Code of Practice

Investigation and Control of Dampness in Buildings

PCA
Property Care
ASSOCIATION

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Foreword

The following Code of Practice sets an overarching methodology for those investigating dampness in buildings. This document cannot be fully comprehensive or cover every situation, eventuality, or construction type faced by a surveyor, but if the basic principles of investigation lead to a carefully considered and recorded rectification strategy, then a robust outcome should result.

Property Care Association (PCA) Codes of Practice are supported by detailed guidance notes, information papers and technical specifications. These are written and published by the Property Care Association and are generally free to download from the website. These publications often refer to guidance and instruction produced by other standard setting organisations including the Building Research Establishment (BRE) and British Standards Institute (BSI). Codes of Practice and operational guidance must work to complement instructions provided by product manufacturers who provide information on the performance and limitations of products used to repair damp or damaged buildings.

It is essential that practitioners who involve themselves in the investigation and eradication of dampness in buildings are trained and competent. Surveyors must ensure that they are fully aware of the implications of their activities and demonstrate familiarity with relevant best practice.

As well as the publication of reference documents and Codes of Practice, the Property Care Association promotes the development of diagnostic and repair skills through a Specialist Apprenticeship Scheme, a range of specialist training and a certification programme for surveyors and technicians. For further information and guidance please visit the website at *www.property-care.org*

Version History

Date Effective	Description of amendment	Author
March 2017	• Initial Document	
January 2023	• Minor changes incorporating principles of joint position statement – Investigation of moisture and its effects on traditional buildings • Updated References • Updated Images	James Berry

Code of Practice for the Investigation and Control of Dampness in Buildings

1. INTRODUCTION

This Code of Practice is issued by the Property Care Association hereinafter referred to as 'the Association'.

This Code of Practice deals with the investigation, diagnosis and control of dampness in buildings and is based on current best practice.

Treatment of walls below ground level (under water pressure) does not fall within the scope covered by this Code of Practice. Information is also given on associated matters and, where appropriate, references made to other documents, legislation etc.

2. DEFINITIONS

For the purposes of this document, the definitions in BS 6100: Part 5: 2009 apply with the following amendments/ additions:

- **Condensation**
  The process whereby water condenses from water vapour to liquid water when the temperature of air containing the water vapour drops to, or below, dewpoint.
- **Damp-proof Course (dpc)**
  A continuous physical or chemical barrier to prevent capillary movement of water in walls.
- **Deliquescent**
  Becoming liquid due to the absorption of moisture.
- **Dew Point**
  Temperature at which 100% relative humidity is reached and air becomes saturated with water vapour (condenses).
- **Hygroscopic**
  Readily taking water vapour from the air.
- **Limitations**
  These are what are 'imposed' and agreed with the surveyor PRIOR to the survey such as inspect ground floor only, roof only, no lifting carpets, do not 'damage' walls etc. Specific limits to the survey should be expressly stated in the report.
- **Peripatetic**
  A surveyor/technician who works on their own in various locations for short durations.
- **Relative Humidity**
  The amount of water vapour contained within a given volume of air compared with the maximum amount of water that could be in the same body of air, at the given temperature (usually expressed as % RH).
- **Restrictions**
  These are discovered by the Surveyor at the time of the survey and that had not been discussed or made aware prior to survey and restricts the inspection e.g. laminate floor to ground floor front room; fitted carpet to ground floor rear room; locked door to cellar access. Again, EACH should be expressly stated in the report.
- **Rising Damp**
  Capillary movement of water in masonry from below, to above, ground level.
- **Salt Damp**
  Damage and contamination of decorative surfaces caused by the action of hygroscopic or deliquescent salts.
- **Thermal Bridge**
  Part of a construction with thermal resistance significantly lower than that of the surrounding construction e.g. a window lintel.
- **Vapour Pressure**
  Pressure exerted due to the presence of water vapour.

3. HEALTH AND SAFETY

3.1 General Measures

3.1.1 The Health and Safety at Work etc. Act 1974 (and its subsequent amendments):
The Health & Safety at Work etc. Act 1974 and its subsequent amendments requires every employer to be responsible, in so far as is reasonably practicable, for the provision of a safe working environment, appropriate safety equipment and instruction, training and information on the safe use of plant, equipment and materials necessary for the job. This also should include: Work at Height; Ladder Usage; Lifting and Asbestos Awareness training.

Employees in turn have an obligation to make proper use of the safety equipment provided and to act upon the information and training given to ensure their own safety and that of others who may be affected by their acts or omissions.

3.1.2 Guidance on Safe Practice:
The peripatetic nature of investigating and undertaking most works (i.e. variable site locations) must be considered when making risk assessments.

