



Technical Advice Guide: Introduction to Lime in Traditional Buildings

Historic background

Lime has been used in the construction and finishing of buildings for at least 4000 years. Before the mid 19th century local sources of lime were almost invariably used, although some lime was transported over greater distances by sea. Geology varies and, historically, local limestones (the raw material burned to make lime) produced a range of different types of lime, from relatively pure to eminently hydraulic. Many different types of lime were available, with different strengths and weathering properties.



Why use lime?

Why should we continue to use lime in the late twentieth and early twenty-first centuries? As a construction mortar, from mass foundations to walls, arches and vaults, lime is resilient and flexible, adjusting to minor settlement and accommodating thermal movement. It is ideal for structural repairs to lime-built masonry buildings. For repairs and repointing of masonry work, lime mortar can be matched to the density of the stone (or brick), to minimise the risks of salt damage and stone decay. The use of lime mortar in wall cores, in joints and on the face of the wall assists in the exclusion of driving rain by 'mopping up' free water before it can penetrate to the building interior and encouraging re-evaporation to the outside air. As an external weathering coat, lime mortars in the form of harling or rendering, can provide a more effective coating than cement-based materials. Good lime coatings do not suffer from the micro-cracking almost always present in cement-based coatings and, being resilient and flexible, they are also much less likely to develop cracks in response to minor movements of the underlying masonry. The porous nature of the material means that any minor cracks which do occur are less likely to admit water, and may even heal over a period of time by the slow action of dissolution and recrystallisation of lime. Lime mortars are also used at roof level for bedding stone or tile ridges, for forming fillets and for parging slates and pantiles. Internally, lime mortar finishes (lime plaster) are breathable and non-toxic. They should be used without vapour barriers and will minimise condensation and promote a comfortable, healthy internal environment. Lime can also be used for floors in the form of lime concrete or lime-ash flooring and for deadening between floor joists to reduce sound penetration and increase fire resistance. Limewash finishes, internally and externally, complete the picture and complement the breathability of the construction as a whole.

Definitions (refer to Mortar Specification technical sheet for expanded descriptions)

Non hydraulic lime = pure lime = fat lime = air lime

Hydraulic lime = lime containing reactive silicates = water lime
(hydraulic = works by action of water, will set in water)

Hydrated lime = treated with water = slaked lime

(slaked, or hydrated, lime may be in the form of a dry powder or, with the use of a greater quantity of water during slaking, in the form of putty.)

(The form of commercial hydrated lime available from builders merchants and used as a plasticiser in cement: lime: sand mortars is not suitable for making lime mortars.) **Take care not to confuse 'hydraulic' and 'hydrated' lime - the results will be disastrous**

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The principal applications for lime mortars are:-

Re-pointing

If original lime mortar has decayed or been replaced by unsuitable materials good quality re-pointing in traditional lime mortar will enhance both the appearance and the weathering performance of your building. Unfortunately re-pointing, more than any other maintenance operation is frequently poorly executed using inappropriate materials. The performance of traditional masonry buildings depends on the ability of the building fabric to transmit moisture vapour. Both stone and mortar naturally absorb a certain amount of water and, importantly, allow it to dry out again. If this process is inhibited or thrown out of balance by the use of impermeable mortars a number of problems may be encountered including accelerated stone decay and water penetration. In addition, modern cement mortars appear harsh and unsympathetic in conjunction with traditional stonework.

External lime coatings

In Scotland lime harling and to a lesser extent, flat renders, were widely used as external protective and decorative coatings. Harling was frequently applied to rubble masonry, first brought out to a level surface with pinnings and mortar. The technique of casting material onto a wall surface in the form of harling was widely used and some harling was finished by pressing back to achieve a flatter surface. Where a more formal finish was required, often in urban areas, a trowel applied lime render, or stucco, might be used, lined out to imitate ashlar stonework.

External coatings of lime mortar are still the most effective method of weatherproofing solid masonry walls. The lime mortar in the form of harling or render forms a permeable coating that holds up water and prevents wind-driven water penetration. The permeability of lime-based materials allows moisture to evaporate from the masonry, and reduces problems of condensation.

Internal lime plaster

In traditional wall construction, lime plaster, either on wood lath or directly onto the masonry, provides a healthy breathable finish. For the repair of lime plasterwork, including decorative work, the use of similar materials is essential. Most early materials and techniques can be matched for repair and conservation work. Later decorative work often incorporates a gauging of gypsum. Lime plaster also possesses good thermal insulation properties.

Limewash

Limewash is a traditional external and internal finish for many stone and brick buildings, applied either directly onto the masonry surface or, more commonly, to a coating of lime harling, render or plaster. A good quality limewash, well applied and cured, will last for many years. Properly applied, limewash will penetrate the surface of a lime render or harling and form a bond with this backing. Limewash will successfully fill small cracks in renders and harling, and subsequent small fissures developing over time will be sealed by the redeposition of lime. As a vapour permeable material, limewash is the most effective and appropriate finish available for traditional buildings.