



Courtesy: Sara Bennison

Choosing a lime

Information Sheet

Types of lime

There are many types of lime on the market. It is crucially important to understand their differences and the way in which they perform, only then is it possible to make an informed choice about which lime to use for different applications and environments.

Slaked/High Calcium/Putty/Air/'Fat' or Non-Hydraulic Lime

This lime is produced by slaking fresh Quicklime in an excess of water. It is also known as non-hydraulic lime because it requires exposure to air in order to carbonate and does not set under water. **This lime is regarded as the most appropriate lime for old buildings where maximum permeability and flexibility is required.**

Premixed 'wet' products are made from this lime putty with the addition of an aggregate and/or fibre.



Lime Hemp Plaster

glaster®



Lime Mortar

Top Coat Plaster

Base Coat Plaster

Premixed 'wet' lime products that are ready to use!

Hydrated or 'Bag' Lime

This is the lime generally available in builders merchants. It is a non-hydraulic lime produced by slaking Quicklime with a shortfall of water which results in a powder. It is generally considered to be an inferior product to the fat lime putty described above for a number of reasons but primarily because it starts to degrade from the moment it is made and can actually fully carbonate in the bag before use. Widespread use of 'bag' lime has given 'lime' a poor name because of the instances where it simply has none of its original properties left by the time the end-user works with it, hence it fails, dusts etc. If 'bag' lime is the only option, then it should be purchased as fresh as possible and left to soak for two days in clean water. Although the resulting product is chemically the same as 'fat' lime putty, it is physically different, in particular it is less 'sticky'.

A cement mix with a shovel of hydrated/bag lime in it is not a lime mortar, in this instance, the lime is simply being used as a plasticizer.

Hydraulic Lime

This 'hydrated' lime is produced from limestone containing clay and other impurities which enable it to set without exposure to air; it is therefore used for providing a faster initial set in more extreme conditions including under water. There are many types of hydraulic lime and they are categorised according to the following (NHL - Naturally Hydraulic Lime):

- **Feebly hydraulic lime NHL1 & 2** – contains less than 12% clay which means it is slower to set (about 20 days in water);
- **Moderately hydraulic lime NHL3.5** – contains 12%-18% clay which gives a slightly faster set (15-20 days in water);
- **Eminently hydraulic lime NHL5 (Z)** – has up to 25% clay content which means that a much faster set is achieved (hours/days).



Feebly Hydraulic

Moderately Hydraulic

Eminently Hydraulic

These limes have become increasingly popular over the last decade because of their comparative 'ease of use' and 'strength', compared to fat limes.

Pozzolans

Pozzolans are 'heated' materials such as brickdust, Pulverised Fuel Ash (PFA), Calcined Clay, that contain silica, alumina and iron which become reactive towards alkalis including lime. They are frequently used to help to give a fat lime mortar a 'faster' set (essentially creating an **'artificial' hydraulic lime**) and are therefore helpful in many situations to broaden the applications for fat limes. It is believed that many historic mortars were 'fat' or 'non-hydraulic' as those that have been analysed contained these 'heated material' which changed the performance of the mortar. Today, hydraulic limes are more commonly used, sometimes wrongly, for increased set and strength. Please see over for some guidance on specifying and choosing the right lime.

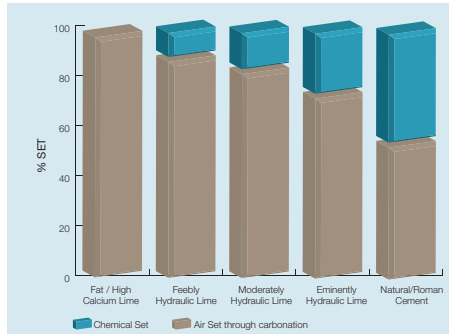
*For further information about the whole subject and illustrated diagrams of plastering and pointing techniques, **The Lime Handbook** is available at a reduced price of £12.50 to Ty-Mawr customers, quote IS09 when ordering.*

Choosing a lime

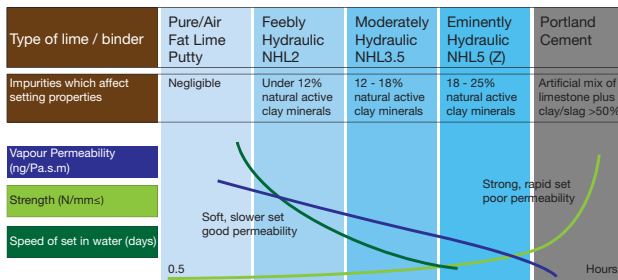
Information Sheet

Properties

Understanding the properties of the various limes will help to ensure a successful result through appropriate specification, see tables below.



