

# Treatment of Dampness



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Damp houses can be unhealthy and costly to remedy, and especially are of a concern in tropical climate countries such as Malaysia. Knowing more about the problems can reduce the worry and expense. Most dampness problems can be cured or minimised by simple remedial work but few will need substantial outlays.

This sheet outlines the causes and remedies of dampness.

## TYPES OF DAMPNESS

### *Rising Damp*

Rising damp occurs at the base of walls. Water accumulating there has a tendency to 'wick up' through the capillaries that are present in the wall, be it brick, block or most stones; and through the mortar in which they are laid. Damp proof courses (dpc) are there to block this upwards movement of moisture but sometimes are ineffective.

### *Falling Damp*

Refers mainly to leaking roofs, pipes etc., which if ponding near a wall can increase rising damp.

### *Horizontal Damp or Penetrating Damp*

Various defects can cause water to move horizontally through a wall at any height and create a damp patch.

### *Signs of Dampness – What to look for*

If the wall or ceiling is damp, problems can be hard to detect, but these start to show up as things become drier. The three most common signs are;

### *Sign of Dampness: Surface stains*

Water moving through bricks, blocks etc may dissolve some of the alkaline salts from the mortar. The salts can then react with the tannins in timber, wallpaper and some paints to produce stains that are usually brown. They can be unsightly, but do not cause damage.

Some clay bricks stained brown or purple after being cleaned with spirits of salts (i.e. hydrochloric acid, which is often applied to remove mortar splashes). Such stains usually disappear with a scrubbed-on application of diluted caustic soda (e.g. dishwashing detergent) but the stains can sometimes be stubborn and require specialised treatment.

### *Signs of damp: Lifted surface finishes*

As a rising damp wall dries, the water will be drawn to the surface and find itself trapped under the paint film or other surface finishes. The evaporating water lifts the film in bubbles that will eventually break to leave blisters.

Wallpaper or other applied finishes, including timber panels, can be similarly damaged.

### *Sign of damp: Efflorescence and fretting*

Where there is a continuous supply of water rising up a wall, it will contain dissolved salts and when that water dries out at the surface the salts will crystallise. If the crystals form on the surface of the wall as a white furry coating, it will be suffering from non-damaging efflorescence, but if the crystallisation occurs within the bricks or mortar, the forming of crystals can exert pressure that causes the surface to break down and fret away. This phenomenon is commonly called 'salt attack'. With rising damp, there is a continuous supply of water so salt attack damage worsens over time, but it usually reaches a stage where crystallisation occurs only in the surface as efflorescence and fretting stops.

## CAUSES OF RISING DAMP

### *Cause of damp: Disrupted damp proof course*

The minor movements to which all structures can be subjected sometimes cause brittle faces to crack and thus create a path for dampness. Slate and mortar dpc's are the sorts most subject to damage from this cause, but tar and sand can also become brittle enough to crack. The result is usually a local path of efflorescence, fretting or timber rot.

### *Cause of damp: The dpc no longer copes*

Some changes to the conditions at the base of the wall that put increased pressure on what was always a deficient dpc (e.g. a mortar dpc with adequate water proofed compound mixed into it) is the most common reason for a building to develop a dampness problem.

For example, some brick walls are higher off the ground than standard building practice and water wicking up that wall is frequently able to evaporate off from the sides of the masonry before it reaches the level of the dpc. However,

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if that evaporation is inhibited by raising the level of the ground outside, or by blocking any subfloor vents that are provided for the purpose of good ventilation under the floor, the moisture has nowhere to go except up through the deficient dpc.

Similarly where the renovation of a house with a timber floor involves the substitution of a new concrete floor slab in place of a timber floor, the concrete against the boundary wall will stop moisture evaporating from that wall and can induce rising damp damage. If the plastic membrane underneath the slab has also been holed or broken down, this can create additional load on a poor dpc and cause rising damp, particularly if the ground underneath is boggy. A partial remedy is to drain the dampness away from the ground.

