

Rising Damp & its Control

A guide to identifying the various forms of dampness encountered in buildings and control of rising damp through remedial action.

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Preface

Rising damp is not the most common form of dampness encountered in buildings; this is left to condensation. However, it is very likely that a high proportion of older buildings are affected by rising damp to some degree or another, and it does cause problems with positive identification, appropriate remedial action and ancillary works.

This manual has been produced to enlighten and inform those who are in some way involved with the control of rising damp in buildings. It assumes the reader already possesses a basic knowledge of the subject and therefore hopes to expand upon this.

The manual deals with the most common situations encountered with regard to rising damp and remedial action. It does not cover structural waterproofing (tanking).

This manual outlines the identification of dampness problems in buildings and the use of Dryzone damp-proofing cream and ancillary works for the control of rising dampness. This book should be read thoroughly to become familiar with the system prior to undertaking any works.

It is also important that the user of Safeguard damp-proofing systems is thoroughly familiar with BS 6576:2005, "Code of practice for diagnosis of rising damp in walls of buildings and installation of chemical damp-proof courses" around which this publication is based.

Finally, the installer of any chemical damp-proof course system must be aware of any risk and hazards which the processes might cause, and therefore be aware of their duties under the COSHH Regulations. Also it is prudent to ensure that the property owners have complied with the Party Wall Act 1996 where appropriate.

Note on British Standards/Publications referred to in this document:

The following publications are referred to throughout this book:

BS 6576
BS CP102 1973
BRE Digest 245

Although these publications were produced in the UK, the techniques and methods described can be used in any country.

Rising Dampness

Rising damp in buildings may be defined as the vertical flow of water up through a permeable wall structure, the water being derived from ground water. The water rises through the pores (capillaries) in the masonry by a process loosely termed 'capillarity'. In other words the masonry acts like a wick.

The height to which the water will rise depends on several factors including pore structure and rate of evaporation. Masonry containing a high proportion of fine pores will allow the water to rise higher than a coarse pored material; basically the water is carried up the wall in the finer pores and not those of large diameter. The average size of pores in masonry gives a theoretical rise of around 1.5 meters but where evaporation is severely retarded, for example by the use of impervious membranes, moisture can sometimes rise in excess of 2 metres.

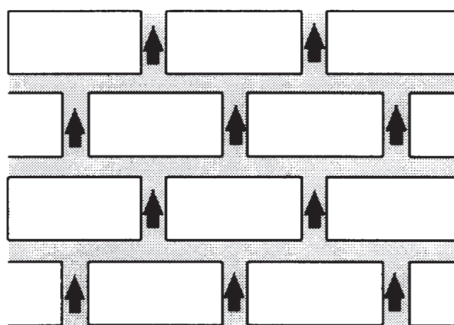


Figure 1: Water rising through mortar beds

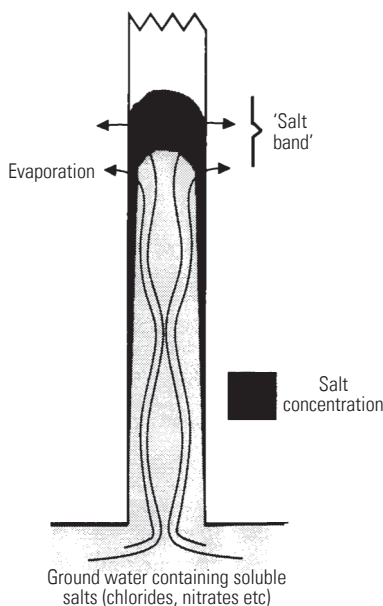


Figure 2: A rising damp complex

The major paths through which the water rises are the mortar beds; this is illustrated in Figure 1. For water to rise through the bricks then it must cross a mortar bed. In effect the mortar beds form the only continuous pathways for water rising through the wall. If a house is built from impervious bricks then water can still rise through the mortar bed but if an impervious mortar is used then no water will rise even if the bricks are very porous. The mortar beds will form an important part in the chemical treatment for rising dampness.

Ground Water

Ground water contains small amounts of soluble salts, the most significant of which are chlorides, nitrates and sulphates. These pass with the water up the wall and are left behind when the water evaporates. Over many years of active rising dampness large quantities of these salts accumulate within the masonry and decorative surface, most becoming concentrated in a general 'salt band' towards the maximum height of rise as illustrated in Figure 2. Frequently, the concentrations of these salts are very low towards the base of the wall.

Both chlorides and nitrates are usually hygroscopic, i.e., they can absorb moisture from the surrounding environment and, in general, the greater the amount of salts the greater the absorption of moisture especially under humid conditions. Thus, even though rising dampness may have been controlled by the insertion of a remedial damp-proof course these salts alone can cause the wall and any contaminated decorations to remain damp.

Damp-proofing

Therefore, to provide a 'dry' wall and a suitable surface to take new decorations the Safeguard Damp-proof Course Systems involve two fundamental processes:

1. The insertion of the chemical damp-proof course.
2. Removal of old contaminated plaster-work and decorations, and replacing with specialist replastering to prevent the passage of any residual moisture and contaminant salts from passing to the new surfaces from the underlying masonry.

Assessment of Dampness in Buildings

The Survey

It is essential when investigating the potential for rising dampness to eliminate other sources of water ingress. A guide to the approach to be adopted for a damp survey is as below. Care must be taken to eliminate other potential sources of moisture, especially condensation in the colder months, and it is therefore essential to ensure that a full investigation is always undertaken. If any other sources are identified then these must be first eliminated before a proper assessment of any rising dampness can be made as it can be very difficult to distinguish between two or more interfering sources of water ingress.

Should it be noted that previous damp-proofing works have been undertaken then it is essential to take great care ensuring that the evidence of dampness is correctly evaluated. The following gives a guide to onsite routine procedures for the survey:

1. External Examination:

- a. External rainwater goods, valleys, flat roofs.
- b. Condition of brickwork, stone, mortar, plinths, render, weatherproof finish, etc.
- c. Wall construction, cracks in masonry, copings, etc.
- d. External timbers including windows and doors.
- e. Air vents; their position and condition.
- f. Chimneys and flashings.
- g. Position of any remedial DPC installation including spacing and depth of holes where chemical systems have been used.
- h. High ground levels, abutting gardens walls, steps and position and integrity of any DPC system.