This chart shows the chemical vs the air setting properties of different types of lime. Care and protection is required for those with greater air setting properties.



The above diagram shows the 'trade offs' that need to be considered when choosing a lime - the stronger the lime, the faster it sets but the compromise is 'breathability' and 'flexibility'

Choosing a Lime

It is important for the well being of the building that the most appropriate lime product is chosen. Every situation needs to be carefully assessed e.g. in terms of:

- softness of the stone, brick etc – this should be a major factor in selection. The mortar should always be 'softer' than the stone/brick, see table below.
- the environmental conditions – where the environment is very wet e.g. sea-defence walls, canal walls, cellars, copings, pavings, a hydraulic lime is more appropriate because of its ability to set under water, see table below.

Lime Mortar Selection

Application	Type of Lime	Suggested Mix Ratio by volume	Notes
Pointing/Building Stone/Brickwork	Fat Lime Mortar	Premixed or 3 Sand*: 1 Lime Putty	<ul style="list-style-type: none"> ■ The exact ratio will depend on the sand/aggregate used. ■ The colour, texture, workability and success of the mortar is predominantly influenced by the selection of sand/aggregate. ■ The softer the stone/brick, the softer the mortar must be. ■ To match an existing mortar, send a sample to us.
	Hydraulic Lime NHL3.5/2	2.5 Sand*: 1 Hydraulic Lime	
	glastere® Lime Mortar	Dry, Premix	
Flag Stone Bedding	Hydraulic Lime NHL5/Z	2.5 Sand*: 1 Hydraulic Lime	<ul style="list-style-type: none"> ■ For smaller tiles, please contact us. ■ Samples are highly recommended
	glastere® Bedding Mortar	Dry, Premix	
Paving, Copings Chimneys, Parapets	Hydraulic Lime NHL5/Z	2 Sand*: 1 Hydraulic Lime	<ul style="list-style-type: none"> ■ For exposed areas, or any high weathering applications.

*It is important to choose a sharp, well-graded, well washed sand. NHL= Natural Hydraulic Lime.

© Copyright - please do not infringe our copyright by copying or reproducing any part of this document.

Disclaimer - no responsibility can be accepted for any errors or omissions or any loss or damage as a result of using the information provided in these guidelines.

- the existing materials – repairing like-with-like – this will usually provide the most satisfactory solution both aesthetically and technically, however it should not be done without considering the performance of the original materials.
- the time of year – the ideal time to do fat lime work, particularly external work, is during the spring and early summer, lime work should never be done when the temperature is likely to fall below 5°C before carbonation has taken place, which is the same for cement. Therefore, if work can not be rescheduled to another time of the year consideration should be given to adding a pozzolan to a fat lime (e.g. brickdust, calcined clay) to speed up the set or to using a hydraulic lime. Appropriate protection is vital.
- the available time – occasionally work is programmed without enough time to support the use of the materials specified, rapid builds necessitate rapid sets therefore adding a pozzolan to a fat lime or using a hydraulic lime should be considered (if work can't be reprogrammed!).

