CORNISH LIME COMPANY LTD

SPECIFICATION
GUIDANCE NOTES
for

THREE COAT RENDER WORK

Using **Non Hydraulic Lime**
(LIME PUTTY)

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No two jobs are likely to be the same, the area to be rendered could be one of any number of substrates, and so conditions encountered on individual projects will need to be taken into account. i.e. moisture content of substrate, weather conditions, etc.

In the event of any doubt please consult us

As with all lime rendering works the key to a successful application is largely dependant on the preparation and after care of the works in question.
Our lime putty is produced to very high standards in a modern production facility.

We do not sell or use lime putty less than 4 months old

LIME RENDERING

The area to be rendered could be one of any number of substrates from a simple masonry wall to a timber lath substrate, so the advice offered here is generalised. However the preparation is paramount for the success of this work. As for any type of rendering, the surface receiving the render should be thoroughly prepared and cleaned, free of all dust etc.
An understanding of the surface with regards to the control of shrinkage, by pre-wetting of the surface would be strongly advised in order to regulate suction from the background substrate. At the same time as keeping an eye to the weather, Strong sun, wind, frost and rain will all have a bearing on the overall performance of a long lasting defect free lime render. These are primary causes of failure in lime renders, which can be avoided by simple wetting tests, observation and planning. They behave nothing like cement renders and on occasions have even been known to be temperamental, but applied properly they will provide both protection and decoration to virtually any structure.

Preparation of the wall would be the same as for any type of render treatment ensuring that the surface is not too smooth and if so it should be prepared in such a manner as to provide a key for the first coat to adhere to.
Deep joints or hollows in the substrate should be prepared so as to avoid large concentrations of mortar. Fill large voids or hollows with a lime mortar using ample stone of appropriate sizes to pack out: 'Remember' the lime mortar is more expensive than the lots of stone that is usually to hand when carrying out such work. On any surface one should be looking to apply a uniform thickness of render of about 9 - 12 mm (Plasters being the top coat are applied much thinner, 4 - 7 mm).

Pre wetting of the substrate is essential in order to avoid the moisture being drawn out of the render coat and into the substrate. When pre wetting the wall try to avoid over wetting, pump up garden sprayers are well suited for this purpose, as a hosepipe will deliver too much water in most cases.
In the case of Very porous material such as Cob, Chalks, and Clunch etc. along with different types of soft brick or stone, the use of a hosepipe may indeed be appropriate

First Coat (Bonding Coat)

For the best results it is recommended to actually '**throw, cast or harl,**'

Above: Harling Trowel

Above: Harling using the Harling Trowel

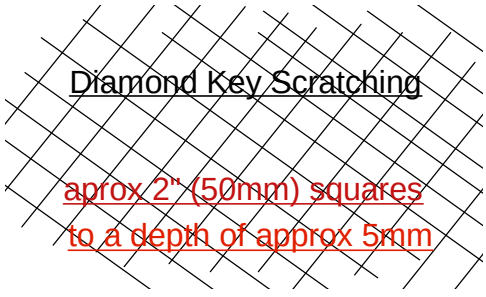
The material for a cast on coat should be wetter than that for normal rendering and should incorporate more gritty material. A thrown coat offers a superior bond simply from the action of casting on, far less likely to delaminate from the substrate thus acting as the ideal bonding coat. Of primary importance on surfaces of a suspect nature such as.

- **Very porous: Cob, Soft Brick etc.**
- **Impervious: Granite, Engineering Brick etc.**

Alternatively apply the first coat as normal using a laying on trowel, using even pressure to 'press' it on or into the wall. Lime mortars are extremely cohesive but require more effort than for cement bound render, requiring greater pressure in pushing the render onto the surface (aided by the pre damping). Application should be reasonably even and once applied should not be overworked or straightened too much. "In simple terms lay it up and leave it go".

Note 1: Application onto "Laths" **See appendix**
Note 2: The addition of hair / Fibre **See appendix**

As initial shrinkage takes place in the drying out phase this can be beaten back by using a plasterers float and dampening the wall again as required Pressing the float home evenly, and in a close circular motion but only if necessary.



Lime renders should never be allowed to dry too quickly. There is a vast difference between a render that has been allowed to carbonate and one that *was** simply allowed to "dry out too quickly". The use of **was* in the past tense is a deliberate choice of words, as a render that is simply allowed to dry out too quickly is more than likely to fail.

Once the "INITIAL" set has taken place, key the wall using a convenient tool to make a groove in the render of sufficient depth that will allow the subsequent coat something to grab, or hang on to. Without over scoring or tearing the backing coat.

The scratching in, of what is often referred to as diamond keying is recommended. A simple three pronged lath scratcher is a simple tool to knock up.
Remember: The scoring should not be such as to tear the render off the wall

Second Coat (Straightening Coat)

The second coat should be treated the same as the first, and applied prior to the first coat having developed too much of a set (in normal conditions this could be about one week but there is no hard and fast rule to the time it may take. Surfaces that are very damp will cause much greater problems in the amount of time to harden up), a leather dry consistency is the aim. The intention of catching the base coat whilst leather dry is to encourage the crystal structure that develops in lime mortars to take place in the mortars as a whole, rather than allowing two or three individual coats to form.
Note: there are differing views on this point depending on whom you talk to.

Above: Second coat of coarse stuff finished with a Devil Float

Note: It is of the utmost importance that an adequate set has taken place in the base coat. To follow on too soon with subsequent coats will result in much greater shrinkage problems as the individual layers will be shrinking back at various rates creating differential shrinkage problems.

