old building is effectively now functioning as a modern sealed structure.

When selecting a DPC system and it is not feasible to insert a physical type, the SPAB suggests following BRE's advice to consider only methods that have been awarded an Agrement or other third-party certificate. Chemical injection is the sole method that currently satisfies this requirement. Physical and chemical DPC's, however, should be avoided in earth buildings, where major structural damage can result, and treatment is difficult in flint and rubble-cored walls. Measures may need to be taken to remove the salts left by rising dampness (section 6.6).

Cill plates are the horizontal bottom members of a timber frame that normally rest on masonry plinths. They can be subject to high moisture levels so are commonly the part of a frame most susceptible to decay. Partial or total renewal may be necessary.[21] Occasionally, it can be acceptable to raise the plinth height to minimise future deterioration if other solutions are limited. When rebuilding a plinth and a DPC is felt justified, try not to place this under the cill plate but lower down in the masonry to avoid the possibility of the timber being in contact with condensation or other moisture on the upper surface of the barrier.

## 6.3.5 Internal joinery and panelling

While most old buildings do not have DPCs and moisture will, therefore, rise in the walls to some degree, this is not, in itself, a problem unless there are timbers built into the wall. Where timber elements, such as skirting boards, architraves and dado rails, are at risk from dampness and, therefore, fungal attack, it may be possible to isolate them.

If such items are taken off to enable treatment of the wall behind, it is important to employ a carpenter/joiner to remove them carefully. These items must not be thrown away. The pieces should be numbered and keyed to a drawing. They should be examined for damage, treated for fungal and insect attack, repaired where necessary and replaced once the work is complete. Where a room is panelled and there is a question about damp-proofing the wall behind, professional advice should be sought from a suitable chartered building surveyor or other independent consultant.

## 6.3.6 Floors

Floors should be tackled in conjunction with soil drainage. As a general rule, a DPM should never be inserted under a floor unless a DPC is inserted into the walls at the same time (or at least a breathing 'lung' formed around the perimeter). DPM insertion is often undesirable because of the risk of it creating or increasing rising dampness in the walls. Applying modern sealants to a floor can also have a detrimental effect but a beeswax and turpentine polish may be suitable.[22]

**Figure 22**: Ventilated dry linings can help with managing below-ground dampness where the underlying cause is difficult to address. Photo: Douglas Kent

**Figure 23:** Evidence of holes drilled for chemical DPC injection, which is not only damaging but usually unnecessary in a traditionally constructed building. Photo: Douglas Kent

**Figure 24:** Various damp-proofing systems and dehydration products exist to combat rising dampness. Their use is generally inadvisable on traditionally constructed buildings but where they are installed only those awarded an Agrement or other third-party certificate should be considered.
Photo: Douglas Kent

## 6.4 Controlling plumbing leaks

Leaks can be addressed with plumbing repairs to pipework and the sealing of gaps around sanitary fittings. Sacrificial magnesium anodes canmay be placed in tanks to halt galvanic corrosion where undesirable combinations of metal pipework exist (such as copper and steel). Pipes and tanks should be lagged to protect them against the cold weather. The positions of shut-off valves should be clearly identified so that they can be closed quickly during emergencies. Leak detection systems and automatic shut off values can be installed to provide protection from leakage and overflow, which is particularly useful for bathrooms above historic ceilings, panelling etc).

Plumbing leaks can sometimes be heard (especially when amplified with a stethoscope or listening stick) or noticed because of higher than usual water bills.

## 6.5 Controlling condensation

### 6.5.1 Humidity

Simple lifestyle changes can produce dramatic improvements at little or no expense. Condensation within a building is eliminated by reducing relative humidity to a maximum of 70%. The optimum range for indoor relative humidity is often considered to be between 40 and 60%.

### 6.5.2 Moisture generation

Ideally, generate less moisture and contain it. Place lids on pans while cooking, dry clothes outdoors, close kitchen and bathroom doors when in use and avoid the use of moisture-generating portable gas heaters.

Modern roofing underlays come in various forms (breather membranes (see figure 25), reinforced felt etc). It is essential to ensure that their use will not set up condensation problems that could lead to premature decay of the roof structure. To this end, manufacturers' instructions should be followed closely – particularly any requirement to seal penetrations into a roof void to limit the ingress of water vapour. It should also be borne in mind that vapour permeable membranes are not 'time-tested'.

