

Diagnosing the causes of dampness

Good Repair Guide 5

good repair
guide

Dampness of one sort or another is the most common problem in housing. It results in visible wetting of walls, ceilings and floors, blistering paint, bulging plaster, mould on surfaces and fabrics, and sulfate attack on

brickwork. It can also lead to less obvious problems — thermal insulation is reduced in effectiveness, or brickwork cracks because metal components embedded in it have corroded. As with all repair work, the first step to

solving any damp-related problem is to diagnose the cause correctly. This guide is the first of a short series. Future titles will cover in more detail specific remedial treatment for the principal causes of dampness.

The different types of dampness

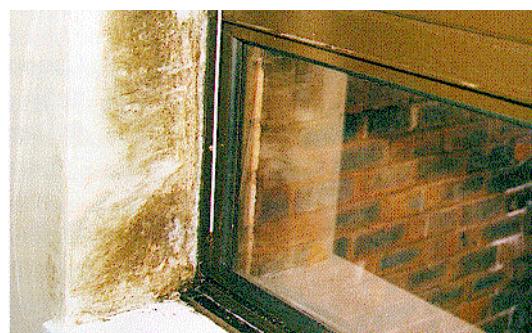
Even in a 'dry' building, there is a surprising amount of water in porous materials, most of which does no harm. A building is only considered to be damp if the moisture becomes visible through discolouration and staining of finishes, or causes mould growth, sulfate attack, frost damage, or even drips and puddles. All these signs can lead to deterioration in decorations and the fabric of the building.

Moisture from condensation

Condensation usually disperses fairly quickly and is a source of only minor inconvenience. However, in homes which are poorly heated or inadequately ventilated, it can become a serious and persistent problem which causes mould to grow. This is a common situation in rented accommodation, but also occurs quite frequently in owner-occupied property: the households affected tend to be those that cannot afford to heat their home adequately.

It can be a complex task to determine the precise cause of condensation, but there are some distinctive features to look for when making an initial diagnosis.

- Condensation normally occurs only from autumn to early spring.
- Problems start on the coldest internal surfaces: external walls (particularly corners), single-glazed windows, wall-to-floor junctions, lintels and window reveals.
- It occurs most often in rooms where lots of moisture is produced, eg kitchens and bathrooms, and also unheated rooms into which moisture can drift.
- It often concentrates in areas where air movement is restricted, eg behind furniture or inside cupboards on outside walls.
- A common problem where flueless paraffin or butane heaters or unvented tumble driers are used, or where clothes are dried indoors.



Typical example of mould caused by condensation



Rain penetration at a window jamb

Rain penetration

Rain penetration shows up as damp patches – usually after heavy rain – on the inside of external walls, around door or window openings, or on ceilings. It can be difficult to pinpoint the exact route the rainwater is taking. For example, a damp patch on a ceiling could be the result of a faulty flashing or a missing tile some distance away from the damp patch. Similarly, unless they have adequate dpc's and flashings, materials in parapets and chimneys can collect rainwater and deliver it to other parts of the building below roof level. Blocked or defective rainwater goods can lead to damp patches on walls that look like straightforward rain penetration.

Causes of rain penetrating solid walls

- Cracked or detached rendering or defective cladding details.
- Pointing that has deteriorated.
- Defects in sills, eg cracks, sills out of level, insufficient projection, blocked or absent throatings.
- Inadequate, damaged or blocked rainwater goods.
- Unprotected joints round windows, doors, air bricks and other components.
- Changes in exposure of a wall, eg adjacent building demolished or sheltering trees removed. **Penetration occurs most often through walls exposed to the prevailing wet winds, usually south-westerly or southerly.**
- Inadequate trays and drips to chimneys and projecting courses.

Rain penetration of cavity walls is much less common, and is usually the result of faulty construction (such as defective wall ties or cavity trays, poorly fixed partial insulation, omission of weepholes, and so on).



Staining to ceiling caused by rain penetration of chimney stack

Causes of rain penetrating roofs

- Tiled pitched roofs: the problem could be as simple as a slipped tile or leaking valley gutter, but more fundamental defects (missing sarking, inadequate flashing) may require major repair work.
- Felted flat roofs: splits caused by local movement of the substrate, allowing rain to get in, or poor detailing at abutments and upstands and penetrations for drainage stacks.
- Inadequate trays and drips to chimneys and projecting courses.
- Inadequate or failed flashing around the chimney; no capping on chimney; rain penetrating stack through eroded pointing or detached rendering.



Typical rising damp stain on internal wall

Rising damp

Rising damp is the result of water being drawn up into porous masonry from wet ground by capillary action. Its effects on walls are immediately recognisable. There may be an horizontal 'tidemark', sometimes several feet above the floor – below it the wall is discoloured, with general darkening and patchiness. There may also loose wallpaper, signs of mould growth and deterioration to plaster; hygroscopic salts brought up from the ground tend to concentrate in the tide mark. In severe cases rising damp may cause skirtings to rot.

