

Maintenance Matters!

Historic buildings



Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Introduction to Lime

www.cymru.gov.uk

The burning of limestone to produce lime mortars, renders, plasters and limewash is an ancient practice. Most pre-nineteenth-century buildings in Wales were built and decorated using these products. Although, their use gradually declined following the patenting of Portland cement in 1824, they still have many advantages.

- They are porous allowing water to be absorbed from the surrounding materials, thus protecting them from the harmful effects of frost and hygroscopic salts. This is particularly important for soft brick and stone.
- They help to control condensation and damp by allowing the building to breathe.
- They are relatively flexible and can accommodate a certain amount of movement in the structure, which hard and brittle cement mixes cannot.
- When small cracks do occur they can self-heal when exposed to air or when given a coat of limewash.
- They have a soft, natural appearance that is well suited to the character of historic buildings.
- Their manufacture is considered to be less damaging to the environment than their modern counterparts.
- Although lime is caustic and needs to be handled with care, limewash does not contain volatile organic compounds or other chemicals that are often found in modern paints.
- They are soft, allowing redundant bricks and stone to be cleaned up and recycled.

There are three basic types of lime available for building work.

Lime putty

This is also known as fat lime or non-hydraulic lime. It can be produced on site by slaking quicklime in water, but this is a volatile process and the lime putty takes time to mature. It is therefore far easier to obtain it ready-made from a specialist supplier. It is usually supplied in 4.4-gallon (20l) buckets or bags, and one ton (1t) bulk bags, ready to be mixed on site with sand. Ready-mixed lime putty mortars, renders and plasters containing a range of

sands are also available. The mix will seem stiff at first and should be knocked up — thoroughly beaten, chopped and turned — to loosen it, rather than adding water, which will encourage shrinkage and cracking as the mortar dries.

Lime putty sets on contact with air; a process known as carbonation. It is a very slow process, which can be a disadvantage in poor weather conditions or when time is limited. Unless carbonation is complete, lime mortar and render will remain susceptible to frost damage, but additives known as pozzolans, such as brick dust and pulverised fuel ash, can speed up the initial process. Alternatively, use a hydraulic lime.

Natural hydraulic lime

Unlike lime putty, hydraulic limes are able to set under water without exposure to air. They are produced from limestones containing impurities, which help to give them a faster initial set. However, they can still be damaged by low temperatures weeks after application and must be given adequate protection. Hydraulic lime comes as a dry powder in 55-pound (25kg) bags. It is usually mixed on site with sand and water, and used quickly as it does not keep.

Hydraulic limes come in four grades, the higher the number the stronger the mix and faster the set: NHL1 is the weakest, NHL2 is feebly hydraulic, NHL3.5 is moderately hydraulic and NHL5 is the strongest. The strength of the mix can also be adjusted by changing the ratio of sand to lime. Less sand will give a stronger mix and vice versa.

Hydrated lime

This is the type of lime most commonly available in builder's merchants. It is supplied as a dry powder and is often added to cement mixes as it acts as a plasticiser. However, it is an inferior product for use in lime mortars and is best avoided. It is often of poor quality and the material begins to degrade as soon as it is produced.

Choosing a lime mix

When repointing or repairing render or plaster, it is important to choose the right material and mix for the job. This will be influenced by a number of factors, including the strength of the building material, the time of year when the work is to be carried out, the prevailing weather conditions and level of exposure experienced by the building, and the existing mortar mix. The colour and texture of the aggregate is also an important consideration.

As a general rule, the mix should be slightly weaker than the building material. Advice should be sought from a conservation architect or surveyor, or the supplier, if you are in any doubt. Many specialist suppliers also offer a free mortar analysis and matching service, as well as offering courses on the use of lime products.