3.1.3 Obligations to other persons, the environment and other properties at risk:
Where deemed appropriate, neighbours/owners of adjoining or nearby properties must be notified directly if it is considered there may be a potential nuisance and/or hazard to health from work being carried out. Information should include the type of hazard (e.g. flammability), method of application (and any potential risks there from) and some recommendations on precautions to be taken before, during or after remedial works (including details of adequate ventilation and minimum property re-entry times).

3.2 Fire Precautions
Where flammable products are proposed to be used, appropriate measures should be taken at all times to reduce fire risks to a minimum. Such measures should include the provision and accessibility of extinguishers of a suitable size and type. All appliances should be maintained in accordance with the manufacturer's instructions and as laid down in the various parts of BS 5306.

3.3 Electrical Precautions
All electrical equipment should comply with the current edition of the IEE Regulations. Items should be properly maintained at all times and handled with care to avoid damage. Portable electrical tools and equipment should be subject to in-service inspections and testing (Portable Appliance Inspections - PAT testing).

Electrical circuits and installations must be properly and adequately safeguarded.

3.4 Training
All staff must have received training commensurate with their duties.

For surveyors this may include, a recognised industry standard of training and competence is the level achieved by the CSTDB (Certificated Surveyor in Dampness & Timber in Buildings) examinations.

For technicians, training and competence may be recognised by passing the PCA Qualified Technician in Damp & Timber examinations.

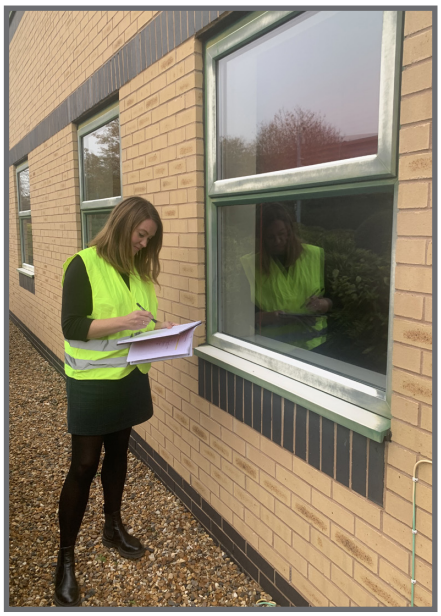
Note: General advice on training and training courses is available from the Association.

3.5 First Aid
All staff who frequently travel, work remotely or work alone should be issued with personal first aid kits and ensure they have means of communication such as a personal communicator or mobile phones.

4. INSPECTIONS

4.1 General Considerations

4.1.1 Inspections should not normally exceed the instructions received from the client. However, a record should be made of any other relevant problems (within the surveyor's area of knowledge) which are observed, and these should be reported in writing.



Even if the instructions given are limited to the investigation of a certain source of dampness, other problems should be highlighted if they are present and reasonably obvious to a specialist surveyor.

4.1.2 Pre-inspection information of the site, details and conditions should be established from the client including size of building, age, structural stability, hazards, safety, services, access arrangements, occupation, intended use/plans, current conditions, previous repairs and awareness of asbestos register etc.

4.1.3 Inspections must only be undertaken by staff that have been adequately trained in the investigation of dampness in buildings and are competent to produce clear unambiguous reports and devise appropriate repair strategies. They must have good working knowledge of all traditional styles of building construction.

4.1.4 The surveyor should be adequately equipped. This will normally include a moisture meter(s) hygrometer, thermometer, floorboard lifting tools, torch, mirror, portable ladder, measuring equipment, and a system to record site notes. The surveyor should have a good understanding and knowledge of most commonly used devices to located and measure moisture, such as those detailed in the investigation of moisture and its effects on traditional buildings – Principles and competencies.

Note: It is essential that all electronic measuring instruments such as thermo-hygrometers are allowed to reach equilibrium with ambient temperatures prior to taking any readings.

4.1.5 During the course of an inspection it may be found that fitted carpets, skirting boards, and furniture etc. require removal in order to establish the extent or cause of dampness. If such items restrict the survey the client should be notified and necessary arrangements made to conclude the investigation in a way that allows a full and correct diagnosis to be achieved. The client should be made aware of any restrictions in writing.

4.1.6 The surveyor must have and use the personal protective equipment identified by any risk assessments carried out under the Management of Health and Safety at Work Regulations and/or the COSHH Regulations. Such equipment may include but is not limited to:

- Overalls
- Hard hat
- Gloves
- Safety Boots
- Eye Protection
- Dust mask

Note: If the structure being inspected is considered to be dangerously unstable immediate action must be taken to notify the owners or their agents and to ensure the safety of others, including site visitors and the public.

4.2 Inspection Procedure

Visual observations both externally and internally are of vital importance and must always be detailed within the report.

The inspection should adopt a “whole house” approach that considers the implications of:

- Location
- Building structure
- Construction materials
- Maintenance / Condition / Defects
- Thermal performance
- Ventilation
- Occupation

Inspections should consider the surrounding context of the building and not just the structure itself. This may include topography, orientation, drainage and UK weather exposure zone. It is beneficial to conduct an initial desktop investigation prior to attending site.