2. Primary Internal Examination: Visible Signs

- a. Fungal decay in skirting and/or other timbers.
- b. Peeling/blistering wallpaper, peeling/blistering paintwork.
- c. Efflorescence.
- d. Mould growth, staining.
- e. Damp/wet patches, water droplets, water runs.

3. Secondary Examination:

(assuming correct use of properly functioning and calibrated electrical moisture meter)

- a. Examine both perimeter and centre of solid/timber suspended floors.
- b. Check moisture content of timber skirting (top and base).
- c. Examine and check condition of the floor/wall junction, edge of DPM of floor.
- d. Check any remedial DPC installation including position and depth of holes (if inserted from inside).
- e. Note distribution of moisture meter readings both vertically and horizontally on the surface of walls.
- f. Check for efflorescence beneath wallpaper finishes.
- g. Note any use of polystyrene sheet/metal foil beneath wallpaper.
- h. Note any new plasterwork, height of replastering, its condition and if possible its type, e.g. renovating, sand/cement, lightweight premix gypsum, etc.
- i. Lift floorboards and thoroughly examine timbers and subsite.
- j. Check for suitable subfloor ventilation.
- k. Look for any internal plumbing defects and water dripping from cold pipes as the result of condensation.

4. Other:

- a. Check (if possible) on history and use of property.
- b. Evaluate 'lifestyle', e.g. use of central heating, paraffin or flueless gas heaters, drying, washing and cooking, degree of ventilation, etc.

Once any form of dampness has been identified then it is essential that the risk of decay to any timbers is assessed and appropriate remedial measures undertaken.

REMEMBER: a combination of dampness and wood leads to potential rot.

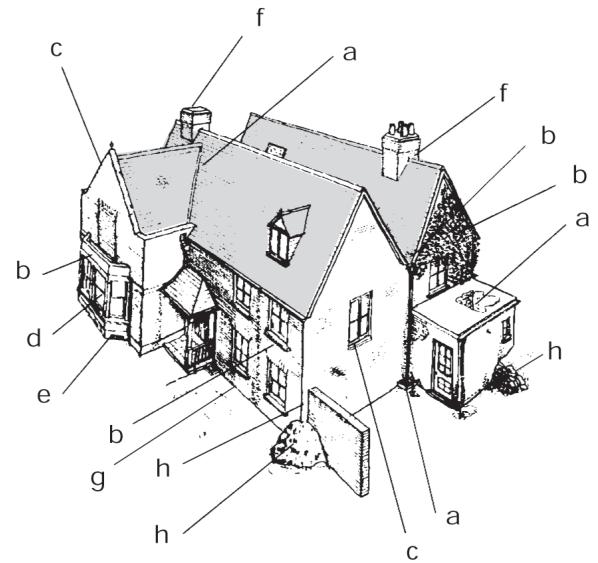


Figure 3: External examination

The primary task of the investigator is to correctly identify the source of dampness. This is best achieved by a process of investigation and elimination. Extreme care must be taken, for example, in the winter months to eliminate condensation as one of the potential causes of dampness. A basic guide to dampness problems is given in the following table.

Table 1: Guide to dampness

Observation	Possible defect
Decayed skirtings, damp base of wall, damp around edge of solid floor	1. Rising dampness 2. Rising dampness + defect in floor/wall junction 3. Faulty edge to dpm of floor 4. High ground level/failed tanking
Surface efflorescence just above skirting/floor	1. Gypsum finishing in direct contact with damp solid floor or damp masonry at base of wall 2. Gypsum finish/porous plasterwork taken below timber suspended floor and subfloor and condensation at floor/wall junction
Dampness at base of wall up to 1.5m* in horizontal band	1. Rising dampness 2. Low level rain penetration (splashback)
Stains, especially in horizontal band, noticeably damp in humid conditions.	1. Heavy contamination with hygroscopic salts
Damp patches on surface increasing in size during/following rain; sometimes heavy efflorescence	1. Rainwater penetration; external defect usually obvious
Stains/damp/efflorescence on chimney breast	1. Contaminated plasterwork from combustion products 2. Condensation in flue 3. Water running down chimney flue
Mould growth on cold surfaces, window reveals, ceiling/wall junction, etc	1. Condensation
Free surface water, water run marks, water droplets, dripping water	1. Condensation 2. Severe rainwater penetration 3. Severe plumbing leak
Damp timber floorboards around edge of floor but not in centre	1. Subfloor condensation at floor/wall junction 2. Floorboards in direct contact with damp masonry
Floorboards damp away from wall	1. Subfloor condensation
Damp at first floor level and above	1. Condensation 2. Rainwater penetration 3. Plumbing defects

*May rise higher depending on conditions

Note: disintegration of cementitious renders may be due to sulphate attack.

It is essential that the survey is carried out thoroughly and that all potential areas of dampness are noted. Special vigilance must be taken where dampness, and hence decay, may be unseen such as beneath timber suspended floors. Wherever timber and dampness coexist the risk of decay should always be reported and the client must be put on notice to that effect.

Comparisons of different types of dampness are given below. During the survey there may be several signs of dampness and it is important that they should be identified as far as possible.

Table 2: Comparing damp

Indicator	Rising Damp	Surface Condensation	Rain Penetration
Electrical moisture meter	Sharp change at top of damp	Gradual change	Usually sharp
Carbide meter	Declining gradient within wall	Dry within masonry	Probably patchy; declines away from point of ingress
Mould growth	Rarely	Yes; may be patchy	Sometimes; depends upon conditions
Water droplets/free flowing water on surface	Absent	Yes, but depends on surface and conditions	Depends upon severity
Hygroscopic salts (chloride/nitrate)	Present	Absent	Absent
Moisture in timber skirtings	High (if in direct contact with wall)	Low	Depends upon position of water ingress
Moisture above 1.5m	Sometimes	Depends upon conditions	Depends upon position of water ingress

Where there is more than one source of water ingress then it may be difficult to distinguish between their origins. Generally, the presence of active rising dampness is indicated by excessive moisture at the base of the wall which slowly declines on going up the wall. This moisture gradient is usually observed up to heights of 1.5 metres but, depending on conditions and the structure of the masonry, it may rise to greater heights. Sometimes, a 'tidemark' can be observed running almost horizontally along the wall and the area below it being obviously damp.

