Product Information Sheet

EcoRight Hydraulic Lime Mortars - Benefits

Lime

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	COMPRESSIVE STRENGTH BANDS (MPa)@28-91 days	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 flaunching's

NHL's can be used when speed is essential as it sets much quicker than a Lime Putty based mortar (slow setting). For historic buildings with soft stone/brickwork then a Lime Putty Mortar is better or a weak mix of NHL.

Hydraulic Lime Mortar

- Sets under water
- Enables building components to be reclaimed and reused as they are softer than cement
- Excellent workability and good water retention which improves bonds
- Improved plasticity, high cohesion and low shrinkage
- Resistant to sulfates and freeze thaw actions
- Suitable for use in conservation, renovation, restoration projects and new build

It therefore means that these limes can be used in harsher conditions e.g. they are ideal for use in foundations, limecrete floors, sea-defence walls, chimneys, parapets, copings and paving.

Movement Joints

Typically, joint spacing can be increased up to 2.5 times that for cement mortar, around 30m for brickwork and 15m for concrete blockwork. However, reduced spacing is required near corners, in areas where there are openings and in exposed areas such as parapets. The aspect ratio of the masonry walls is also important, with panels with high length to height ratios needing closer spacing of joints. All joint spacing and positions should be determined on a project by project basis. More information on the movement of masonry (see Appendix A)

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Construction

Rate of Laying

The rate of laying masonry is related to the water absorption of the unit. For natural hydraulic lime mortars in units with water absorption of around 15%, the maximum height of wall that should normally be built in a day is 1.5m. For engineering bricks with a water absorption of 2-5% the maximum height can be laid in a day can be as low as 23 courses for a half brick thick wall or 56 courses for a one brick thick wall. It is however recommended that consideration be given is design to the temporary (construction) loading condition particularly where significant point loads are applied. Where it cannot be demonstrated that the flexural strength develops at the required rate (comparable to cement based mortars) then a build rate of less than 1.5m per day may be required

Lime mortar properties

Workability

Lime is well known for its ability to improve the plasticity and workability of mortar. While providing a high degree of cohesiveness it spreads easily under the trowel. Cohesiveness reduces the wastage produced by material sliding off the trowel. The improved setting properties of mortar containing lime allow adequate time for tooling up the joints as work proceeds.

Water retentivity

This characteristic becomes important where mortar is to be used with bricks, or masonry units that have a moderate or high suction rate. The inclusion of lime in mortar generally leads to improved water retentivity. This provides an improved bond, as there is more intimate contact between the unit and the mortar. The retention of water in the mortar results in the best conditions for the early hydration of the mortar, thus reducing cracking and water penetration into the hardened mortar joints.

Air content

Entrained air provides improved workability of fresh mortar and improved freeze thaw resistance of hardened mortar. The inclusion of lime into mortar can assist in stabilising the entrained air content.

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Mortar strength

It has long been recognised that excessively strong mortars can lead to reduced bond and cracking, which may result in cracking being induced in the bricks and blocks instead of the mortar joints. The use of lime in cement based mortar however, tends to reduce the compressive and flexural strength of the hardened mortar. In a situation where structural movement takes place, lime mortars can better accommodate this movement, whereas excessively strong mortars will tend to resist movement perhaps until some cracking occurs. For example, lime-based mortars have always been used for tall factory chimneys as they can accommodate a considerable movement in high winds.

Autogenous healing

When lime-based mortars crack they tend to do so in the form of a much-reduced number of micro cracks. Subsequent movement of rainwater through the surface of the mortar joints dissolves the free lime, which is deposited in the micro cracks as the water evaporates. The lime subsequently reacts with the carbon dioxide in the air and is converted to calcium carbonate, a carbonation reaction. In a short period of time the cracks are healed, a process known as autogenous healing.

Weather tightness

The inclusion of lime in a mortar promotes more intimate contact between the mortar and the masonry units. For example, the increase in plasticity and cohesion results in a more effective filling of the vertical joints and results in a bond which subsequently resists penetration by wind driven rain better than some non-lime mortars. Furthermore, reduced moisture contents in walls resulting from their greater impermeability increases the thermal insulation of the structure as well as reducing internal damp penetration problems.

Durability

The reduced water penetration achieved with lime-based mortars can minimise the risk of freeze thaw damage. The inclusion of lime will also help to resist some forms of sulfate attack. Together, combined sulfate/freeze thaw attack can be very damaging to masonry structures.

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Efflorescence

Some building materials contain soluble salts, which can be transported to the external surface by the migration of water through the structure. Once these salts are deposited on the surface, the water evaporates leaving unsightly staining. Lime based mortars minimise this effect by reducing the amounts of water that can penetrate the masonry units. Furthermore, they can also precipitate the soluble salts in the insoluble calcium form before they reach the surface.

Site practices

Lime has a higher sand carrying capacity than any other bonding agents. The excellent working properties of the mortars produced from it lead to higher productivity from the bricklayers and the quality of the finished work is better than with other materials.
Due to the weather tightness and durability of the finished work subsequent maintenance is low.

APPENDIX A - Movement in Masonry

Bricks undergo irreversible expansion following firing. This process can take many years to complete although the rate of expansion reduces with time.

Concrete blocks and other cement-based masonry units such as reconstituted stone undergo shrinkage as they dry our following laying. Again, this movement will gradually reduce with time but can continue over many years.

Natural Stone generally undergoes very little drying movement following laying.

All masonry materials expand and shrink due to changes in moisture content and temperature. These movements are reversible and will continue throughout the life of the building. The amount of movement varies between materials.

Movement joints therefore need to be provided in masonry walls to accommodate this movement. Superseded BS 5628 -3 and its re- placement BS EN 1996-2 gives recommendations on the spacing of movement joints. For cement-based mortars these are typically 12m for brickwork and 6m for concrete blockwork, with reduced spacing near corners, in areas where there are openings and in exposed areas such as parapets. The aspect ratio of the masonry walls is also important, with panels with high length to height ratios needing closer spacing of joints.

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