4.2.1 External Inspection

An external inspection should always make up part of the diagnosis even if this is just to conclude that no obvious external defects exist.

A methodical approach should be taken with observations starting at roof level and working down.

The surveyor should establish the construction type and any variations in construction. Knowledge of the construction and associated building dynamics will assist in the diagnosis of any dampness issue e.g. solid masonry walls in particular may be more prone to condensation and rainwater penetration.

Reference must be made to any defect identified and its location and the implications of the defect must be understood and communicated clearly in the report. In addition, a note should be made of any water staining to the external elevations.

Ivy or other climbing plants may hide many faults. Roots of nearby trees and vegetation may cause similar damage to foundations and damp-courses. Vegetation may also obscure the view of any existing damp-proof course, defective pointing and air vents to the sub floor.

Vegetation may also damage masonry, grow behind render, encourage the passage of water through the masonry/structure and inhibit drying.

Any signs of recent changes should be noted e.g. renewed rainwater goods, evidence of remedial damp proof course installation, new rendering or patch pointing, so that the possibility of any residual moisture is considered.

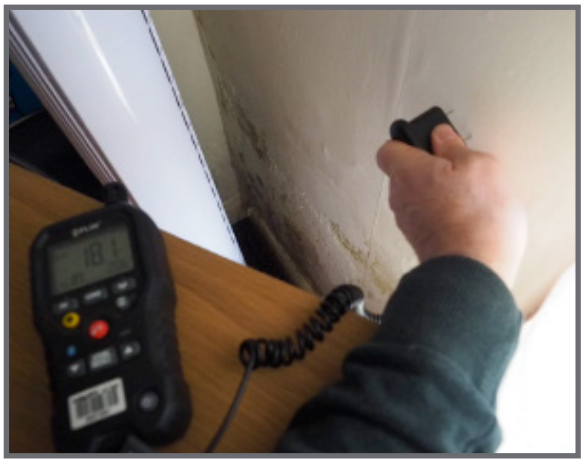
Consideration of any alterations that may not be sympathetic to the original construction of the structure e.g. impermeable mortars in repointing.

Evidence of cavity wall insulation, external or internal retrofit insulation materials should be established and recorded. The presence of retrofit insulation may conceal defects, restrict drying and act as a medium for moisture migration. Their presence and characteristics must be understood as they influence the performance of the building.

4.2.2 Internal Inspection:
A visual inspection should always be the principal method of assessment supplemented with further testing, sampling and evaluation.

Look for evidence of dampness where the inspection of the external fabrics as identified defects - 'follow the trail'. Be aware that a number of potential causes of dampness will not be visible from the outside such as plumbing leaks, condensation and salt contamination. A full understanding of the distribution of dampness in a structure will normally require the use of various moisture measuring techniques. Surveyors should be familiar with the use of such equipment and interpretation of the results produced. It must be recognised that electrical moisture meters will produce only qualitative and comparative readings in masonry. These readings may also be affected by salts. Quantitative estimates can ONLY be made using gravimetric or chemical methods of moisture determination.

The use of moisture meters will assist in identifying areas where further investigation is required. Further guidance of the use of moisture meters can be found in the PCA guidance note - The Use of Moisture Meters to Diagnose Dampness in Buildings - *https://www.property-care.org/resources/use-of-moisture-meters-to-diagnose-dampness*



Moisture meters and other methods of determining the presence of moisture in building materials cannot differentiate between dampness from one source and that from another. It is therefore necessary to consider all potential causes of dampness before arriving at a conclusion.

In addition to an inspection of physical building defects, it may be necessary to obtain information from the occupants to build up an accurate picture regarding moisture management within the property.

Information from the occupants may include:

- Number of occupants
- Pattern of occupancy
- Heating pattern
- Family economics –heating costs
- Domestic appliances – e.g. condenser dryers
- Arrangements for drying washing and wet clothing
- Existing ventilation – especially bathrooms and kitchens

5. SOURCES OF MOISTURE

Moisture within buildings can come from a variety of sources and can often be highly complex in nature. It can occur within the fabric of the building or be created by the internal atmospheric environment.

The following sections describe the common causes and basic diagnostic features of the various types of dampness within buildings.

5.1 Rainwater Penetration

5.1.1 The assessment of any building for dampness must include a check both externally and internally for defects that could lead directly or indirectly to the presence of dampness on internal surfaces. Typical external defects which may lead to rainwater penetration include:

- Defective roof coverings
- Poorly maintained or designed rainwater goods, gutters, drains and downpipes
- External vegetation affecting rainwater goods and covering wall surfaces
- Cracked or defective render or other external coatings
- Perished mortar joints and defective pointing
- Spalled masonry or permeable brickwork or stone
- Defective seals around windows and doors
- Cracked window sills
- Parapets, valley gutters and other architectural features which are prone to failure if poorly designed or maintained
- Debris in the cavity

5.1.2 Rainwater penetration is less frequent in cavity wall construction, but can occur because of inappropriate or poorly installed retrofit cavity wall insulation, mortar drippings, or the cavity being bridged by debris.