Masonry contamination with a 'band' of hygroscopic salts (Figure 2) will also confirm the presence of a rising damp but will not differentiate between an active or past complex.

The proper use of a surface electrical moisture meter can give a useful indication as to the existence of a rising damp complex but cannot give absolute proof, especially where remedial works have been previously carried out. (See British Wood Preserving and Damp-proofing Association DP1, 'The use of electrical moisture meters to establish the presence of rising dampness'). Generally, with an electrical moisture meter high surface readings are obtained followed by a sudden 'cut-off' at the top of the rise of moisture. This pattern of readings is typical of that resulting from active rising dampness.

However, other meter reading patterns can be obtained during investigations. Some possible interpretations are given in the below table. Please note that it is the pattern of the readings which are important, not the actual reading itself.

Table 3: Example moisture meter readings

Height	i	ii	iii	iv	v	vi	vii
2000mm	0	0	0	0	0	0	100
1750mm	0	0	25	0	0	0	100
1500mm	0	10	*90	0	*80	0	100
1250mm	10	*85	*90	0	*75	0	100
1000mm	85	*65	40	0	0	0	100
750mm	90	35	65	0	0	0	100
500mm	90	20	90	0	0	0	100
250mm	95	20	90	75	10	5	100

* = 'salt band'

- i. Old or inadequate plasterwork, no effective DPC.
- ii. Old contaminated plasterwork, effective DPC – readings increase due to hygroscopic salt band.
- iii. Old or inadequate plasterwork, partially effective DPC – water at base and salt band towards maximum height.
- iv. Defective construction of floor/wall junction.
- v. New effective render following DPC insertion but dpc failed and rising above new work.
- vi. No apparent problem.

For a precise evaluation of potential rising dampness then quantitative measurements of moisture are required and methods such as those described in Building Research Establishment Digest 245, 'Rising dampness in walls: diagnosis and treatment', should be used. Basically, this involves the use of drilled samples taken in a vertical series and determining the hygroscopic and capillary moisture content of each sample. The capillary moisture content represents water ingress and therefore its presence and distribution in the vertical profile will indicate whether rising damp is actually occurring or not. This technique will also identify dampness problems caused by heavy contamination with hygroscopic salts rather than water ingress.

Finally, it must be understood that dampness can rise to heights well in excess of 1 metre, a figure frequently quoted as the maximum height to which dampness can rise.

The British Wood Preserving and Damp-proofing Association leaflet DP9, 'Guidelines to Survey Report writing' should form the basis on which the report should be structured.

Chemical Damp-proofing

Suitability for Treatment

Most types of traditionally built masonry wall can be treated using Dryzone damp-proofing cream. However, some walls should not or cannot be suitably treated. Special procedures may be required for certain types of masonry, e.g. perforated brick and some types of blockwork. Extra care should be taken when used on rat trap bond.

Where a wall has been contaminated with a detergent or where a masonry sterilant containing a surfactant has been used a water repellent type chemical damp-proof course may be unsuitable.

Earth retaining walls can only be treated above external ground level. That area below ground must be suitably 'tanked' to prevent lateral moisture penetration (see Safeguard Structural Waterproofing Specification).

Damp-proofing Materials

Dryzone damp-proofing cream is designed to cause water repellency. The water repellent material lines the pores of the masonry (Figure 4) and on curing, the water repellent

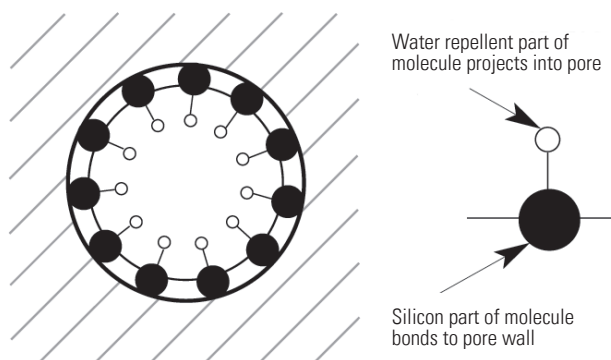


Figure 4: Water repellent lining pore

causes a modification of the interfacial tension between the wall of the pore and the water (Figure 5). In an untreated pore the 'contact angle' is less than 90° and the interfacial tension causes the water to rise. Following application of the water repellent the interfacial tension changes. The contact angle becomes greater than 90° and the resulting tensions now cause a slight downward 'pressure' so preventing the future rise of water. The Dryzone system does not block the pores.

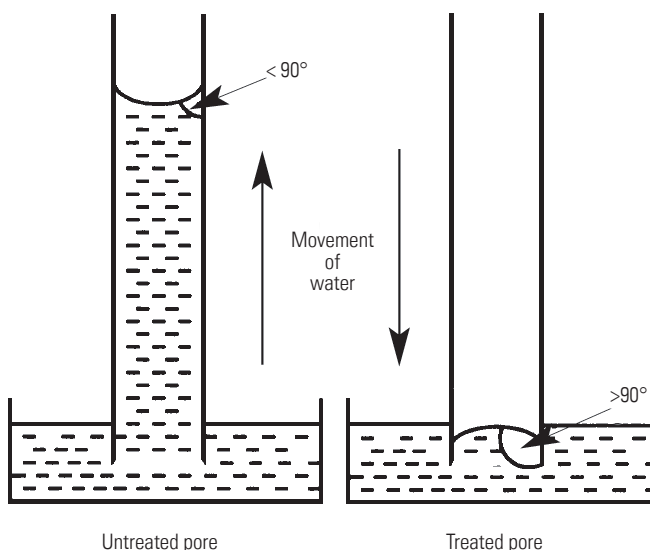


Figure 5: Water repellency

Effectiveness of Chemical Damp-proof Courses

Pressure Injected Systems

The effectiveness of any pressure injected chemical damp-proof course is governed by a number of factors; one of the most important technical features is 'viscous fingering'. When any fluid is injected under pressure into a heterogeneous porous material such as a masonry wall, it does not pass through the wall evenly, pushing out the resident moisture in front of it. Instead, it forms 'fingers' of fluid so leaving 'holes' which can contain resident moisture (Figure 6). Many of these are continuous, which leave complete

