



Saving our Built Heritage

Since the introduction of Portland cement in the early 19th century, cement has been widely used in the construction industry ever since. Whilst successfully applied in the building and repair of more modern buildings, this hard, brittle material has caused untold damage to our older built heritage. Despite a resurgence in the use of traditional lime products over the last few years, there is still a huge amount of ignorance about lime products and their properties in older buildings.

Traditional buildings benefit in a number of ways from using lime based mortars, renders and plasters, this is because:

- their porosity allows the structure to breathe
- their elasticity helps accommodate general movement
- their self-healing nature reduces problems with cracking
- stone masonry pointed with lime mortar allows moisture to evaporate from the joints rather than penetrate the masonry
- a limewash or silicate paint finish allows evaporation of moisture from a render

Builders and consultants in traditional buildings tend to use the term 'like for like'. This means that if a building had a particular material used when it was built, it is probably best to use that for repairs as well. On the other hand, cement-rich repairs used by many builders are often very damaging to the structure, resulting in:

- a tendency to crack rather than absorb movement
- water entering the structure via cracks and then being trapped, creating damp conditions
- a tendency for renders to separate from the wall, increasing dampness
- cob walls may progressively deform and can fail

Left: Poughill Barn in Devon, repaired with the use of traditional lime render.

Right: Poughill Barn prior to repair.

Below: This cob barn wall has collapsed due to cement render and poor maintenance.



These problems are often compounded by the use of modern acrylic paints which trap moisture in the walls. This may result in damp, cold walls, condensation, flaking paint, rotten skirting boards, joists and other timber fittings, increased heating bills and a never-ending battle to hold back the dampness from the inside. Chemical damp course injections, tanking and even drylining are common prescriptions wherever the "professional" has failed to understand the basic requirements of a traditional property. In the worst case scenario, the combination of sealing the external and internal walls leads to a dramatic rise in the moisture levels in the wall, potentially causing particularly severe damage to earth and timber framed structures. Whether through simple ignorance or wilful neglect, many people continue to seriously damage the fabric of buildings by employing inappropriate materials and this needs to be addressed.

The listed buildings scheme was introduced to try to protect older properties from just such destruction and although it can be controversial, in many cases listing a property has been the only reason that a building is still standing. Traditionally, buildings were made with no cavity, often limited foundations and certainly no damp proof course (DPC). Although dependant on the location, the local water table and the time of year, the nature of this type of structure means that moisture is drawn up from the ground and needs to evaporate to the outside. The walls also need to be thick enough to allow rain to be absorbed and then evaporate to the outside before penetrating through to the inside. This can be a problem for some dwellings converted from agricultural buildings as these walls can be too thin – livestock rarely complain about damp.

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Left: *Traditional lime based products such as this haired lime mortar are currently enjoying a revival.*

Below Left: *Replastering of a 300 year old cob wall.*

Below: *Lime putty plaster has been used in the replastering of this cob wall.*

Different Types of Lime

Hydrated lime

Often referred to as 'bagged lime' or 'builders lime'. This is the cheapest form of lime but it is intended for use as a fattening agent to be mixed with cement in modern mortars. Hydrated lime can be converted to an inferior form of lime putty by mixing with water and left standing to fully absorb the water. Its high alkalinity makes this a hazardous operation as breathing in lime dust can cause serious lung problems.

Lime Putty

Otherwise known as 'fat lime' or 'air setting lime'. It is a wet product, can last indefinitely and actually improves with age. This pure form of lime only sets by carbonation where the lime (calcium hydroxide) reacts with carbon dioxide from

the air to form calcium carbonate. Pure lime putty has been used for thousands of years and is mixed with suitable sands to make mortars, renders and plasters which are ideal for internal work or sheltered conditions where setting in damp conditions and frost resistance are not necessary. They offer maximum breathability and their lower compressive strengths can be an advantage in accommodating stress and movement.

The Romans used volcanic ash from Pozzuoli as an additive with their lime mortars to increase their compressive strength, improve frost resistance and allow them to set in damp conditions, hence the

term 'hydraulic'. Nowadays we use brick dust and calcined clay, and the general term for these additives is a pozzolan. The more pozzolan added, the more hydraulic the lime mortar becomes. Hydraulic lime mortars are best suited for building work or external rendering. The degree of hydraulicity of the lime mortar will affect many of its characteristics e.g. compressive strength, speed of set in the presence of water and water vapour permeability. Lime putty is also the principal ingredient in limewash, the natural breathable paint for older structures.

Naturally Hydraulic Lime

Also known as 'NHL', or simply 'hydraulic lime', this comes as a bagged, dry powder that has a limited shelf life of around 9 months dependant on the storage conditions. Having been around for at least two hundred years, NHLs are made from limestone that is quarried with natural impurities such as clays or silicates that when burnt produce cementitious compounds. These compounds allow the lime to set in damp or wet conditions and also make the mortars and plasters harder and less flexible than a mix with a fat lime.

The amount of impurities in the NHL affects its compressive strength and places it within a broad European standard, from NHL2 which is the weakest, NHL3.5 through to NHL5 which is the strongest. Normally, once sand is mixed with an NHL it has to be applied within a reasonably short time as a chemical set begins.



Restoration

Practical Considerations

Before starting a project, consider:

- if the building is listed or in a conservation area, has consent been sought?
- which lime is appropriate for the purpose – bedding, pointing, rendering, plastering – and their different requirements.
- the nature of the backing material (substrate) – its strength, durability, porosity, water vapour permeability.
- the environmental conditions to which substrate and mortar are exposed.
- the need to match existing mortars in texture or colour.
- the type of decoration that may be used if at all?
- is the time of year appropriate for the work?
- are you able to undertake the work yourself, if not does your preferred builder have the necessary experience and the available time? Specialists may be in demand.
- the cost may also have a bearing on the approach chosen.



Image courtesy of Natural Building Technologies

Using traditional materials is not difficult, but sometimes requires different techniques to a modern material and it will take a little longer for mortars and plasters to set. In fact, first time users often comment on how nice lime is to work with and how user friendly it is. Its high alkalinity means that sensible precautions should be taken when using lime eg using suitable safety glasses and gloves.



Above and Right: Use of breathable paints helps to avoid trapping moisture in walls.

Left: Severe damage to wall caused by hard cement pointing.



Image courtesy of Natural Building Technologies



Mike Wye & Associates is a specialist supplier of natural building and decorating products and one of the UK's leading lime specialists. They have been training people in the techniques needed to maintain and conserve traditional buildings for many years and over 2,000 builders, surveyors, architects and owner occupiers have enjoyed their practical training course on using lime, giving them the confidence required to deal with traditional buildings in the correct way. As well as the course, they have produced their own DVD of which over 1500 have been sold. They won the Small Business Champions award for manufacturing for the Southern UK in 2007.

In a further move to help those looking for advice, the company has now launched an excellent free guide that can be downloaded from www.mikewye.co.uk or will be posted to anybody who calls their office on 01409 281644. The guide is an introduction to the materials and concepts as well offering practical advice on plastering, pointing, rendering and limewashing and much more besides.