If rainwater penetration has been diagnosed in a cavity wall the surveyor must also consider the possibility of wall tie corrosion and the effects this may have if cavity wall insulation is present.

5.1.3 Consideration must be given to the nature of the structure as certain building materials will be more prone to water penetration. Walls built using porous materials or thin walls are more susceptible to water penetration.

Wall thickness must always be measured and not assumed.

5.1.4 Attention must be paid to openings such as doors and windows, as defective seals may allow rainwater penetration. Window sills should be checked for drip moulding/ beads/ throats. These features directly below the sill allow the correct management of rainwater to prevent excessive water running down the masonry.

5.1.5 Location can also have a significant impact on the potential for rainwater penetration. Areas which are more prone to wind driven rain are more likely to be affected e.g. coastal areas and areas on the western side of the UK. Further information on the assessment of wind driven rain especially regarding the aspect of walls

in relation to the prevailing wind and shelter from surrounding buildings, can be found in BS 8104:1992 Code of Practice for Assessing Exposure of Walls to Wind-driven Rain.

5.1.6 Rainwater penetration can be confused with rising damp where it occurs at low levels on external walls. Moisture profiles will generally be fairly uniform over the affected area, perhaps increasing towards the source of ingress (i.e. through the depth of the wall). Hygroscopic salts are not usually found unless they were already present in the structure, although chlorides can be associated with penetrating damp in coastal areas.

Note: Water ingress in structures below ground is discussed in detail in the PCA Code of Practice for Below Ground Structures.

5.2 Atmospheric moisture

With Government drives to increase building efficiency, many buildings have been "draught proofed" and sealed to prevent heat loss. This reduces the rates of ambient air exchanged between the interior and exterior. At the same time moisture production has usually increased. The greater use of showers and higher occupancy rates have made ventilation an increasingly important issue.

Problems associated with high levels of relative humidity in the internal environment such as condensation and mould growth are commonplace. A surveyor undertaking a survey for dampness in the built environment must understand atmospheric moisture and its control.

5.2.1 Condensation

Surface condensation occurs where the temperature of a material falls below the dew point. Where air reaches a relative humidity of 100% it will allow water vapour to change from a gas to a liquid and free water will be deposited as condensation.

Physical features to note are liquid water on non-porous surfaces. The distribution of condensation is usually towards areas of poor air circulation where surfaces are colder than the surrounding air.

Areas where this can occur typically include:

- Surfaces of windows, doors and reveals
- External corners of rooms
- Lintels, beams, reveals and seals
- Behind furniture placed against external walls
- On the internal surface of north facing walls
- Surfaces in areas where air movement is restricted e.g. behind fitted units or white goods

Condensation typically forms on non-absorbent surfaces such as glass, pipework or impervious painted surfaces and whilst that condensate might not damage the material on which it occurs, if there is sufficient deposit it will run and drip on to materials where it may cause damage.

At low level, condensation may be confused with rising damp, although the moisture will usually be on the surface, superficial and hygroscopic salts will be absent. The removal of wall coverings and/or plaster will often reveal a dry substrate.

Condensation can, in very unusual circumstances occur within porous but otherwise solid materials. When it does occur, it can pose diagnostic problems which may necessitate structural investigations.

Construction may also be a factor. Materials with poor thermal properties used in occupied buildings will be

more susceptible to condensation.
Consideration should be given to a property when occupation levels may change after the survey has been carried out, such as a change of tenancy or a pre-purchase house sale survey. For example, a 2-bedroomed house infrequently occupied by 2 people may subsequently be occupied by a family of 4 or more people with pets which are likely to produce greater volumes of moisture resulting in higher relative humidity.

Note: 'One-off' measurements of atmospheric temperature and relative humidity combined with surface temperature readings may allow a surveyor to demonstrate that conditions are suitable for condensation to occur at the time of inspection. However, to build an accurate picture of the role of condensation and elevated levels of atmospheric moisture, more detailed information may need to be collected over an extended period. In these situations, the surveyor should consider the use of long term data recording equipment.

Consideration should also be given to the time of year as it is widely accepted that the colder months of the year will see an increase in problems associated with the internal environment.

5.2.2 Mould growth
BS5250: 2021 states "In winter the internal surfaces of the external walls can be colder than the air in the room and the relative humidity at the face of the wall is about 10% RH greater than that in the room. As a result, if the relative humidity of the room stays at 70% RH for long periods of time the external wall surfaces become sufficiently humid to support
the growth of mould."

This is considerably less than the 100% relative humidity that is required for surface condensation to occur. The presence of liquid water is not required for mould growth. With a suitable substrate and adequately high relative humidity levels, mould spores will germinate and growth
will occur.