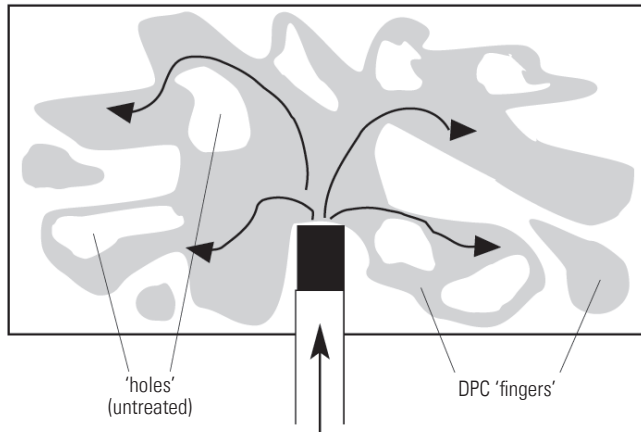


Figure 6: Fingering effect of pressure injected DPC fluid

paths through which water is still able to rise. In practice, therefore, it is unlikely that a chemical injection damp-proof course on its own will stop rising damp with a sudden cut off of rising water such as that brought about by a physical damp-proof course. Pressure injected systems are also heavily reliant upon good operative technique and furthermore up to 96% of a pressure injected fluid is just a carrier in the form of water or white spirit and all of this has to evaporate off. Solvent based systems are also fast curing and not water miscible and are therefore less likely to be as effective in the diffusion process, especially in very wet walls.

Dryzone Diffusion Cream

Dryzone is a revolutionary concept made possible by modern technology for the control of rising damp in masonry. The principle is very simple and requires no electrical pumps, high-pressure systems or excess fluids in the form of a water or white spirit carrier. Dryzone is a very high concentration of water miscible active ingredient in a cream formulation that cleverly utilises the moisture already in a damp wall to aid its distribution. This significantly minimises the occurrence of 'fingering' (Figure 7) associated with pressure

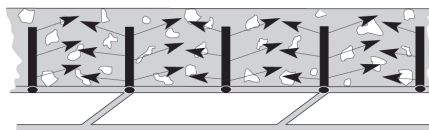


Figure 7: Diffusion of Dryzone through mortar greatly reduces 'fingering'

injected systems and Dryzone has the further advantage of an inherent slow curing process that ensures the maximum diffusion potential. Of further significant importance is the vapour phase of Dryzone, which imparts considerable water repellent properties into adjacent masonry. The combined effect is the most revolutionary and effective method of controlling rising damp by a chemical process to be introduced in over 40 years. Of further significant importance is the simplicity of the introduction process that makes it difficult to install 'incorrectly' and is therefore less reliant upon good operative technique.

Replastering

In order to complete an effective damp-proofing system it is extremely important that the new plasterwork which replaces the salt contaminated material resists the passage

of residual moisture and contaminant salts from passing from the underlying substrate through to the new decorative surface. This function is important because the underlying wall can take many months to dry down following damp-proofing, but more importantly, the base of the wall may always remain damp due to the inherent limitations of the actual injection damp-proof course. The importance of this function is described in Building Research Establishment Defect Action Sheet No. 86. A specification for replastering is contained in the appendix at the end of this manual on page 18.

Finally it is important to understand that chemical dampproofing is a system – (1) the injection of the DPC and (2) the replastering: they are inseparable.

Preparation for Dryzone Damp-proof Course Installation

Pre-installation Procedures:

Important: before undertaking any work it is essential to check the following:

1. Check all cavities, where present, for debris which may cause bridging of the damp-proof course.
2. Ensure sub-floor ventilation is adequate where timber suspended floors are installed.
3. Lower ground levels where necessary.
4. Remove perished/damaged external plinths and cut any external rendering back to above the height of the DPC line.
5. Remove all floor covering and furniture.
6. Remove floorboards if appropriate.
7. Remove timber skirtings and architraves. If they are to be re-fixed put to one side; remove all fixing grounds.
8. Remove all plasterwork to a minimum height of 1 metre or to 500mm above evidence of dampness/ contamination with hygroscopic salts.
9. Ensure that plants, paths and glass are protected from spillage.
10. Check level of any adjoining solid floor which may be present and ensure that proposed DPC line is not bridged.

Safety

Please note: In all cases where damp-proofing works are undertaken in the UK it will be necessary for the installer to undertake an assessment in accordance with the requirements for the Control of Substances Hazardous to Health (COSHH) regulations.

1. Install safety notices and advise other trades of risks.
2. When appropriate ensure that the property owners have complied with the Party Wall Act 1996. Advise interested parties of possible inconvenience of noise and vibration especially neighbours living in an adjoining property which shares a party wall to be treated.

Those conducting work in countries other than the UK should ensure that they comply with local regulations.

Operators note:

1. Should Dryzone cream come into contact with the eyes they should be flushed out immediately with cold water for 10-15 minutes, and medical attention should be sought.

The Drilling Programme

Line of the Damp-proof Course

All damp-proof courses should be installed in accordance with the recommendations given in BS CP102: 1973, "Protection of buildings against water from the ground" and especially in accordance with BS 6576: 2005, "Code of practice for diagnosis of rising damp in walls of buildings and installation of chemical damp-proof courses". They should therefore be installed not less than 150mm above external ground level.

The intended line for the damp-proof course should be exposed and clearly defined, taking into consideration internal and external ground levels, party and abutting walls, and changes in ground levels.

Internally, where a solid floor is present, the DPC should be inserted as close as possible to floor level. In all cases there should be continuity between the injected DPC and any damp-proof membrane of a solid floor, the latter being taken up the wall to overlap with the injected DPC as described in BS CP 102. Where suspended timber floors are encountered the DPC should, if possible, be inserted below the timbers (see Figure 15).

