

## Different types of building limes

Natural hydraulic limes are made from limestone that contains impurities such as clay or silicates. Unlike lime putty which is non-hydraulic lime, NHLs can set in damp conditions, indeed they require water for a minimum period of around 72 hours to gain maximum strength. They also have some free lime available for carbonation. There are three European classifications NHL 2, NHL3.5 and NHL5 based on the compressive strength of laboratory mortars after 28 days. These are often somewhat misleadingly termed feebly hydraulic, moderately hydraulic and eminently hydraulic. We generally recommend the use of NHLs where the need for breathability and lower strength is outweighed by the desire for an earlier and harder set such as working on bedding hard masonry, wall copings, chimneys and slate floors. In some circumstances hydraulic lime mortars can be used for rendering or plastering.

The strength of a hydraulic lime mortar (HLM) varies depending on the manufacturer of the hydraulic lime as some NHL will be high in the band or low.

HLM will also vary depending on the ratio of lime binder to aggregate and the type of aggregate or sand used.

### Natural Hydraulic Lime (NHL)



NHL or Natural Hydraulic Lime, comes from limestone that has natural impurities of clay and other minerals, the amount of impurities within it determines how hard it will set.

NHL works by setting in the presence of water, hence the term Hydraulic: Natural hydraulic lime powders come in 3 European grades:

| GRADE  | STRENGTH(MPa) | EXAMPLES OF USE                                      |
|--------|---------------|--|
| NHL2   | >2 to <7      | Pointing internally or with soft masonry, plastering |
| NHL3.5 | >3.5 to <10   | Bedding, pointing                                    |
| NHL5   | >5 to <15     | Flooring, below DPC or chimney flaunchings           |

NHL's can be used when speed is essential as it sets much quicker than a Lime Putty based mortar. You must be aware that it is less flexible and not as breathable as a Lime Putty Mortar, these attributes are reduced as the NHLs get stronger. For strawbale or historic buildings with soft stone/brickwork then a Lime Putty Mortar is better or a weak mix of NHL.

The ratios of sand : NHL vary depending on what job you are doing, you can generally use a 3:1 mix for most jobs, but for floor screeds you would use a 2:1 mix.

## Hydraulic lime (HL)

Consists of lime and other materials such as cement, blast furnace slag, limestone filler and other materials that react to harden the mortar. The additives do not have to be declared. This is legally different to a natural hydraulic lime.

## Formulated lime

Formulated lime (FL) Formulated lime consists of hydrated lime and/or natural hydraulic lime with added hydraulic or pozzolanic material. Inclusion of any cement or cement clinker must be declared and a limited percentage. This is legally different to a natural hydraulic lime and formulated lime.

## Lime putty



Lime Putty is the product that has historically been used as the binder in lime mortars. It has many names, and this sometimes causes issues, for example it can be known as Non Hydraulic Lime, Fat Lime or Air Dried Lime. It is made when quicklime is slaked with enough water to make a liquid and then left to mature for 3 months+ into a cottage cheese like consistency.

Lime Putty cures by carbonation with the air once dry, this is why it can be kept for years in an air tight environment.

Lime Putty naturally forces water to the surface of the container that you are maturing it in so it forms its own air tight barrier. Lime putty gets better as it gets older as it has had time to fully slake and force out all of the excess moisture that it has gained from the slaking process.

Lime Putty based mortars take longer to set than Natural Hydraulic Limes and cement, this is because it carbonates at 1mm a month, this can be altered by gauging it with pozzolans which we will talk about later.



## Hydrated lime

Often confused with natural hydraulic lime due to similarity of name and also being a powder but is not to be used for the same applications. Hydrated Lime is created when quicklime is added to just enough water to slake it into a powder. It is a lesser form of lime putty, it is usually used as an additive in cement as a plasticiser, and it should never be used as a binder in its own right as it is not strong enough

## Quicklime

Calcium oxide, or quicklime, is also known as lump lime This is the raw material that is used to make lime putty. Quicklime is made by burning limestone or chalk in a kiln. This drives carbon dioxide into the atmosphere, leaving a very reactive material, calcium oxide. It is made in a range of sizes from lumps down to very fine powder.

## Hydraulic lime mortars (HLM) and their applications

Use the following tables to decide on which strength and mix hydraulic lime mortar is appropriate for your project.

| Building element                      | Hydraulic Lime Mortar Designation |
|---------------------------------------|-----------------------------------|
| Internal walls                        | HLM 0.5                           |
| External walls                        | HLM 0.5 – 2.5                     |
| Facing to solid construction          | HLM 1.0 – 2.5                     |
| Walls close to/below ground           | HLM 2.5 – 3.5                     |
| Parapets, sills, lintels and cornices | HLM 2.5 – 3.5                     |
| Copings and cappings                  | HLM 2.5 – 5.0                     |
| Chimneys                              | HLM 3.5 – 5.0                     |
| Earth retaining walls                 | HLM 3.5 – 5.0                     |
| Masonry below water level             | HLM 5.0                           |

| HLM Designation | NHL2 lime:sand | NHL3.5 lime:sand | NHL5 lime:sand | Mean compressive strength (MPa @ 91 days) |
|-----------------|----------------|------------------|----------------|---|
| HLM 5           | -              | -                | 1:2            | 5.0                                       |
| HLM 3.5         | -              | -                | 1:2.5          | 3.5                                       |
| HLM 2.5         | -              | 1:2              | 1:3            | 2.5                                       |
| HLM 1           | 1:2            | 1:3              | -              | 1.0                                       |
| HLM 0.5         | 1:3            | -                | -              | 0.5                                       |

## Lightweight thermal Hydraulic lime mortars

It possible to obtain hydraulic lime mortars mixed with lightweight aggregates that provide a much enhanced thermal performance. We stock Secil ecoCORK, a ready mixed render/plaster system that has around 7-8 times greater lambda value than lime mixed with sand aggregates. This system allows the different layers to be applied far quicker than conventional HLM mixes as well.



For more information please contact the Mike Wye & Associates friendly technical sales team, we are only too pleased to advise on materials we supply.

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