Causes

- No damp-proof course.
- Damp-proof course bridged by *pointing or rendering*; by *soil, paving or rubbish* heaped against the wall; or internally by *plaster*. In a cavity wall, the cavity could be bridged by a build-up of mortar droppings.
- Rising damp affects both solid and suspended floors – in solid floors, it may be present because the damp-proof membrane is missing or faulty (but this is rare). Dampness in suspended timber floors often shows itself as wet or dry rot, starting in the joist ends.

Remember!

Remedial work for rising damp is expensive, so it is important to make sure the diagnosis is correct before starting any treatment (see page 4).

Other sources of dampness

Construction moisture

The fabric of wholly or partly new buildings contains water used in the concrete, mortar and plaster. This moisture can take a long time to dry out – a 150 mm floor slab can take more than a year. If protection is inadequate, rainwater can also saturate the building while it is under construction, or get trapped in older buildings while they are under repair.

Leaking pipes

A small leak in a water supply, central heating or internal drainage pipe can cause extensive dampness over a period of time, although the signs of dampness may only appear some distance from the leak. For the same reason, the results of leaking, blocked and misplaced gutters and downpipes can easily be mistaken for rising damp, rain penetration and condensation.

Leaking roofs

Blocked valley gutters and downpipes can cause rainwater to ‘pond’ and overspill the flashings. Parapets and chimneys can also get very wet: the water drains downwards to other parts of the building and causes damp patches inside.



Using an optical probe to investigate hidden dampness in a cavity wall

Spillage

Frequent spillages from tanks, cisterns, washing machines and dishwashers – even regular floorwashing! – can cause problems. Water running through cracks or joints in an impervious floor covering can spread underneath and may reach areas which may never dry out.

Ground and surface water

Ground or surface water can seep into ground floors and basements. In some circumstances, buildings may also suffer repeated flooding.

Contaminating salts

Walls and floors can become contaminated by hygroscopic salts, which absorb water vapour from the air and cause damp patches to form. These salts may have been present in the original building materials – eg sea-sand or gravel that has not been properly washed – or they may have been brought into the building fabric by rising damp or chimney damp. The salts will stay in the wall, absorbing moisture and causing damp, brown patches.

Checking for hidden dampness

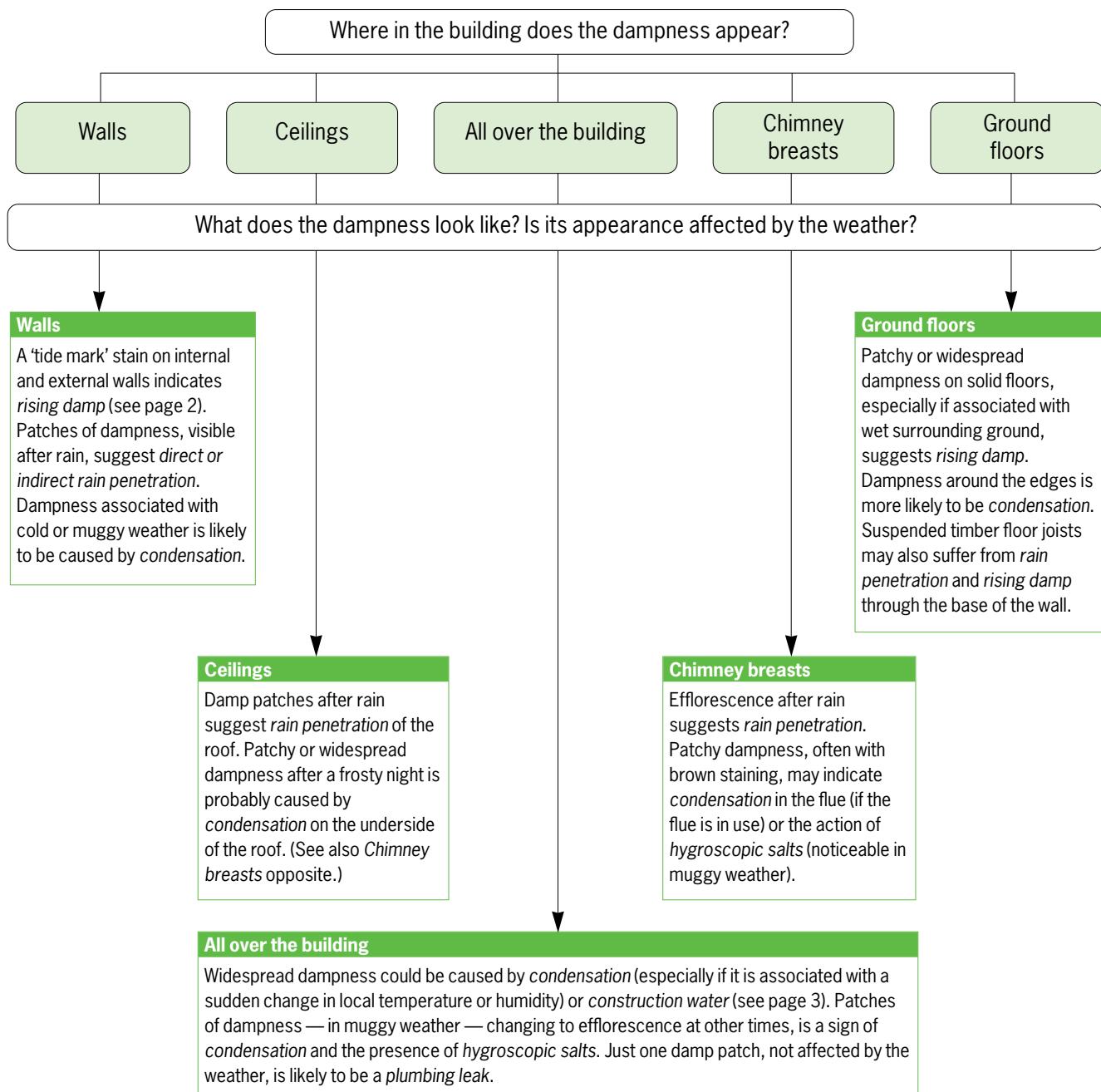
It is also important to check for hidden dampness, which can lead to severe deterioration in timbers or metals and to structural problems. A moisture meter and an optical probe are both useful tools in this part of the investigation.