Drill Hole Size, Depth and Location

For treatment to be fully effective the correct volume of Dryzone must be introduced. The system requires 12mm diameter holes to be drilled at horizontal centres no greater than 120mm. The depth of hole required for various thickness of wall is shown in the table below. For all other walls the depth of hole should be to within 40mm of the opposite face. In all cases the most effective target site is to drill horizontally directly into the mortar course, preferably at the base of all perpend of selected course (see Figures 8 and 9).

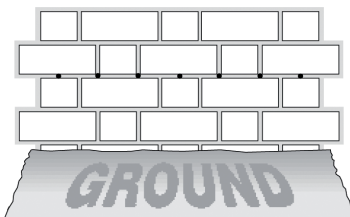


Figure 8: Drilling pattern for Double Flemish Bond

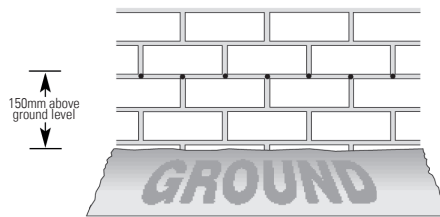


Figure 9: Drilling pattern for Stretching Bond

Drill Preparation

Measure the thickness of each wall to be treated. Set the depth gauge of the drill or apply tape to the drill bit in order to identify the correct drilling depth accordingly.

Drilling Cavity Walls

Cavity walls may be drilled/treated from one side in a single operation or if preferred each leaf may be treated separately. When undertaking treatment from one side drill completely through the selected mortar course, allow the drill bit to pass across the cavity (see Figure 10) and then drill the other leaf of brickwork to a depth of 90mm. The viscosity of Dryzone is such that it is possible to treat each leaf from a single drilling operation. Always ensure that the cavity is clear before treatment.

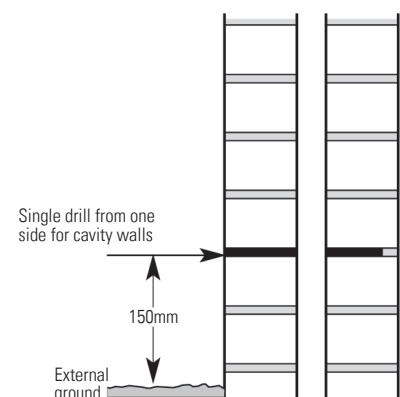


Figure 10

Table 4: Dryzone drill hole depths

	12mm drill hole depths required			
Wall thickness	4½" (110mm)	9" (220mm)	13½" (330mm)	18" (440mm)
Depth of hole required	100mm	190mm	310mm	430mm
Hole centres	120mm	120mm	120mm	120mm

Drilling Solid Brick Walls

In virtually all cases solid brick walls may be drilled/ treated from one side only in a single operation (see Figures 11, 12, and 13). Drill the selected mortar course at the prescribed centres to the appropriate depth in accordance with the table above.

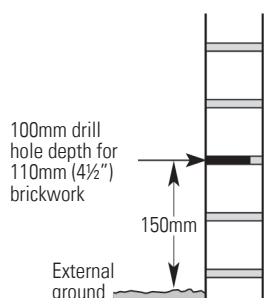


Figure 11

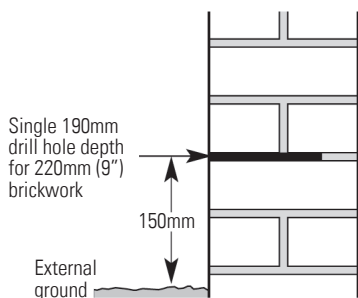


Figure 12

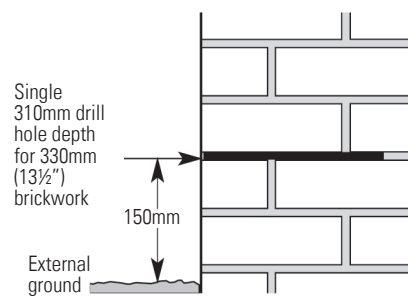


Figure 13

Drilling Random Stone and Rubble Infill Walls

As far as practically possible follow the mortar course at the appropriate selected level (see Figure 14). If the stone is of a porous type e.g. sandstone then there is no reason why this should not be drilled. The variable thickness of stone walls and the possibility of rubble infill dropping and blocking injection holes cause difficulties for any system. Should these difficulties occur it might be necessary to drill to 50% of the wall thickness, from both sides at a corresponding height. Alternatively drill additional holes, which do not become obstructed, adjacent to obstructed holes to ensure that an adequate or volume of Dryzone is introduced.

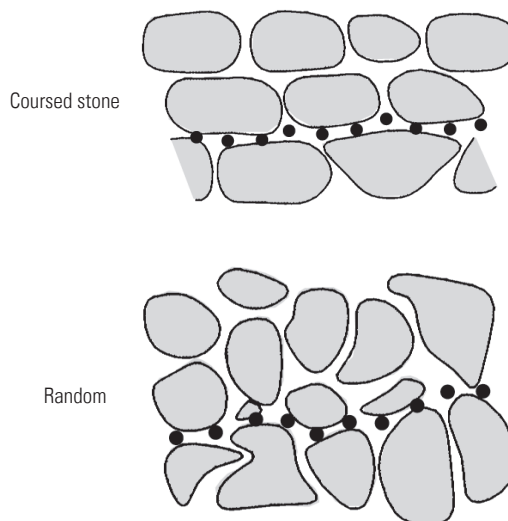


Figure 14: Drilling patterns for stonework

Dryzone Injection Process and Making Good

Dryzone Cartridge Preparation

1. Unscrew and remove the delivery tube end of the Dryzone application gun.
2. Retract plunger from the barrel and insert Dryzone cartridge into the barrel of the gun.

3. Cut or puncture the visible end of cartridge once in the barrel.
4. Replace delivery tube end of the application gun.

Dryzone Injection

Insert delivery tube of Dryzone application gun into the full depth of the pre-drilled hole. Gently squeeze the gun trigger and back-fill each hole fully with Dryzone to within one centimetre of the surface. Periodically wipe clean the outside of the delivery tube.