The main requirement for the development and growth of mould is a source of moisture however, food, oxygen and temperature are also important. The susceptibility of material to mould growth will vary.

5.3 Rising Damp

5.3.1 Rising damp describes water from the ground that enters a structure by capillary action. Its presence is normally indicated by high free-moisture content at the base of the wall, reducing with increasing height. Often a 'tide-mark' is visible, typically up to 1m above floor level, occasionally higher. Hygroscopic salts (particularly chlorides/nitrates) are almost invariably present in ground water and will therefore be found in walls and plaster suffering from rising damp. These salts normally concentrate in a band in the upper area of dampness and may cause electrical (conductivity) moisture meters to give readings.

5.3.2 During the external observation the surveyor must always look for the presence of a dpc and should be expected in buildings after 1875.

Acknowledgement of the type and presence or absence of a damp-proof course must always be included in the written report.
5.3.3 When considering the presence of a dpc, the possibility that it has been bridged or buried should be investigated. Bridging will result in the dpc being compromised and can allow moisture to bypass the barrier to water. Bridging can occur in many ways including:

- Over rendering
- Raised soil, paths or ground levels
- Internal plaster continued below the level of the dpc
- Debris in the cavity, or subfloor void
- Inappropriate insulation material within the cavity
- Solid floors
- Intersecting Masonry Structures

5.3.4 The proper and educated use of an electrical moisture meter can give a useful indication as to the existence of rising damp but cannot give absolute proof, especially where remedial works have been previously carried out. The limitations of an electronic moisture meter must be understood by the surveyor.

5.3.5 BS5250: 2011 says that "One of the most reliable ways that may be used to differentiate between dampness due to condensate and due to rising damp is to compare the moisture contents of samples of masonry, or preferably mortar, from within the depth of the wall and near the inner surface of the wall; samples from within the wall will not be damp if surface condensation is the sole cause".

5.3.6 If a positive diagnosis of rising damp is being obscured by other faults the surveyor should recommend that the client remedies them first and then allows a period of time to elapse before further checks are made. It is acknowledged that time and commercial implications may make this difficult but where best practice is not followed, the client should be informed of the risk of misdiagnosis and the delivery of unnecessary work.

5.4 Hygroscopic/Deliquescent Salts

5.4.1 Hygroscopic and deliquescent salts have the ability to absorb atmospheric water vapour. Consequently, depending on the relative humidity conditions prevailing, structures which contain such salts may be intermittently 'damp' even though no external source of liquid moisture is present. Ground salts, such as chlorides and nitrates, will normally be present as a result of rising damp or penetrating damp below ground level. However, widespread problems with chlorides in walls may indicate:

a) the use of unwashed sand during construction

b) overuse of chloride-based mortar additives

c) salt-water exposure (e.g. sea-water or de-icing salts on roads)

5.4.2 Dampness as a result of hygroscopic salts without any free or capillary moisture, is often referred to as salt damp. Visual evidence of salt damp will be dependent on humidity levels. Hygroscopic salt contamination of the plaster work may sometimes be detected with the aid of an electronic moisture meter even if the surface appears visually dry. A moisture meter may suggest hygroscopic salts but further tests such as those detailed in BRE Digest 245 may be required to distinguish between hygroscopic moisture and free moisture.

5.4.3 Combustion gases in chimney flues can deposit significant qualities of sulphates in the masonry. This is a common source of contamination at the surface of chimney breasts and reveals at all levels (upper floors as well as ground floor level) and is frequently misdiagnosed as penetrated damp particularly on chimney breasts.

5.4.4 The surveyor must consider any former use of the building, for example agricultural buildings or former industrial buildings where animal urine and industrial products containing chlorides nitrates and may lead to salt contamination of the masonry/plaster work.

5.4.5 Hygroscopic salts can be introduced by seawater flooding, so when inspecting coastal properties enquiries should be made about any history of flooding in the area. In addition, wind driven rain in coastal areas will contain 'airborne' salts in solution.

5.5 Plumbing defects

5.5.1 The Surveyor must always consider the possibility that dampness within a building is as a result of a plumbing defect. Even a small leak, if left undetected, can cause a significant amount of damage.

5.5.2 The surveyor must keep in mind resultant dampness may manifest itself some distance from the defect.

5.5.3 Solid floor construction may contain buried pipework which can leak and result in dampness to the floor slab and may potentially escalate defects at wall floor junctions. This is particularly common in 1960s – 1970s buildings where buried copper pipes are prone to corrode within the aggressive concrete floor, resulting in leakage. Replacement surface pipework can often be a good indicator of leak repair.

5.5.4 Plumbing defects may be concealed and specialist contractors may be required to identify the source of the plumbing defect.

The presence of certain fungi, such as Peziza and Coprinus spp. commonly indicate that large volumes of free water are available and can suggest plumbing defects.