### 6.5.3 Ventilation

Improving ventilation to the exterior can also help prevent condensation providing that this is not done in an uncontrolled manner that introduces large quantities of warm, moist air into a room or void. The lower vapour pressure that normally exists will tend to draw out moisture. Open windows, therefore, and avoid draught-proofing those in kitchens and bathrooms. Alternatively, utilise powered extract fans. Ensure that lofts and floor voids are ventilated adequately. (See figures 26(a), 26(b) and 26(c).)

Condensation in wardrobes or kitchen cupboards built against external walls can be alleviated by fitting slatted shelving to improve airflow or increasing the ventilation of the cupboard to the room. The use of freestanding furniture on legs or spacers behind wall-mounted picture frames can also be beneficial, especially for north-facing external walls.

**Figure 25:** Manufacturers' instructions should be followed closely when installing vapour permeable membranes.
Photo: Douglas Kent

There will be cases of rooms with insufficient ventilation where former fireplaces and chimney flues have been sealed up. Often, these can be opened up or fitted with grilles so that additional ventilation can be achieved. Redundant chimneys should be ventilated at the top and bottom, assuming that they have not been partially dismantled.[25]

### 6.5.4 Heating and insulation

Increased heating can maintain surfaces above dewpoint, especially if run constantly at a low level rather than intermittently. Radiant heat is better than convective heat for higher surface temperatures. (See figure 27.)

Lagging cold pipes may prevent surface condensation, as can improving insulation levels (taking care not to cause interstitial condensation instead, as discussed in Section 6.5.5). Other dampness problems should be resolved before thermal insulation is added, for example, by repointing open mortar joints externally to stop rainwater penetration. The thick walls in many old buildings may have relatively low levels of heat loss so perform in a similar way to an insulated wall but their thermal efficiency is requenlyreduced considerably by dampness present in the wall. The use of hygroscopic insulation materials, such as sheep's wool, can help avert condensation by temporarily storing excess moisture. Spray-on roof insulation is inadvisable (see section 3.4).

Solid masonry walls have a high heat capacity, which means they can absorb a great deal of heat and therefore respond slowly to changes of temperature. Churches and other buildings used intermittently may not be heated continuously, which can result in low surface temperatures. In such buildings, limewash or another suitable vapour permeable paint should be used for wall surfaces in preference to standard modern paints. Vapour permeable paints will absorb condensation and prevent the wall from 'running with water'.

Because softwood windows are prone to decay where condensation occurs inside during cold weather, it must be remembered that internal painting of windows is just as important as external. Secondary glazing can be installed to minimise the formation of condensation on windows and is preferable to the fitting of standard double-glazed units. It should be borne in mind that listed building consent may be required for some work.

26(a)

26(b)

26(c)

**Figure 26:** Adequate ventilation helps to prevent condensation, for example, by: **(a)** opening windows on fine days **(b)** ensuring subfloor ventilators do not become blocked **(c)** providing ventilation at the bottom and top of redundant chimney stacks left in place.

Photos: Douglas Kent

Dampness on chimney breasts is often caused by problems of condensation within chimney flues. Disused flues should generally be vented top and bottom (unless dismantled). Further advice should be obtained for problems in flues that are in use.[23]

### 6.5.5 Interstitial condensation

Interstitial condensation may, in theory, be eliminated by preventing the entry of vapour into the wall/fabric. This is difficult to achieve in practice and attempts to do so are nearly always incompatible with the character of old buildings.

A more practical approach is to attempt to ensure that moisture production is reduced and evaporation can take place from the wall faces. This means, for example, closing gaps where moisture can enter a wall internally and removing impervious barriers, such as dense cement renders. Insulation materials that possess poor vapour permeability should also be avoided.[24]

### 6.5.6 Dehumidifiers

Dehumidifiers are designed to reduce and maintain humidity levels (see figure 28).

