

# Background Preparation for Lime Rendering

Published on 4<sup>th</sup> April 2017

Technical Note B3

## Introduction

The ideal substrate should be constructed of durable and moderately strong materials specifically designed for lime renders. On old substrates and some eco-projects (e.g. straw bales) the choice of material becomes vital, especially on soft and delicate backgrounds. Your local Lime Green distributor can help you with choosing the correct type of render. Render adheres by a combination of moderate suction and good mechanical key. In a correctly specified background, the lime binder in the product is drawn by capillary action into the pores of the substrate. The sand and aggregate within the product also locks into the physical key of the background to provide a strong durable bond. To ensure this occurs, all substrates should be clean, suitably dry (i.e. damp, but not saturated), sound and free from anything that may interfere with adhesion such as; paint or lime wash, oil, grease, bird droppings, moss, algae and visible ground salts etc.

## 1) Construction Issues

### 1.1) Alignment of Background

The background construction should be sufficiently true, in line and plumb to accommodate the product specified and its constraints. The lime render alone should not be used to correct gross irregularities. As a guide, with 1 coat or 2 coats the maximum that can be achieved is a correction of a deviation of 5 mm underneath a 2 m straight edge placed anywhere on the surface of a newly built substrate. On historic buildings this could be substantially more, and an acceptable level of flatness of finished lime render should be agreed by all parties before rendering commences, taking into account the alignment of the wall.

The old Code of Practice for Masonry BS 5628 Part 3 also has info on alignment which may be useful if further guidance is needed.

Applied lime render will follow the line of its substrate and cannot be expected to correct all deviations in the background especially over long distances. While there are no tolerances quoted in current standards for the alignment of what is basically a hand-finished material, we would expect that a standard of 3 mm deviation underneath a 1.8 metre rule placed anywhere on the surface can be achieved on modern block or brickwork. Greater deviation can be expected on historic buildings or unusual substrate types. Over longer lengths the lime render will follow the general line of the background. On walls which are out of true attempts can be made to bring alignment into tolerance with what are referred to as dubbing out renders or levelling coats. Caution should be exercised here as the overall thickness of the build-up needs to be planned for strength and bond compatibility with the masonry. Seek further advice in this instance.

### **1.2) Curing of Masonry Construction**

It is important that a freshly constructed masonry substrate be allowed to cure properly before the application of any lime render materials. If the substrate is not fully cured, creep and shrinkage of the background can occur. This could result in the formation of cracks in the substrate, which will more than likely be reflected through into the render material. It is recommended that masonry substrates be allowed to cure for a minimum of 28 days before the application of lime render.

### **1.3) Cleanliness of Background**

Substrates for lime render must be clean, sound and dry. The construction must be free from oil contamination, dust, fungal growth, crystallised salts and anything else that may impair the adhesion of the applied system or form a weak intermediate layer. Fungal or algae growth can be removed using a wash of Beecks fungicide solution.

### **1.4) Protection of Construction**

A building exposed to rain and allowed to become saturated will be subject to a greater amount of movement due to drying shrinkage than one that is protected from the elements. This will put additional strain on the building envelope increasing the risk of cracking within the substrate, which will inevitably be reflected in the applied lime render. Protecting elevations during the construction programme has the additional benefit of helping to enable application to continue during poor weather. Tented or sheeted scaffolding can be heated using space heaters but caution needs to be exercised over positioning and even dispersal of the heat.

### **1.5) Moisture Content of Background**

Temporary guttering should be in place prior to lime rendering to avoid the substrate getting saturated and the resulting increased drying shrinkage of the construction. Temporary down pipes or plastic socks, should direct water away from the wall throughout the project. Saturation of the substrate can mobilise any salts that it contains and allow them to move to the face of the substrate. It will also encourage algae/fungal growth. Both of the above will have an adverse effect on the bond between the substrate and the lime render. In addition, saturation of the substrate will prolong the drying and curing of the applied render increasing the likelihood of lime bloom (efflorescence) on the finished elevation and allow adverse environmental effects such as freeze/thaw to take place.

### **1.6) Building Fittings**

Before lime rendering is started on an elevation, all the major building components must be fitted. This includes copings, cappings and flashings, windows and doors, soffits and fascias etc. The fittings must be detailed to protect the finished render from staining due to localised water runoff. Flue pipes, air bricks and weep holes should also be in final position prior to the application of lime render to remove the need to breakout and repair finished render after their installation. Repairs in finished lime render often result in differences of appearance compared to main wall areas and are often visible on completion.