5.6 Subfloor ventilation

Where suspended timber floors are present, attention should be paid to check that there is adequate ventilation to the subfloor void. A lack of ventilation will increase the possibility of condensation and high levels of atmospheric moisture in the subfloor void and may result in timber decay.

Number, size, type, location and any restrictions of vents should be noted during the inspection.
If a solid floor extension has been added to a property or a replacement concrete floor installed, the subfloor ventilation must be investigated to determine efficient ventilation to any remaining suspended timber floors.

Checks should be made to ensure any air bricks are not compromised by internal alterations or retrofit insulation.

6. INSPECTION REPORTS

6.1 Following the inspection, a report should be submitted to the client confirming the instructions received and recording the areas to which access could not be gained and describing the surveyor's observations and recommendations. If appropriate, any quotation submitted for corrective works should be justified, free from ambiguity and bear a direct relationship to the recommendations detailed in the report. All necessary preparatory and other associated works (e.g. replastering) should be detailed including clear instructions defining who is responsible for preparation and finishing works.

When considering repair strategies of any property, particularly building of historic interest or those of traditional construction the specialist report should indicate that the surveyor has considered the impact of those measures against the heritage significance of the building. In the case of treatment of Party Walls, clients should be made aware of the requirements of the Party Walls etc Act 1996 to obtain agreement of neighbours prior to commencement of works.

It should be noted that in all cases the requirements of the individual countries Building Regulations and/or any local building bylaws must be observed, and where necessary the advice of the Local Authority Building Body should be taken. Reference to any legal protection on the property should be identified in the report.

6.2 Reports must accurately record any significant defects found during the inspection that relate to past, present, or future ingress of water.

The report MUST highlight the consequences of dampness in buildings, placing emphasis on the role of dampness in initiating and sustaining fungal decay and influencing insect attack.

6.3 The company issuing the report and/or estimates should retain copies of the report, the quotation, the client's written instructions and all other relevant documents. These should be retained for up to seven years where no work is undertaken or for the total period of any liability where works are undertaken by the company.

Note: Where a company is acquired by another company, every effort should be made to ensure that the documents listed above are passed to the entity acquiring any liabilities.

6.4 Structural Timbers
In all cases where the presence of moisture is identified, the condition of associated structural and other timbers must be ascertained where possible. If circumstances preclude a detailed inspection it must be recorded in the report that timbers in such areas may be at risk from fungal decay/insect attack and further inspection is recommended.

7. CONTROL

In all cases the requirements of the Building Regulations and/or any local building bylaws must be observed, and where necessary the advice of the Local Authority Building Inspector should be taken. A suitable and sufficient risk assessment should be undertaken by a competent person to assess the hazards and risks to the specific site and who will be affected by the proposed corrective works and products used.

Where it has been deemed that there is no risk of fungal decay to timber components within a building and the consequences of damp are considered acceptable, then it may be considered unnecessary to undertake any further works.

In some circumstances, however, rising damp that affects masonry walls may require control where structural or decorative deterioration is considered significant.

Where possible consider all options for repair. Clients should be provided with repair options that optimise outcomes while limiting wherever possible the impact on the heritage value of the building and its fabrics.

7.1 Rainwater Penetration (above ground)
With any incidence of rainwater penetration, it is critical to establish the construction and design defects that have allowed water to enter the buildings fabric. Without knowledge of the moisture pathways it will not be possible to recommend the necessary steps to control the dampness and make appropriate repairs.

Any defects noted at the inspection stage which may contribute to rainwater entering the building should be rectified. The responsibility to correct any defect should be highlighted at the report stage and a timetable placed on the repair. The report should also highlight the implications to the building if repairs are delayed.

Whilst some defects which may contribute to rainwater penetration can be avoided by routine maintenance, in some instances rainwater penetration may require specialist treatment. These remedies may include:

- Pointing, masonry repairs, or rebuilding
- The renewal or application of Lime/cement renders
- Exterior weatherproof cladding
- Repair, redesign or elimination of architectural features that promote rainwater ingress
- Repair, upgrade or redesign of rainwater management systems including roofs, parapets, valleys, gutters, rainwater goods and drains
- The targeted and considered use of specially formulated masonry water repellents

Note: The use of internal waterproofing products for the treatment of rainwater penetration is rarely recommended. Adopting this approach without stopping further water rain penetration at source is likely to result in the issue manifesting elsewhere or leading to other damp issues or deterioration of timber, masonry or finishes within the building.

7.2 Atmospheric Moisture

General:
BS5250: 2021 states that “All surface condensation problems can, in principle, be solved by the application of heat to raise temperatures above the dew point, coupled with adequate levels of ventilation.” Although applying this in practice can be a more challenging task.

Education of the occupant(s) may also assist in improving conditions by regulating moisture production and improved heating and ventilation strategies but this approach may be limited by defects in design and to the construction.