In order to prevent wastage when treating a cavity wall from one side, it is advisable to mark the delivery tube using tape to indicate the depth of the concealed hole and the width of the cavity.

Dispose of used cartridges in a plastic bag in accordance with local waste disposal regulations.

Making Good of Drill Holes

Holes drilled internally may be left uncapped. Externally drilled holes should either be plugged or pointed over.

Accidental Spillage

In the event of any accidental spillage of Dryzone, the spilt material should be wiped up immediately and the wipes placed in a plastic bag and disposed appropriately. Contaminated surfaces should be washed immediately with warm soapy water.

Equipment Cleaning

It is recommended that the application gun is washed regularly using warm water. If the gun is to be left unused for a period of time, then the inside of the gun barrel and delivery tube should be thoroughly flushed clean.

Injection Positions

The diagrams in Figure 15 illustrate the correct positions for injection into brick walls. The same principals also apply to stone walls.

Vertical Isolations

Where adjoining/abutting walls are present which are not to be treated, a vertical DPC must be installed. This should not be less than 1200mm high and extend not less than 500mm above the last evidence of dampness/salt contamination.

Vertical isolations are not capable of withstanding hydrostatic pressures which may be encountered with stepped properties, raised external ground levels, etc.

The Risk of Timber Decay

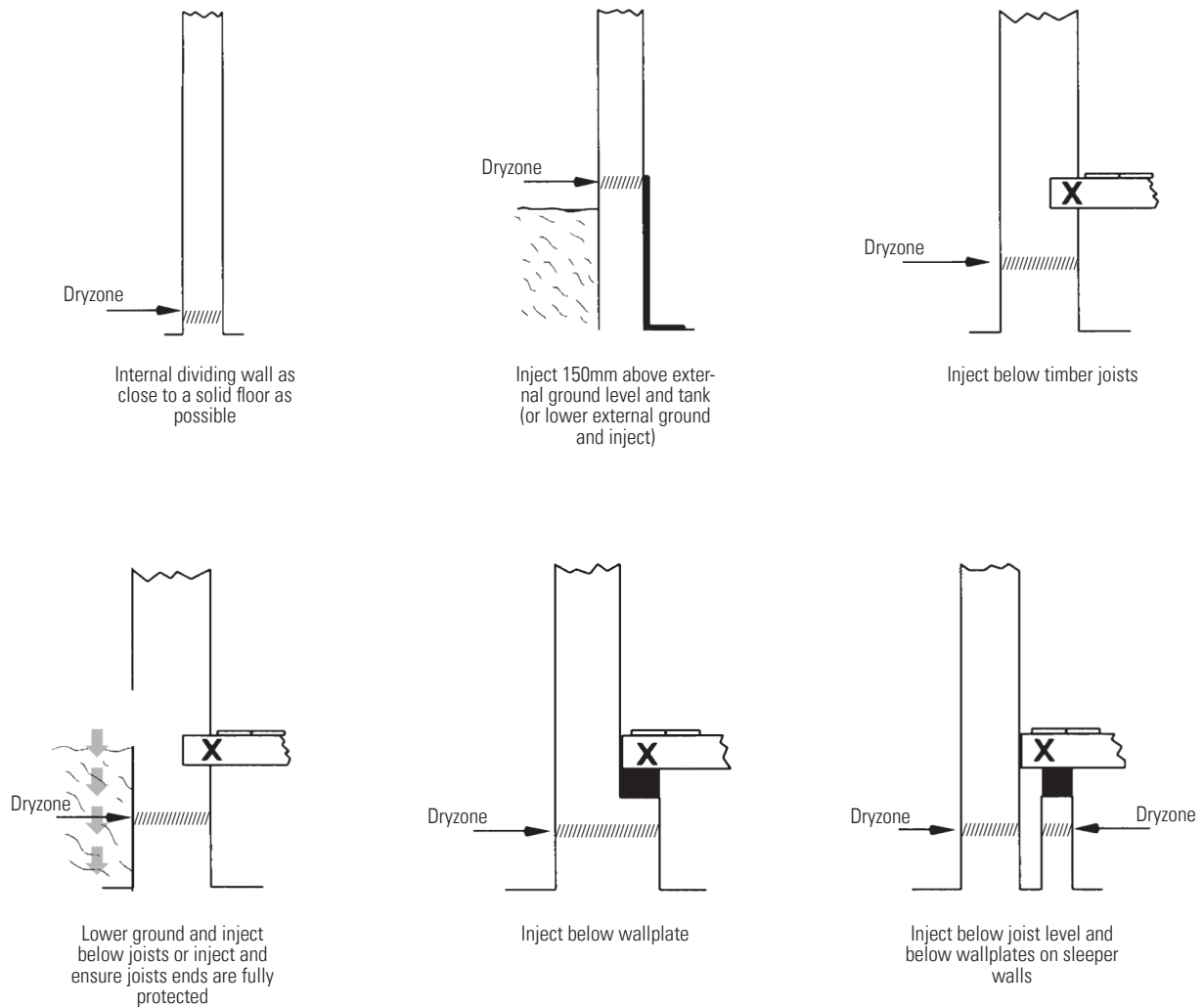
Where joist ends/timber wall plates are embedded on damp masonry these must be checked for the presence of fungal decay. Ideally, physically isolate the timbers from the masonry by a damp-proof membrane or joist hangers.

Where this is not possible and where timbers are damp and not decayed or just embedded in masonry, the ends should be given a thorough application of Safeguard ProBor 20 and/or ProBor 50 as described in the Safeguard publication, 'Dry Rot and its Control'. Any timber remaining damp will always be at risk to decay; proper treatment as described in the above publication will reduce the risk of rot.

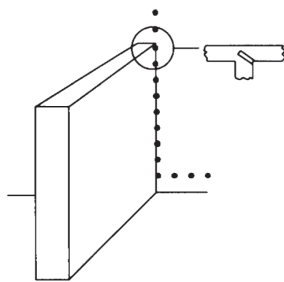
Should the DPC have to be above the floor timbers then measures must be taken to ensure that the timbers are not vulnerable to fungal decay. Precautions should be taken as described above especially with reference to the application of ProBor 50.