The second coat is the straightening coat so after application the work needs to be ruled/staffed off thereby further straightening the work in order to produce the desired level of finish (if necessary). Once sufficiently set the render should be rubbed up with a normal float finished with a devil float to slightly score forming a key for the topcoat of plaster.

Third Coat (Finishing Coat/ Plaster)

The final coat is treated much the same as the previous coats assuming any straightening required has been carried out prior to this point. Once the surface has been laid avoid rubbing up the work, too soon, leaving it for as long as is practically possible. Top coat plasters will normally have a greater lime content and use a finer sand, so will be more prone to shrinkage problems. Working on lime mortars too soon, simply results in free lime being pulled to the surface (Case Hardening) thus affecting the properties of the material, and sometimes resulting in failure. The choice of sand in the topcoat is important dependant on the required finish. For a basic smooth finish most BS1200 sands will do, but for work requiring a higher quality finish much finer sand will be required. In the event of any doubt please consult us for further information. Most importantly the thickness of the final topcoat is crucial and should not be applied any greater than between 5-7 mm. Lime plasters supplied by CLC from stock are mixed at 2:3 Lime : sand, using the most mature lime putty we have in stock.

APPENDIX

CARBONATION

The set made by a cement or hydraulic lime is a chemical one triggered by water, there is also a degree of carbonation that takes place owing to the lime element in the material.
The term carbonation refers to the controlled process of a lime mortar " making a set, or going off" and completing the chemical return of the hydroxide of lime back to calcium carbonate.

Since kilning the limes affinity to carbon dioxide has been denied by holding it in suspension in putty form and if stored as a mortar it should be covered to prevent air getting to it. Once placed as a mortar in any form or location it is then exposed to atmospheric carbonic acid and is thus able to complete its return to calcium carbonate, "The Lime Cycle".

It is this process that largely determines how good or durable the final product is and one that requires at least an understanding, in order to achieve successful results when using building limes. Too rapid a carbonation will result in a very poor product creating many faults such as increased shrinkage, separation from the backing, crumbly and powdery mortar. Rapid surface drying will also pull free lime into the outer face, closing down the pore structure and creating unsightly lime staining.

The greatest risk to carbonation is the weather, care should be taken to protect the work from both strong sun and a drying wind by using either polythene, or Hessian (even both) draped over the area of work. New lime mortars need to dry out slowly from within the depth of the material by keeping them moist (not wet) a period of up to ten days plus is advisable. One of the best ways to assist this process is the use of a pump up sprayer delivering a fine mist spray. This will assist in two ways, firstly by keeping the work moist, retarding drying out and secondly by carrying carbon dioxide (slightly soluble in water) into the mortar.

Frost damage to lime mortars can be a problem and needs careful evaluation prior to carrying out work during the winter months.

A period of three months should be allowed for lime mortars to achieve a state where they are protected from frost damage, with any work carried out after September being properly thought out and fully protected for as long as practically possible.

As daunting as it all may sound, a little thought and planning will yield a mortar that will outlive its contemporary counterparts and greatly extend the life of the already old building it is to be used on.

Note 1: "LATHS"

"Laths" have traditionally been 'hand riven' from either oak or chestnut, as well as various other species of wood. More recently the use of sawn laths has superseded the more labour intense process of splitting the laths by hand, with many "Experts" extolling the virtues of the riven lath as superior to the sawn variety. But as with many traditional materials they take much longer to make and are therefore more "expensive".

The laths should always be dampened, prior to the first coat of render being applied. If however the laths are wet as a result of exposure or similar: Are they too damp to be covered in any case? Too much moisture even in a 'lath' will inhibit the lime renders ability to carbonate thus resulting in problems.

Note 2: The addition of HAIR / FIBRES

Animal hair has traditionally been used as reinforcement in lime renders as a means of improving tensile strength and to reduce shrinkage cracking. Introduced into the mix by teasing the hair into the mix prior to the mortars use. This is a time consuming job as it involves teasing the hair into the mix as it is mixed. Clumps of hair simply cannot be placed into the mixer as they will remain in the mix as large balls of hair and will not part no matter what type or method of mixing is used.

The use of hair in renders is most definitely advised on walls with a lath background and hair should be added to the first two coats but not the final setting coat. As for its use on a solid masonry background this is somewhat questionable (in our opinion) but does act as a good reinforcement by reducing the amount of shrinkage cracking in thick coats of render.

Fibres work nearly as good as natural animal hair but are cheaper and far easier to introduce into the mix. Rather than teasing in as for hair, the fibres are simply sprinkled into the mix requiring only a few minutes mixing to be thoroughly distributed.

The hair used would be any animal hair, rough in texture from goats, cows, horses (body hair not the mane or tail) amongst others. Evidence of other types of reinforcement has been found which include hemp or jute fibres amongst others but the use of hair is fairly universal for this role.

Hair is indeed 'the' Traditional and often preferred choice with fibres as a very modern yet "Honest" approach to a centuries old practice.

The information provided in this guide is intended for general use for operators with limited experience of traditional renders. Individuals will have their own methods and styles and we are not suggesting that tradesmen relearn how to plaster.

SUMMARY

{ Surface preparation will need to thorough.
{ Hair / Fibres must be incorporated when render is going onto a lath carrier.
{ Lime mortars are harder to apply as they need to be drier than that for cement renders with greater pressure applied.
{ Once applied they require more looking after than a cement render, by keeping them damp and protecting them from the weather.

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