### **Cause of damp: The dpc is bridged**

If a membrane dpc is not placed through the full thickness of the wall, you will have a mortar 'bridge' at the face of the mortar joint. Moisture will cross that bridge and can cause salt attack fretting in the bricks and mortar above. This problem is most common in older homes where a bituminous felt membrane was used that is less than the full width of the wall, but fortunately it seldom produces extensive damage because the mortar bridge itself soon frets away and thus enables the membrane dpc to do its intended job. A similar, but non-self-curing problem can occur when older face brickwork or blockwork is rendered and the render bridges the dpc.

The dpc can also be bridged when a concrete path to the level of the soil externally is located above the dpc level, with the problem being made worse if the path slopes towards the wall.

Another bridging problem can be created where mortar droppings in the base of the wall cavity build up and cover the stepped flashing/dpc and thus provide a passage for the dampness from the outer to the inner leaf of the wall. This type of bridge is seldom continuous and usually only causes local patches of damp to develop.

### **Causes of falling dampness**

Water pipes, stormwater pipes, roofs, gutter and downpipes can all leak into the roofs, down walls and also into the ground which will increase the chance of rising damp. A thorough examination of all these elements may reveal sources of leaks.

Minor guttering problems can be patched with bituminous paint or similar. Water pipe problems and other persistent problems may be solved through reference to Architect Centre's Technical Sheet on 'Roofing and Guttering' or by contacting a licensed plumber for major repairs.

Water from leaking roofs can travel for some distance before it finally appears within the house as falling damp, making it difficult to determine the precise sources of the problem. Tracing the origin of white salts on the underside of the sheets or tiles may produce the answer. Replacing the roof sheeting or tiles, patching partly defective surfaces or reducing condensation where possible are the best solutions.

### **Causes of horizontal dampness**

In Malaysia, single skin plastered brick-wall concrete framed construction is quite commonly used in low cost (remove) most housing projects; and dampness can accumulate within the walling. This construction technique relies on the protective paint coating to the external finish of the wall to inhibit moisture through the walling. If the external finish (eg paint) is poorly applied or starting to flake off, it will allow the masonry walling to absorb moisture.

Where horizontal dampness is present in a cavity wall, it is usually because mortar droppings lodge on the ties joining the two walls and form a bridge for water to cross and create damp patches.

## **CURES FOR RISING DAMPNES**

### **Cure for damp: Repair the damaged dpc**

Mention has been made that a deteriorated dpc is nearly always one that has cracked rather than physically broke down. The associated damage is usually local and close to the crack. In the case of isolated patches of rising damp due to this cause, local insertion of a new dpc followed by treatment of deteriorated plaster as further described will usually be appropriate.

### **Cure for damp: Improved sub-floor ventilation**

Where rising damp results from sub-floor ventilation becoming partly or completely blocked, usually because the ground level around the house has risen over time, removing the obstruction or lowering the ground level will frequently fix the problem. Where the blockage is caused by the laying of a higher than original level path or verandah and it is not possible to lower them, ducts connected to the sub-floor vents will frequently bring the desired cure.

Traditional terracotta and cast iron vent faces in older homes (especially Chinese pre-war homes) can look handsome, but the holes through them offer only about one tenth the ventilation areas as the modern counterparts. Substitution of them for the originals will frequently bring sufficient improvement to circulation under the house to eliminate the rising damp problem. Simply increasing the number of vents will further improve the circulation. In the cases of full brick homes, it might be necessary to form openings in the base of the wall below floor to ensure the free flow of air-throughout the whole sub-floor space.

Ventilation can be further increased by creating suitably located flues, such as sheet metal pipes, that uses the stack effect to draw air from the subfloor and discharge it to the outside above roof level. The amount of air moved can be increased by using wind driven rotating cowls on the top of such flues or solar powered electric fans.

#### **Cure for damp: Repair leaking plumbing**

Modern domestic water meters measure the volume of water passing through them with such accuracy that they can be used to test for leaks. If all the taps are tuned off and the meter still registers a flow of water, there must be a leak. Repair of leaking water pipes or drains will eliminate them as a cause of the problem, but remedying the damage will often require additional effort.

#### **Cure for damp: Combat dpc bridge**

Dampness caused by poorly laid paths can be cured by either

- (a) rebuilding the path below the dpc, and sloping it away from the house or
- (b) installing drainage grilles on the path nearest the wall and connecting the grilles to the stormwater drainage system

Of the two (a) is preferable because it improves the subfloor ventilation.