Examples of Injection Positions

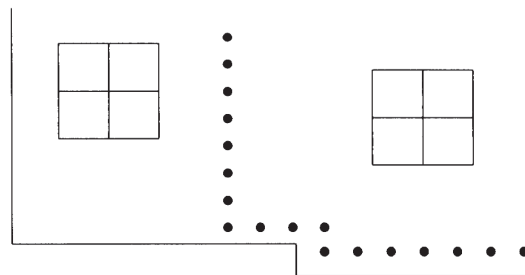
Please note: Ideally inject below timber suspended floors. Where timbers above and below injected damp-proof courses exist action must be taken to protect them from decay.



'X' = all timber should be preferably physically isolated from any damp masonry in the vicinity of the DPC. Where this is not possible fully treat timbers with Safeguard ProBor 50 in accordance with the directions given in the Safeguard 'Dry Rot and its Control' publication, also available free from www.safeguardeurope.com.



Vertical DPC to isolate abutting walls, etc



DPC to accommodate slight changes in ground levels and adjacent untreated sections of wall

Figure 15: Examples of injection positions

Dryzone Material Requirement

Dryzone is packed in 600ml cartridges. The table below illustrates the number of Dryzone cartridges required to treat walls of various length and thickness. Different site conditions may cause slight variations. Drill holes to be 12mm deep and at 120mm centres, with one 600ml cartridge of Dryzone filling 5.31m of a continuous 12mm hole.

Table 5: Dryzone cartridges required for treatment

Length of wall	Thickness of wall			
	4½" (110mm)	9" (220mm)	13½" (330mm)	18" (440mm)
5m	0.7	1.5	2.5	3.5
10m	1.5	3.0	5.1	7.0
15m	2.3	4.5	7.6	10.5
20m	3.0	6.0	10.2	13.0
25m	3.8	7.5	12.7	17.5
30m	4.6	9.0	15.3	21.0
35m	5.3	10.6	17.8	24.5
40m	6.1	12.0	20.4	28.0
45m	6.9	13.6	22.9	31.5
50m	7.7	15.0	25.5	35.0
55m	8.5	16.6	28.0	38.5
60m	9.2	18.0	30.6	42.0

Length of wall one cartridge of Dryzone will treat in the following thickness of wall			
4½" (110mm)	9" (220mm)	13½" (330mm)	18" (440mm)
6.5m	3.3m	1.96m	1.43m

Making Good after Treatment

Important: The insertion of a chemical damp-proof course does not dry out already damp walls; it only controls the further vertical ingress of moisture from the ground. Therefore, if possible, delay the attendant works for as long as is feasible to facilitate the maximum possible period for drying.

1. Provide good ventilation to allow drying of the wall.
2. Ensure that the damp-proof membrane (DPM) of any new solid floor overlaps with the inserted damp-proof course (BS CP 102:1973). If necessary join the DPM with the DPC by the use of a pitch epoxy material or similar. If no DPM is present run Vandex BB75 out across the solid floor for 50-100mm and up the wall to overlap with the DPC (e.g. Figure 16).
3. Replaster strictly in accordance with the Safeguard Replastering Specification (see appendix).
4. Refix timber skirtings after applying a liberal coat of Safeguard ProBor 20 to their backs and base. Similarly, when dry apply two coats of bituminous paint to the backs and base. Fix using plastic grounds. If timber grounds are used these must be first worked to size then thoroughly treated with Safeguard ProBor 20 prior to fixing.

5. If required form a bell-mouthed casting with the external render and apply two coats of Safeguard Raincheck or Rainsance below the bell cast or lower extremities of the wall.
6. Fill external holes with either plastic plugs or a 3:1 sand/cement mix incorporating Safeguard Rendereguard Gold additive.

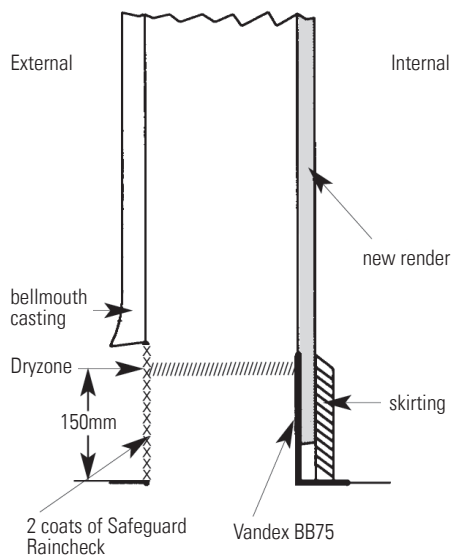


Figure 16: Suggested finishing work

Redecoration

A damp wall takes time to dry out. As a general guide, the drying rate is given as 1 month for every 25mm of wall thickness (BRE Digest 163, 'Drying out buildings'). Thus 230mm will take approximately 9 months to dry. However, the drying processes depend on conditions, ventilation and the type of masonry, so drying may take considerably longer.

Due to the potential prolonged drying of the wall, the following must be considered:

1. Delay any decoration for 4-6 weeks following replastering and allow for good natural ventilation to enhance drying. Do not apply heat or accelerated drying methods.
2. Do not use wallpaper for at least 12 months (longer on thick walls).
3. Redecorate using a non vinyl based emulsion.
4. Maintain good ventilation around walls.

Note: The initial decorations should be regarded as temporary, the final decorations not taking place for at least 12 months after completion of the damp proofing and ancillary work.

Health and Safety

Before using any material always read and understand the label, the relevant data sheet and Health and Safety information. Health and safety data sheet available on request.

Appendix

Replastering following Insertion of a Damp-proof Course

Important: It should be noted that the replastering is as important as the insertion of the damp-proof course and care must be exercised when carrying out the works.

Why Replaster?

As described in the earlier part of this manual, high levels of contaminant hygroscopic salts can build up in both the old plaster/underlying masonry over many years of active rising dampness. Even though the damp-proof course is effective the hygroscopic nature of the salts may cause moisture to be attracted to the wall so causing further dampness, decorative spoiling, and giving the impression that the damp-proof course has not been successful.