Used in conjunction with air heaters and air movement, dehumidifiers provide an effective means for the removal of excessive dampness from buildings that have been long disused, flooded or recently repaired. The permanent use of such devices, though, is a poor substitute for efficient heating combined with adequate ventilation and air movement. They consume electricity, are not silent, require a permanent drain and are visually intrusive in old buildings.

Simple lifestyle changes that lower humidity and/or keep surface temperatures above dewpoint will tend to provide a more practical and less expensive long-term solution than dehumidifiers.

Similarly, whole-house ventilation systems, which can have a role in controlling condensation, should not be seen as the automatic answer in old buildings. Their installation can entail significant harm to the historic fabric.

## 6.6 Controlling hygroscopic salts

### 6.6.1 Salt removal

Tackle the contributing sources of dampness before attempting to remove salts.

Salt accumulations on plain-faced walls are best treated by repeatedly brushing or vacuuming away crystalline deposits. Plastered wall surfaces pose a more difficult problem. A poultice of whiting and water is an old method of removing patches of residual salts from plasterwork. Alternatively, the contaminating salts are mainly on the surface of plaster so removal of the plaster can be an option but if it is replaced before the wall has dried out the new plaster is likely to become contaminated by salts retained in the wall.

### 6.6.2 Replastering

Dampness treatment companies will normally insist, as part of their guarantee for a retrofit DPC, that the internal plaster is removed up to about 1 m above the floor level and replaced with a salt-resistant plaster. This tends to just

**Figure 27:** Increased heating can assist with controlling condensation problems. Photo: Douglas Kent


**Figure 28:** Dehumidifiers are rarely a practical long-term solution for condensation problems. Photo: Douglas Kent

disguise dampness problems temporarily and may require listed building consent. Additionally, it is now recognised that quite a large number of houses, particularly those built before the 18th century, have wall paintings or more simple painted designs that are hidden by later layers of decorations. These are easily and unwittingly destroyed during building works. If there is any chance that the building has wall paintings, specialist professional advice must be sought before proceeding with any treatment.

Lime plaster should normally be used for any replastering or repairs following work to combat hygroscopic salts. Delayed replastering may reduce the need for more than one replastering by allowing time for walls to dry out and salts to come to the surface. The rule of thumb is to allow approximately 25 mm per month for the thickness of a wall to dry out. Decoration with permeable finishes such as limewash, soft distemper or clay-based paint, where possible, will maximise 'breathability' and dissipate moderate amounts of moisture with a positive benefit to the structure, finishes and furniture.[25]

### 6.7 Controlling high humidity

Dampness arising from high humidity can be controlled by removing impervious floor coverings, clearing air vents, increasing subfloor ventilation and utilising more tolerant materials when undertaking repairs. Builder's debris can hydrate subfloor voids and inhibit their ventilation so should be removed.

The use of dehumidifiers is generally not the answer (see Section 6.5.6) and their performance is suboptimal where spaces are cold.

# 7 Prevention

With all buildings, good maintenance and care is essential to help control dampness. Prevention is better than cure. Good preventative maintenance, involving uncomplicated tasks such as clearing gutters and rainwater pipes, will restrain, or even obviate, the need for repairs in the first place, prevent the loss of original fabric and also be cost-effective.

Moisture sensors and alarm systems can be installed to warn of excessive moisture conditions in building envelopes, especially in hidden or difficult-to-access areas.

# 8 References

1 See SPAB Technical Advice Note on *The Need for Old Buildings to 'Breathe'*

2 See SPAB Technical Advice Note on *Roughcast*

3 Further guidance on remediation work after natural flooding can be found in Pickles, 2015

4 See SPAB Technical Advice Note on *Fireplaces, Flues and Chimneys* (forthcoming)

5 *Ibid*

6 See SPAB advice on *Colourless Water-Repellent Surface Treatments on Historic Masonry* (forthcoming)

7 Hubbard, D, personal communication, 7 June 2018

8 Derived from Burkinshaw and Parrett, 2004, pp105-117

9 Derived from Burkinshaw and Parrett, 2004, p117

10 After Coleman, G

11 The Building Regulations (Part L) allow for 'special considerations' for traditionally constructed buildings where the application of standard solutions would cause unreasonable harm

12 See SPAB Technical Advice Note on The Need for Old Buildings to 'Breathe'

13 See SPAB advice on *Breathability and Old Buildings* at: https://www.spab.org.uk/advice/breatability-and-old-buildings

