



lime mortars



An introduction to Lime Mortars

Making quick lime by heating limestone and chalk in kilns, and using it to prepare mortars, plasters and lime wash for buildings is an ancient practice. Examples of lime plasters can be found in the pyramids and lime mortar supports Hadrian's Wall and the Coliseum in Rome and still supports our medieval abbeys and churches.

More recently these mortars can be found extensively in all traditionally constructed houses, farm structures, civic and industrial buildings in the United Kingdom. These buildings constructed with lime mortars date from the 16th to the early 20th centuries and still form a massive part of our built heritage.

Lime mortars used in construction, renders, plasters or lime used in decoration allow our traditional buildings to 'breathe', water is not trapped within them, and they can accommodate small amounts of seasonal movement. These mortars also contribute to the aesthetic character of our old buildings.

This character can be badly damaged

by the use of alternative, newer building materials such as cement, modern gypsum plasters and plastic paints.

Rebuilding or re-pointing using hard cement mortars can cause rapid weathering of softer stone and brick. Such mortars used for pointing and rendering can trap water within a building allowing walls to become saturated.

Gypsum plasters when used on the inside face of outside walls can be damaged by moisture moving through them and nearly all modern paints including some so called 'heritage ranges' can stop our walls breathing.

It is therefore important to use lime in the repair, conservation and restoration of our old buildings. This paper sets out how to use lime, with additional technical advice and support being available from Womersley's Ltd.

Historically lime mortars either just set by absorbing carbon dioxide out of the air or also have a Hydraulic set which can occur even in wet conditions. This range of limes is still available today.

Re-Pointing and Rebuilding with Lime Mortars

As a general principle surviving original lime-based materials and sound walls should not be rebuilt or re-pointed unnecessarily and the original appearance of the masonry should be retained as far as possible. Upon completion building/re-pointing mortar must be durable and offer protection from wind, rain and frost but permeable enough to allow evaporation, to protect softer older stones and bricks that are vulnerable to accelerated decay.

The type of lime used to bind the sand together to make the mortar will depend upon how exposed the building is to bad weather. The weakest lime mortars made from lime putty have the most breath ability and flexibility but are more easily damaged by poor weather especially for the first few months after they have been applied. Hydraulic limes are also readily available and these give more resistance to poor weather but are a little less breathable and flexible. Any building of single leaf walls should only be carried out using eminently hydraulic mortars.

As a general rule one part of lime is mixed with three parts well graded sharp sand, with the largest sand grains being less than one third the width of the joint. Selection of good quality sands is as essential as choosing the correct lime. If the joints are less than 8mm the amount of lime to sand will generally be increased.

Usually the depth of a joint for re-pointing should be around twice its width and a minimum of 20mm. After removal of old mortar, loose material should be brushed out and the joints flushed with water to remove dust and debris. The lime pointing mortar should be sticky but not wet and should cling to the underside of an inverted trowel. Mortar used for rebuilding will be slightly wetter. Check that joints and adjacent stones are damp but not wet before re-pointing.

The use of appropriate tools and careful working are essential in achieving sensitive re-pointing work. Prepared mortar should be pressed firmly into the joints with a small



tool or pointing iron, small enough to fit into the joint without causing damage to adjoining stones. The thickness of mortar applied in one pass should not exceed 15 to 20mm and material within the depth of the masonry should be allowed to firm up and start to carbonate before being covered by further mortar.

Before pointing commences place mortar well back into any voids and pack these areas with small pieces of sandstone or similar absorbent material, such as soft burnt clay tile or brick, firmly tamped into the new mortar. Some masonry, particularly rubble work, was originally constructed with numerous small pinning stones which contributed to the overall stability of the masonry. Replacement pinnings should be built in as the work proceeds.

When the mortar has stiffened up the joints are ready to be finished. Finishing techniques vary but the main aims of all finishing processes will be to remove laitance from the surface and leave an open textured finish, to compact the mortar fully into the joint and ensure a good seal to the stone, and to give a visually acceptable finish. The processes employed may involve a lightly scraping back mortar or tamping the surface of the mortar with the end of a stiff bristle brush. With all Finishing techniques correct timing of the work in relation to hardening of the mortar is absolutely critical and the importance of this stage of the process.



Plastering with Lime Mortars

Historically lime mortars have been used to plaster walls within the humblest to the grandest of our ancient and historic buildings. Finishes from Rustic to Polished can be achieved using plasters applied on to solid walls, timber lath, clay infill panels and reed based backgrounds.

Lime mortars allow traditionally constructed walls to breathe dampness out of them and when applied to stud partitions and ceilings cope much better with seasonal movement within older buildings. The lime plasters were often made with lime putty slaked in a pit on site but sometimes the backing coats made use of the hot lime mortars that were often used during construction. The following general advice should be followed when plastering with traditional haired lime plaster:

Ensure that the background is thoroughly clean. If the background is saturated check externally for cracks or other causes of water penetration. Causes of damp should be remedied and cracks should be cleaned out, (packed with low fire clay tiles or slate if necessary) and filled with a hydraulic lime pointing mortar.

Joints should be raked back (normally 10mm) or a hydraulic lime stipple coat applied to provide a key for the

under coat. Once a key has been provided apply sufficient water to reduce excessive suction, especially on bricks and porous stone. Always dampen down before applying subsequent coats of plaster

On defaced surfaces or in areas with a large amount of damaged joints it might be necessary to apply a dubbing out coat to provide a relatively level surface. When a dubbing out coat is used let it set sufficiently before keying it. Apply a base coat or scratch coat after 3-7 days.

The lime plaster undercoats usually consist of one part mature fat lime putty to three parts grit sand, (Coarse Stuff). Just before the mortar is ready for application horse, goat, cow or yak hair should be added to the mix approx. 0.5 kg per 100 litres. Each coat should not be applied over 15 mm thick. Provide a criss cross key between coats, creating 25-35 mm diamonds, with a pointed but blunt wooden lath.

After the final undercoat coat has got an initial set it should be scoured back with a devil float, and once the undercoats have cured and dried out apply a fine lime plaster finish coat, (fine Stuff). This is made from well matured, un-haired sieved lime putty and fine silica sand and is applied in very tight coats, (1-2mm).

Rendering with Lime Mortars



Rendering old building with lime mortars has been done traditionally to help keep the rain out, as part of local building practice to protect softer building materials below and for aesthetic reasons.

Lime renders like lime plasters allow old solid walls to breathe out excessive moisture and do not trap water within the structure as often happens with cement renders.

Many of the general principals detailed in the plastering section apply but it is often necessary to use hydraulic limes for many renders. Ensuring each coat is weaker than the previous one but never weaker than one part lime to three parts sand.

Hydraulic limes are more resilient to the weather during the curing process yet retain a good degree of breathability and flexibility for older properties.

The appearance of the finish coats can vary from a soft sponge finish to a rough cast, thrown finish. The render may be marked out to mimic stone, may be coloured by local sands or pigments or covered in lime wash or other breathable pure mineral paints

Further Advice

Further advice and support is available from...

Womersley's Ltd
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West Yorkshire, WF16 0PG