Moisture meters reveal sudden changes in the moisture content of wood, plaster and screeds, which may indicate the need for a more detailed investigation. They can also be used to indicate the boundaries of damp areas (although it is sometimes difficult to interpret the significance of the actual measurements, so the results should be treated with caution). *Optical probes* are used to look inside cavity walls to see if the cavity is bridged by mortar droppings or other debris. As such, they are indispensable for diagnosing the causes of damp patches on unfilled cavity walls or walls with partial fill.

At a more humble level, *a sheet of kitchen foil* can help to distinguish between rising damp and condensation as the cause of dampness in a solid floor. Put half a square metre of foil on the floor – underneath the carpet/underlay if there is one – and seal round the edges with adhesive tape. If, next day, moisture has collected on the underside of the foil, there is dampness in the slab. If there is moisture on the upper surface, condensation is occurring.

Signs of hidden dampness

- Blistering and flaking paint
- Softening and deterioration of plaster
- Expansion or cracking (which could indicate moisture movement, sulfate attack or corrosion of metal fixings)
- Sagging of ceilings or timber floors
- Fungal attack on timber floors
- Warping, buckling or deterioration of wood-based sheet materials
- Corrosion of steel conduits
- Loss of adhesion of impervious floor coverings on solid floors



More advice

Good Repair Guides are accessible, illustrated guides to defect diagnosis, assessment and repair. The GRG series will be available on CD-ROM during 1997. More detailed advice is available in the following BRE publications.

- **Rain penetration through masonry walls: diagnosis and remedial treatment.** A J Newman. Garston, CRC, 1988.
- **Tackling condensation.** J Garratt and F Nowak. Garston, CRC, 1991.
- **Thermal insulation — avoiding risks.** Garston, CRC, 1994 (second edition).

BRE Digests

- 163—Drying-out buildings
- 245—Rising damp in walls: diagnosis and treatment
- 380—Damp-proof courses

Audio/visual material

- **Remedies for condensation and mould in traditional housing.** In video or tape/slide format, with supporting literature pack.
- Packs of **condensation checklists** are also available for use on site in conjunction with the *Tackling condensation report*.

Guidance on all aspects of construction is also available from the BRE Advisory Service (Tel: 01923 664664).



Technical enquiries to:
BRE Advisory Service
Garston, Watford,
WD2 7JR
Telephone 01923 664664
Facsimile 01923 664098

Digests
Good Building Guides
Good Repair Guides
Information Papers
are available on
subscription. For current
prices please contact:

Construction Research
Communications Ltd,
151 Rosebery Avenue
London, EC1R 4QX Email:
crc@construct.emap.co.uk
Telephone 0171 505 6622
Facsimile 0171 505 6606

Full details of all recent
issues of BRE publications
are given in *BRE News*,
sent free to subscribers.
© Crown copyright 1997
ISBN 1 86081 115 9

Published by
Construction Research
Communications Ltd by
permission of the Controller
of HMSO and the Building
Research Establishment

Applications to copy all or
any part of this publication
should be made to
Construction Research
Communications Ltd,
PO Box 202, Watford,
Herts, WD2 7QG