Specific action in relation to thermal bridges may also be required to address localised issues.

Ventilation:
BS5250:2021 says that it is “In order to keep the internal relative humidity low enough to prevent a build-up of harmful condensation, adequate ventilation should be provided.”

The installation of extractor fans in kitchens and bathrooms will carry away moisture laden air from the two areas most typically responsible for moisture creation and is now required by Building Regulations in new construction.

In addition, whole house ventilation systems, air conditioning systems and dehumidifiers can also be used to assist atmospheric moisture management.

The provision of ventilation systems in occupied homes is a specialist activity and can be complex. For further information please refer to the Property Care Association Code of Practice for Investigation and Provision of Ventilation in Existing Dwellings.

Heating:
A common cause of condensation in existing buildings is a lack of adequate heating. Good heating practices should be encouraged.

Insulation may improve the thermal properties of the building and help to control running costs but should always be designed and undertaken by a competent person. It has been proven that poorly considered or executed works have caused increased internal dampness.

The addition of insulation should not be used by itself to prevent a condensation issue and should be considered in conjunction with improved heating and ventilation.

Mould growth:
Although the symptoms of mould growth may be easily dealt with by either the use of a proprietary mouldicide wash or cleaning, it is essential to remove the cause of the mould growth i.e. the high relative humidity.

Mild cases of mould growth can sometimes be controlled by simple changes in the heating and ventilation regime, or changes in the occupants lifestyle. In some situations the application of products such as fungicidal paint may address minor localised issues but will not remedy the underlying cause of mould growth.

In severe cases, fungicidal treatments should only be considered as a temporary holding measure whilst the required actions are taken to improve heating, ventilation, moderate water production by occupants, or address any contributing defects.

7.3 Rising damp

Note: Only rising damp can be controlled by the installation of a new damp proof course.

Bridging:
Where an existing damp proof course has been compromised and bridged by raised ground, patios, solid floors, plaster, and debris in the cavity, the bridge should be removed and the existing damp proof course returned to efficiency. Consideration must be given to the possibility of salt contamination to plaster work once the bridge has been effectively removed.

Where it is not possible to remove the bridge e.g. public highways, then the installation of an internal vertical waterproof barrier and an appropriate remedial damp-proof course at a suitable height should be considered.

Physical Damp-proof Courses:
In some instances, it may be possible to install a new physical damp-proof course.

This type of system is limited to certain construction types and is not suitable for flint, rubble filled or unusually thick walls. The presence of services can also prove problematic for the installation of a physical damp-proof course.

Where the insertion of a physical dpc is not viable, the Building Research Establishment (BRE) strongly recommend that alternative methods should only be considered if they have been awarded a third-party accreditation. The only method currently satisfying this requirement is an injected damp proof course.

Chemical Damp Proof Courses:
In most instances the installation of a chemical damp-proof course is economically the most viable option for the control of rising dampness. Chemical damp-proof courses currently fall into four groups:

- Hand insertion – typically thixotropic materials but also includes injection mortars
- Low pressure injection
- Gravity feed
- High pressure injection

If there is any doubt about the suitability of a particular system, the manufacturer should be contacted for advice.

Note: Newer brickwork with a failed conventional damp-proof course may have an alkaline mortar which could prevent effective treatment with some of the currently available water repellent chemical systems.

Electro Osmosis Systems:
The lack of a British third party accreditation for electro osmosis systems restricts its acceptance. However, due to their relative ease of removal and perceived lack of impact on the building fabric they are supported for use by some in Listed Buildings and thick, inconsistently structured walls.

Cavity Drainage Membrane (for above ground dry lining systems):
The use of waterproofing membranes or impervious coating applied internally are not recommended as the primary or a long-term remedy for the control and eradication of rising dampness in masonry walls. The use of such membranes has been adopted by industry as a means of isolating finishes from damp structures during the drying process and isolating finishes from salt affected masonry walls. The technique can be adopted in some circumstances to speed the recovery of damp structures and combat salt staining problems (see below).

7.4 Salt Contamination
Problems caused by residual salt contamination are usually dealt with by removing the salt contaminated plaster and re-plastering with a salt resisting plaster mix. It should be noted that removal of plaster does not remove the salt accumulated within the masonry itself. There is no economic method of removing this salt and this is the reason why special plastering is used for walls affected by salt contamination.

Re plastering and other forms of rectification should only be applied when the cause of the damp that allowed water to introduce the contaminating salts has been removed or is understood. All rectification strategies are likely to fail unless the sources of any free water ingress have been eliminated. As a guideline, plaster affected by hygroscopic salts should be removed up to a line not less than 300mm above the last detectable signs of dampness and/or salt contamination.

Cavity or plaster membranes can be used in conjunction with another system as an alternative to renders or other forms of plaster repair, to cover areas of wall that are contaminated with very high levels of salts. This method may be preferable with unconventional construction types or in some historic settings where a dry defect free decorative wall surface would be difficult to achieve with conventional wet plastering systems.