Removal of the old contaminated plasterwork will remove the contamination at the surface but underlying contamination may pass into new works unless it is designed to be resistant to the passage of residual moisture and these contaminant salts.

The design function of the new plasterwork must therefore be twofold:

1. It must prevent the passage of residual moisture reaching the decorative surface during the drying process which can take some considerable time as well as control the limitations of the injection system itself.
2. It must prevent the passage of hygroscopic salts from the underlying masonry to the new decorative surface to prevent further spoiling.

In order to perform these functions the replastering has to be carried out strictly in accordance with the following specification.

Safeguard Replastering Specification



Safeguard replastering specification as assessed by the British board of Agrément, certificate no. 97/3363.

Important: This specification must be strictly adhered to. Please ensure that the plasterer understands its importance.

Preparatory Work

- i. Timber skirtings, architraves, etc., should be removed as outlined in the survey report/specification.
- ii. Remove plaster back to masonry to the height outlined in the survey report/specification, but this should not be less than a height of 1 metre, or 500mm above the maximum level of the visual rising dampness and/or salt contaminated plaster.
- iii. Rake out all mortar joints to a depth of 15mm (½") - this is important in order to help resist the natural shrinkage of new cement renders.
- iv. Remove any timber fixing grounds that are present in the masonry.

First Coat

Note: All water to be used must be clean, free from oil, dirt or other injurious chemicals (water suitable for drinking if available).

- i. Prepare 3 parts sand to 1 part cement using gauging water containing Safeguard Renderguard Gold at the recommended dilution. The sand should be specified as washed, sharp, concrete sand, loam free, which satisfies the requirements for the 'M' grading as laid down in British Standard 882:1992. The cement should be fresh and free flowing.

- ii. Use minimum of water to ensure a dense coat; an approximate is not more than 8 litres per 50 kilos of dry mix.
- iii. Compact mix well into raked out joints, and render to give an overall thickness of 12mm. Do not over trowel. When cement obtains its first set, scratch to form a key.

Second Coat

- i. The mix is as for the first coat except that clean water only is used for gauging (no additive). This is applied as a further 12mm of render, giving an overall thickness of the render coat of 25mm. This coat should be applied before the first coat has finally set in order to obtain a satisfactory adhesion between the rendering coats. Scratch surface to form a key for finishing plaster. Do not over trowel.

Third Coat

- i. This should be 3mm mix of multifinish or similar finish. Other finishes are acceptable provided they are porous. Do not polish.

Important Points to Note:

Important: Please ensure that you read the section 'Making good after injection' earlier within this manual.

Where walls are known to be excessively contaminated with hygroscopic salts (e.g. old barns, old kitchens, chimney flues, stables) then consideration should be given to tanking the walls prior to replastering as added protection for the decorative surface.

Where masonry is unstable, this must be made good prior to the application of the renderings. Where it is not possible to obtain a proper bond between the wall fabric and rendering, as in the case of cob walling for example, the rendering must be applied direct to the wall face but over expanded metal lath, previously fixed to the wall surface.

Render and plasterwork should be cut short of finished solid floor level or at suspended timber floorboard level. This will prevent any damp which may be present within the solid floor from being transferred into the soft setting coat, or any subfloor condensation passing into the new work.

Gypsum plasters and lightweight premix plasters must not be used to bond metal angles to corners. Ideally, use plastic angles or, better still, form them.

It should be remembered that the walls will take a considerable time to dry out and it is possible that sufficient moisture could be absorbed by the new joinery to cause fungal decay.

It is important that the replastering specification is strictly adhered to and not varied in any way. No other additives must be added to the mix.

Lightweight gypsum premix backing or bonding plasters (e.g. Carlite) must not be used.

Safety

Safeguard Renderguard Gold is innocuous in normal use. However, it should not be swallowed or splashed into the eyes. If it is splashed, etc. eyes should be washed with copious quantities of clean water. Medical attention should then be obtained.

We cannot stress enough the importance of plastering strictly in accordance with the specification and it is essential that the plasterer realises the implications should this specification not be strictly adhered to. Experience has shown that whilst the damp proof course may be fully effective and no action has been taken to prevent the migration of hygroscopic salts reaching the new plasterwork, then problems do exist, often resulting in a situation where the property visually appears to be no drier than prior to the work being carried out. It is therefore essential to make sure all recommendations, as stated in the contractors report and recommended by Safeguard Europe Ltd, are strictly adhered to.

Further Reading

Safeguard Europe Ltd.:

Dry Rot and its Control

Published by Safeguard Europe Ltd., Redkiln Close, Redkiln Way, Horsham, Sussex RH13 5QL

British Wood Preserving and Damp-proofing Association:

DP 1: The use of moisture meters to establish the presence of rising dampness

DP 2: Plastering in association with damp-proof coursing

DP 9: Guidelines to Survey Report Writing

Code of practice for remedial treatments

British Standards:

BS CP102:1973 Protection of buildings against water from the ground

BS 6576:2005 Code of practice for diagnosis of rising damp in walls of buildings and installation of chemical damp-proof courses

Building Research Establishment:

Digest 18: Design of timber floors to prevent decay

Digest 163: Drying out buildings

Digest 180: Condensation in roofs

Digest 245: Rising damp in walls: diagnosis and treatment

Digest 297: Surface condensation and mould growth in traditionally built buildings

Digest 299: Dry rot: its recognition and control

Digest 345: Wet Rots: recognition and control

DAS 86: Brick walls: replastering following DPC injection

Coleman, G.R.:

Guide to Identification of Dampness in Buildings

Published by Surdaw Press, Gillingham, Dorset

Gratwick, R.T.:

Dampness in buildings

Published by Crosby Lockwood Staples, Frogmore, St. Albans, Herts

Marsh, P.:

Thermal insulation and Condensation

Published by The Construction Press Ltd., Hornby, Lancashire

Oliver, A.C.:

Dampness in buildings

Published by BSP Professional Books

Richardson, B.A.:

Remedial treatment of buildings

Published by The Construction Press Ltd., Hornby, Lancashire

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