## **2) Architectural Detailing**

### **2.1) General**

The vulnerable part of any lime render is the bond to the wall. Run-offs of water from cills, weep hole details etc are likely to lead to staining over a period of time, especially in areas where the atmospheric conditions are polluted. All detailing therefore has to protect the bond to the wall by throwing water away from the surface.

Careful design is required at the base of walls to prevent the lime render bridging the damp proof course (DPC) if there is one. A bell cast feature will assist in the shedding of water and provide a drip. The DPC should never be bridged as doing so will allow water to track up behind the lime render face; many old buildings do not have a DPC, but the same conditions apply. In addition to the DPC detail, consideration should be given to the use of a French drain at the base of the wall to prevent splash back staining the completed lime render and promoting fungal/algae growth. A minimum of 150 mm should be allowed between the base of the render and ground level.

### **2.2) Forming Angles**

Angles in all render finishes can be formed by splayed timber battens that are temporarily fixed during application. This method is a necessity when specifying

an Ashlar render finish as profiled beads will interfere with the continuity of the Ashlar joint. For scraped renders, some render may spall away from the nose of a standard angle bead profile during the scraping process. Proprietary Y-section plastic beads are available and form the best solution, after traditional methods, by promoting an even thickness of render right up to the corner point. When using chamfered timber batons, the wood needs to be pre-soaked in water to reduce local suction on the render and ease removal. Otherwise all wood needs to be treated with a non-staining mould release or varnished. When a free formed corner is required this is down to the skill of the applicator using a nosing trowel. It is still good practice to reinforce the corner by using a hidden corner bead buried in the undercoat render, with just the topcoat render being free formed.

### **2.3) Movement Joints**

Movement joints may not be necessary in lime renders, but are often used in modern brick or blockwork, the joint in the substrate must always follow with one in the render. The traditional method of expressing a movement joint is with the use of temporary treated wooden battens to create the joint in the fresh lime rendering. The formed joint is then filled with a suitable elastomeric sealant after rendering. This method is recommended for ashlar work where the cut detail may pass through the movement joint position. In all other finishes the use of proprietary pre-sealed movement beads is an acceptable alternative. These can be obtained in either plastic or stainless steel depending on the finish required. If a more discreet option is required then employ a back to back stop bead, which can be filled with a suitable mastic / sealant infill afterwards. Ensure a compressible foam strip is positioned into the back of the joint tucking into the masonry so as to avoid excessive consumption of mastic / sealant.

### **2.4) Stop Beads and Bellcast Beads**

Temporary timber battens can be used to form stops and bellcast details, particularly when ashlar work is specified. For all other finishes, the use of proprietary beads in stainless steel or plastic can be used to form vertical lime render stop details and a bellcast bead used for horizontal details. When such a pronounced nose from a bellcast bead is not desired (more so for modern render styling), then a drip bead should be substituted. When working with lime render up to windows or other dissimilar materials, the use of a stop bead is required followed by a mastic / sealant infill behind. Render butting up to dissimilar materials, in particular wood, will in time be subjected to movement stress and cause local fracturing of the render at the interface. Be aware of slam panels for large patio or folding conservatory doors for this effect as well. There are specific window frame beads that can be employed during and after the installation of the lime render and further advice should be sought.

## **3) Suction Control**

### **3.1) Principals**

This is a critical element to a successful application of a lime render that is often overlooked or little understood. It should be achieved by spraying the elevation with an even mist of clean water approximately ½ hour prior to lime rendering. If there is a combination of issues, such as varying suction or insufficient key in addition to high suction, then an application of **Lime Green Stipple Coat** or **Lime Green Prebond N** will be required (NB: mist spraying with water should be done in a controlled manner to avoid over saturation). Excessive watering, even naturally by a previous heavy downfall of rain will increase drying shrinkage and can cause cracking problems (any such cracking is likely to be reflected in applied materials) It is also worth noting that this can lead to a problem known as Ghosting or Shadowing. This is the highlighting of the mortar joints in the finished lime render during curing and subsequent drying. Inadequate suction control will lead to this effect resulting in aesthetic failure of the lime render and the need for remedial work.