Demountable dry linings applied to membranes can be decorated with the minimum of delay after installation of the damp-proof system and can be demounted without affecting the underlying structure. Care must be taken when specifying and applying these systems in a way that prevents salt migration at the perimeters of the membrane system. In all situations, it is essential that the underlying source of moisture ingress is properly addressed.

Note: Plasterboard should not be directly fixed to walls with a history of dampness issues using traditional gypsum adhesive as this may result in visible damp patches where the adhesive acts as a bridge for moisture or salts between the old masonry and the plasterboard surface.

Note: The use of cavity drainage membrane below ground level should be recognised as a waterproofing system and is covered under a separate code of practice.

Note: If traditional lime plasters are specified in areas where it is known that high levels of salt contamination exist, then the client must be put on notice to expect the risk of staining or deterioration to new finishes. Due to the nature of natural lime products such notification may still be appropriate even when salt contaminated walls appear to be devoid of free water.

7.5 Subfloor ventilation

Where inadequate ventilation to sub floor voids has been identified, additional airbricks should be specified to ensure all areas of any sub floor voids are adequately ventilated. Guidance on ensuring adequate subfloor ventilation can be found within Building Regulations, Approved Document C.

Mechanically assisted ventilation should be considered where additional air bricks are not possible.

7.6 Drying and Redecoration

Impervious wall coatings should not be applied to walls that have been affected by damp until the walls have dried out. This could take between 1 to 12 months, or longer, depending on wall thickness, permeability, heating, etc. The presence of paints or renders will substantially extend the drying period. Consequently, walls should be re-instated with a moisture resistant vapour permeable coating. A temporary decorative finish is particularly recommended for use during this interim period (e.g. water based plaster primer paint).

The client should always be put on notice of anticipated drying times in the report and the implications of applying impervious coatings. Dry linings can be decorated with the minimum of delay after installation of the dpc.

Note: In walls contaminated with hygroscopic salts ‘dry’ conditions may never be fully established and impervious coatings will, therefore, perform badly. See 7.4.

8. QUALITY ASSURANCE

The PCA conducts regular inspection visits on its members to ensure that standards are maintained. In particular, visits ensure compliance with the objectives, standards, application methods, specification and use of approved products as detailed in the preceding sections. These inspections are carried out by the Association’s Regional Support Officers. By these means, members are kept up-to-date with developments and maintenance of the high standards demanded can be assured.

9. OTHER SOURCES OF INFORMATION

This Code of Practice should be read in conjunction with:

British Standards

From: BSI Publications, Linford Wood, Milton Keynes MK14 6LE)

- BS 5250: 2021 Management of moisture in buildings – Code of practice
- BS 6100:2009 Part 5 – Glossary of Building & Civil Engineering Terms (Masonry)
- BS 6576:2005 – Code of Practice for the Installation of Chemical Damp Proof Courses
- BS 8102:2022 – Protection of below ground structures against water ingress. Code of practice.
- BS 8104:1992 – Code of practice for assessing exposure of walls to wind-driven rain
- BS 8201:2011 – Code of Practice for Flooring of Timber, Timber Products and Wood Based Panel Products
- BS 8215:1991 – Code of Practice for Design & Installation of Damp Proof Courses in Masonry Construction
- BS 8481:2006 – Design, preparation and application of internal gypsum, cement, cement and lime plastering systems
- BS EN ISO 9000: 2015 – Quality Management and Quality Assurance Standards
- BS EN 13914-1:2016 – Design, preparation and application of external rendering and internal plastering. External rendering

BRE

From: BRE Bookshop, BRE, Garston, Watford WD2 7JR

- Digest 245 – Rising Damp in Walls
- Digest 297 – Surface Condensation and Mould Growth
- Digest 364 – Design of Timber Floors to Prevent Decay
- Digest 369 – Interstitial Condensation
- Good Repair Guide 11 Repairing Flood Damage Parts 1,2,3
- Information Paper IP 19/88 – House Inspection for Dampness

Property Care Association (Downloadable from *www.property-care.org*)

- Code of Practice for Remedial Timber Treatment (2016)
- Certificated Surveyor of Timber & Dampness in Buildings (CSTDB) - Examination syllabus
- Investigation of Moisture & its Effects on Traditional Buildings, Principles and competencies - Joint Position Statement (2022)
- Code of Practice for the Provision and Control of Ventilation in Buildings (2017)
- Best Practice Guidance – Surveying of Ventilation in Existing Residential Dwellings

Employers should satisfy themselves that they have knowledge of the duties placed on them by all relevant legislation.

The information contained in this booklet is given in good faith and is believed to be correct. However, it must be stressed that of necessity it is of a general nature. The precise condition may alter in each individual case and the Association is therefore unable to accept responsibility for any loss howsoever arising from the use of the information contained therein.

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