Lime Plaster Selection

Building Material*	Site Type	Suggested Base Coat / Levelling Coat	Suggested Build-up	Suggested Top Coat – please note the top coat should not be stronger than the base coat	Suggested Build-up
Cob, Rammed Earth, Strawbale*	Internal	Fat Lime Base Coat Plaster	2 x 9mm	Fat Lime Top Coat Plaster	1 x 3mm
	External	Fat Lime Base Coat Plaster or Hydraulic Lime NHL2	2 x 9mm	Fat Lime External Top Coat Plaster or Hydraulic Lime NHL2	1 x 6mm 1 x 6mm
Reed Mat, Reed Board (haired base coat)	Internal**	Fat Lime Plaster For Boards	2 x 9mm	Fat Lime Top Coat Plaster	1 x 3mm
	External		N/A		
Celurit Wood Wool Boards (mesh base coat)	Internal**	Fat Lime Plaster For Boards (unhaired) or Hydraulic Lime NHL3.5/2 (with Beach aggregate)	1 x 9mm	Hydraulic lime NHL3.5	1 x 9mm
	External	Hydraulic Lime NHL3.5 (with Beach aggregate)	1 x 9mm	Hydraulic lime NHL3.5	1 x 9mm
Woodfibre Board (mesh base coat)	Internal**	Fat Lime Plaster For Boards or Hydraulic Lime NHL3.5 (with Beach aggregate)	2 x 9mm 2 x 9mm	Fat Lime Top Coat Plaster	1 x 3mm
	External	Hydraulic Lime NHL3.5 (with Beach aggregate)	1 x 9mm	Hydraulic Lime NHL3.5	1 x 9mm
Lath (Internal only) Soft Stone (haired base coats)	Internal	Fat Lime Base Coat Plaster	2 x 9mm	Fat Lime Top Coat Plaster	1 x 3mm
	External	Hydraulic Lime NHL3.5/2	2 x 9mm	Fat Lime Top Coat Plaster or Hydraulic Lime NHL3.5/2	1 x 6mm 1 x 6mm
Soft Brick (haired base coat)	Internal	Fat Lime Base Coat Plaster	2 x 9mm	Fat Lime Top Coat Plaster	1 x 3mm
	External	Fat Lime Base Coat Plaster or Hydraulic Lime NHL3.5/2	2 x 9mm 2 x 9mm	Fat Lime Top Coat Plaster or Hydraulic Lime NHL3.5/2	1 x 6mm 1 x 6mm
Hard Stone (haired base coats)	Internal	Hydraulic Lime NHL2	2 x 9mm	Fat Lime Top Coat Plaster	1 x 3mm
	External	Hydraulic Lime NHL3.5	2 x 9mm	Hydraulic Lime NHL3.5	1 x 6mm
Hard Engineering Brick Concrete Blocks (10mm mesh or haired base coat)	Internal	Hydraulic Lime NHL3.5/2	2 x 9mm	Fat Lime Top Coat Plaster or Hydraulic Lime NHL3.5/2	1 x 3mm 1 x 6mm
	External	Hydraulic Lime NHL3.5	2 x 9mm	Hydraulic Lime NHL3.5/2	1 x 6mm
Insulation Blocks* (10mm mesh or haired base coat)	Internal	Hydraulic Lime NHL3.5/2	2 x 9mm	Fat Lime Top Coat Plaster	1 x 3mm
	External	Hydraulic Lime NHL3.5	2 x 9mm	Hydraulic Lime NHL3.5/2	1 x 6mm

*Dub out uneven surfaces prior to applying first coat. **May require more coats due to wainness of bales.

**Insulation blocks have very high suction, be careful to maintain moisture content in render.

**Lime Hemp plaster is preferred in these scenarios - see table on page 15. Please note: Manufacturers application guides must be followed. To reduce the environmental impact of your lime plaster, use glastere® see pages 22-24 or lime hemp plaster see pages 13-15 as alternatives to standard lime plasters.

NHL= Natural Hydraulic Lime (to which plastering/rendering aggregate, see page 8-9, must be added in correct ratio). Exposed elevations may require additional coats.

Occasionally, the choice still seems to be based on the availability of skills (or lack of them) and this does mean that often in these cases that the stronger hydraulic limes or even cement are introduced into buildings where they have no place and will, in the long term, almost certainly contribute to damp problems and damage the very fabric of the building.

Other information sheets consider the various lime-based products in more detail and set out some 'golden rules' for successful results. Before beginning to use any lime product, it should be understood that lime is caustic and eyes and skin should be protected at all times.