Where dampness is caused by a bridge of mortar droppings in the base of the cavity in full masonry house, experience shows it often to be practically impossible to gain access to the cavity to remove the bridge.

However, there will usually only be occasional damp spots and a local dpc insertion above the damp patch plus the

internal application of the waterproof coating of the masonry below the dpc and then replastering will usually effect the cure.

#### **Cure for damp: Install new damp proof course**

Where the remedies described above are ineffective or not possible it will be necessary to embark on the process of inserting a new damp proof course. There are a variety of methods of doing this, but two dominate to the effective elimination of all others and they are discussed below.

##### **(a) Physically insert an new membrane**

A mortar bed-course, at a level below the lowest floor framing member is cut out and a new dpc membrane is then inserted into the resulting horizontal gap.

The main difficulty is in ensuring that the mortar caulking around the new membrane is adequate to support the wall above. Because of this problem, the technique is now mostly associated with a patented method using a plastic bag as the membrane. It is inserted into the joint and then pumped full of a quick setting mortar to ensure support.

##### **(b) Create a chemical dpc**

A horizontal row of holes is drilled into the bricks or mortar and they are then injected with a chemical – usually polysiloxane – under the pressure of gravity or a pump to impregnate a band of bricks and mortar and render that layer highly resistant to passage of water.

The method has great advantage of not requiring any interference with the structure, but like all other methods of dpc insertion, its effectiveness is highly reliant on care taken, and expertise of an experienced operator.

## **REPAIRING THE DAMAGE DONE BY RISING OF SALT DAMP**

### **Repairing damaged plaster**

Plaster that has been wet because of rising damp will have reacted with the salts in rising water to create hygroscopic compounds that attract water from the air into the plaster. Because of this, a completely dry wall will not be created unless that contaminated plaster is replaced. It is wise to remove that plaster to a height about 300mm above

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the level to which water was observed to have risen, but it is also wise to wait several weeks – perhaps as long as three months between repainting the damp problem and replacing the plaster. This time period will allow the rising damp moisture to evaporate off the bricks, draw the undesirable salts into the plaster layer and thus enable that salt to be removed with the plaster.

### **Repairing with waterproof plaster**

Mention has been made of the use of waterproof plaster in the cure of salt attack resulting from horizontal damp, where mortar bridges the cavity of the dpc, but that is about the only time that it will fix the problem.

Attempts are sometimes made to cure the consequences of damp rising through an adequate dpc by applying waterproofed plaster to the damp areas. Rising damp is far too smart to be cured by this technique and the result will usually be to simply cause it to move further up the wall and appear in what was previously an un-effected area.

### **Installing veneers**

Some contractors replace the entire surface with waterproof plasterboard. Other use a technique of attaching battens to affected walls and nailing on plasterboard, providing a 5mm to 10mm gap between the old surface and providing ventilation slots top and bottom. All timber should be decay-resistant and fasteners rust resistant.

All of these methods fall into the category of cover-ups rather than cures and consequently cannot really be considered permanent solutions.

### **Repairing fretted mortar**

Where rising damp has caused mortar in external face brickwork to fret away and the cause of that dampness has been cured, the appearance of the brickwork can be restored by repointing the joints. If this is undertaken it will be wise to rake out the existing joints to a depth of 25-30 mm before repointing and it will be important not to use too strong a mortar in the repointing.

### **The cure for horizontal dampness**

Horizontal dampness by mortar bridging between walls are usually isolated patches and can be repaired with waterproof plaster etc.

Horizontal dampness problems are usually cured by the application of a waterproof coating to the outside of the wall. Painted-on coatings, either obscure or pigmented or as clear coatings, such as silicones, are very effective for this purpose. However, competent repairs of cracks and gaps in the mortar are essential prior to painting; otherwise the coating will probably deliver more water to the gap than was the case before the coating was applied.

If the horizontal damp penetration has been severe and protracted, it might be necessary to strip off and replace affected plaster, as described above in relation to rising damp.

In these circumstances it is important that any flaking paint be removed and 2-3 coats of paint be reapplied to the walling. Some paints are specifically designed to be 'water resistant' for the purpose of waterproofing single skin walls.