The suction of a substrate has implications on the finish, performance and the workability of the product applied. It is therefore important that a test of the suction is made prior to the application of material. This can only be done by the visual inspection of water applied to the surface. Ideally the substrate should slowly draw the water into the surface leaving it slightly damp.

If the test reveals the suction to be high (i.e. water disappears at a rapid rate leaving an apparently dry surface) then the substrate should be dampened evenly with a light spray of clean water, re-tested and the process repeated until the correct suction is achieved. During this process over wetting must be avoided to prevent impairing the bond of the render and possible increase in drying shrinkage in the construction due to saturation. Once the correct suction is achieved application of the lime render can begin.

If the test reveals the suction to be poor (i.e. water readily runs from the surface without drawing in) then the substrate is either too damp to be rendered or is too dense and may need an application of **Lime Green Stipple Coat** to offer additional key. If the substrate is too damp then it should be protected and allowed to dry until the test procedure reflects the required suction.

### **3.2) Blockwork Masonry**

Generally, a block is manufactured with an open texture or a mechanical key for rendering. Smooth dense blocks with little mechanical key should have the key enhanced by an application of **Lime Green Stipple Coat**. Relying on the raking out of mortar joints is not sufficient to provide mechanical key alone. Most block manufacturers will give guidance on the suitability of a block to receive render and also the correct bedding mortar mix appropriate to the construction. A general purpose, medium density concrete block will best meet the criteria for lime renders. **DO NOT** use Lime Green's products on lightweight autoclave or

thin joint blocks of any stated density or strength without consulting your local Lime Green distributor for specific advice.

### 3.3) Brickwork Masonry and Hollow Core Clay Blocks (HCCB's)

Brickwork can offer a very stable surface on which to render. If the joint is too hard the key should be created using **Lime Green Stipple Coat**. Some common bricks may contain sulphate salts. If possible, advice should be sought from the brick manufacturer regarding their use as a substrate for lime rendering in that location, particularly in high exposure or potentially damp areas. An application of **Lime Green Stipple Coat** together with a suitably specified lime render will deter sulphates from crystallising and impairing the bond of the render.

### 3.3) Stone Masonry

Lime renders are ideal for natural stone masonry. Because of the vast variation in types of building stone used over many centuries, generic advice is difficult to give. Contact your local Lime Green distributor for specific advice relating to our stone library covering the United Kingdom. Be aware of any conditions relating to Listed Building Consent or instructions from a local authority Conservation Officer.

### 3.4) Concrete – all types

Concrete will offer very little suction and no mechanical key, so **Lime Green Stipple Coat** or *Prepbond N* will be required.

### 3.5) Render Carriers

A suitable Wood Wool Board such as Ionic Woodwool at 15mm or 25mm thickness (mechanically fixed at 300mm to 500mm centres) maybe used to act as a render carrier instead of Expanded Metal Lath (EML) or Rib Lath. This is a preferred choice due to better thermal compatibility with the lime render. This type of board provides substantial open texture for direct mechanical key. A suitable board is deemed as one that is moisture tolerant even to the point of complete saturation, where the board will not exhibit any signs of leachate, (particularly tannin or manufacturing salts) and will also retain its structural integrity without softening or breaking down over time.

If a metal render carrier must be used then it must be stainless steel, and further advice should be sought to the compatibility of the lime render undercoat that is being specified to bed it in. Attention must be paid to what is a commonly overlooked fixing procedure which involves specific fixings for the metal carrier that creates a stand off from the background. This is achieved with a double mushroom head or button washer arrangement, to allow the principal of the render being pushed through the mesh openings by the force of the applicator. The aim is to ensure that the metal carrier sits in the centre of a lime render "sandwich" for a good key and will prevent thermal movement between lime render and the metal carrier. This occurs due to variation of conditions

between winter and summer and can result in cracking, de-bonding and eventual spalling of render. There is a growing trend in recent years of the use of plastic sheet render carriers that have evolved out of the tanking and waterproofing market. These consist of a fine weave, plastic or starch coated glass fibre mesh, bonded directly onto a plastic sheet with a 3D relief that looks like "bubble wrap." Under no circumstances are these to be specified in conjunction with Lime Green's products. This type of carrier is designed for strong cement based renders that are heavily polymer modified which promotes direct chemical adhesion and better movement resilience. In reality, they offer very little physical anchoring of the render undercoat by the principal described above in accordance with the Codes of Practice.