14 See SPAB Technical Advice Note on *Fireplaces, Flues and Chimneys* (forthcoming)

15 Further guidance on dealing with damp towers can be found in English Heritage, 2013

16 See SPAB advice on *Infill Panels* for alternative materials to wattle and daub at: https://www.spab.org.uk/advice/infill-panels

17 Oakum can be obtained from boatyards

18 See SPAB Technical Advice Note on *Basic Limewash* (forthcoming)

19 Excavation may well reveal interesting or important archaeological evidence. In the case of important (or particularly old) buildings you should notify your local planning authority and county archaeologist before starting work. If you come across any such evidence during the course of the work you should notify the same authorities. In the case of a Church of England place of worship, a faculty will be required and the diocesan archaeological adviser should be involved

20 See SPAB advice on *French Drains* at: https://www.spab.org.uk/advice/french-drains

21 See SPAB Technical Advice Note on *Timber Frames and Roofs*

22 See SPAB Technical Advice Note on *Beeswax Polish*

23 See SPAB Technical Advice Note on *Chimneys, Flues and Fireplaces* (forthcoming)

24 See SPAB advice on *Breathability and Old Buildings* at: https://www.spab.org.uk/advice/breathability-and-old-buildings

25 See SPAB Technical Advice Note on *Basic Limewash* (forthcoming)

# 9 Other advice

## 9.1 Contacts

Where work to old buildings is being considered, the SPAB may be able to suggest suitable specialists.

## 9.2 Further reading


Burkinshaw, R and Parrett, M (2004) *Diagnosing Damp*, Coventry: RICS Business Services

Burkinshaw, R (2009) *Remedying Damp*, Coventry: RICS Business Services Ltd

Coleman, G R *Dampness and Condensation in Buildings*: Course notes, unpublished

*English Heritage (2013) Damp Towers Conference*. Available at: http://content.historicengland.org.uk/content/docs/research/damp-towers-conf2013-programme-transcripts.pdf

Hughes, P (2020) *The Need for Old Buildings to 'Breathe'*, SPAB Technical Advice Note

Kent, D (2018) *French Drains*. Available at: https://www.spab.org.uk/advice/french-drains

Kent, D (2018) *Infill Panels*. Available at: https://www.spab.org.uk/advice/infill-panels

Massari, G and Massari, I (1993) *Damp Buildings, Old and New*, Rome: International Centre for the Study of the Preservation and Restoration of Cultural Property

Pickles, D (2015) *Flooding and Historic Buildings*, 2nd edition. Available at: https://historicengland.org.uk/images-books/publications/flooding-and-historic-buildings-2ednrev/

Schofield, J (forthcoming) *Basic Limewash*, SPAB Technical Advice Note

Schofield, J (forthcoming) *Beeswax Polish*, SPAB Technical Advice Note

Society for the Protection of Ancient Buildings (2016) *Breathability and Old Buildings*. Available at: https://www.spab.org.uk/advice/breathability-and-old-buildings

Society for the Protection of Ancient Buildings (forthcoming) *Chimneys, Flues and Fireplaces*, SPAB Technical Advice Note

Society for the Protection of Ancient Buildings (forthcoming) *Colourless Water-Repellent Surface Treatments on Historic Masonry*

Society for the Protection of Ancient Buildings (forthcoming) *Timber Frames and Roofs*, SPAB Technical Advice Note

Townsend, A (forthcoming) *Roughcast*, SPAB Technical Advice Note

Trotman, P, Sanders, C and Harrison, H (2004) *Understanding Dampness: Effects, Causes, Diagnosis and Remedies*, Garston: HIS BRE Press

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First published in this form in 2018. This pamphlet draws on material contained in former Technical Pamphlet 8, written by Andrew Thomas, Gilbert Williams and Nicola Ashurst. Thanks for advice on the preparation of this document are due to: Philip Hughes, Caroline Rye, Joseph Orsi and David Alexander.

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Published by the SPAB
in 2018


SPAB ref T5301M
www.spab.org.uk

ISBN 978-1-898856-40-5

The Society for the Protection of Ancient Buildings
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