Pointing with St Astier Natural Hydraulic Lime (NHL)

Re-Pointing Masonry Walls: Brick, Blocks and Natural Stone with Pure Natural Lime

Understanding mortars

Before deciding to re-point a basic understanding of the function of mortars is required. Mortar is used for jointing individual units in a mass of masonry. The final structure must have certain characteristics to function satisfactorily. It must carry the load for which it was designed, it must be durable and it must give protection against wind, rain and frost. See "Protecting Lime Mortar".

Mortar should develop sufficient strength and at such a rate as to be capable of withstanding the stresses to which it will be subjected during the construction of the building and subsequently when the structure is fully loaded. It should not however set and harden so quickly that it becomes inflexible at any stage and cannot accommodate slight movement. There is normally no requirement for significant structural strength in the mortar of traditional masonry buildings, particularly in re-pointing work.

Mortar should be permeable in itself, both so that the quantity of free water on the face of the building is reduced, thus reducing the possibility of wind-driven water penetration and so that moisture evaporation is not concentrated in the masonry, which may then be vulnerable to accelerated breakdown in the vicinity of the joints. Mortar should bond firmly to the units so that a tight joint is obtained through which rain will find it difficult to penetrate.

Mortar should be workable, so that the material may be applied easily and to ensure that the vertical as well as the horizontal joints can be adequately filled. Masonry buildings rely on their mass and the interlocking of individual units for their stability and the mortar in a masonry building serves in the main to provide a bedding medium for often very irregular components, filling the voids and maintaining the wind and watertight integrity of the building.

Choosing an appropriate re-pointing mortar.

Analysis of original bedding material is usually a good first step in determining the correct materials to use in the repair of historic masonry. Mortar can and does change with time, it is better that the analysis is carried out by a suitably experienced person or laboratory.

It will not always be the case that simple matching will be sufficient. The exposure and condition of the building today may well be different from its original construction. Ruins and monuments in severe disrepair (i.e: lack of roofs, copings to wall heads etc...) might well require a repair mortar different from the original as the new mortar will have to cope with weather and exposure conditions for which the original mortar was not designed.

Most important of all: the new mortar should be compatible with the old. Do not introduce mortars containing potentially damaging elements or that can constitute an impermeable barrier obstructing vapour exchange and retaining moisture. The consequences in a relatively short time could be disastrous and, in most cases, irreversible.

Resistance to salts

Soluble salts (sulphates, nitrates, chlorides) can be present in walls, they can be in the original mortar, in bricks and stones (often as a result of previous repair work), in ground water or from air bourn pollutants. All St Astier NHL limes are resistant to salts. They do not contain the reactive components such as high levels of aluminium, potassium and sodium oxides and gypsum. Existing salts will therefore be allowed to migrate out of the structure without affecting the soundness of the mortar and, in time, be washed off.

Protection and good working practice. See "Protecting Lime Mortar"

Current codes of practice for working with cement-gauged mortars are also relevant when working with lime mortars and cover most of the basic requirements for good working practice although these practices are seldom if ever carried out correctly. For all mortar work, best practice requires proper curing and aftercare against the effects of drying winds, strong sunlight, rain and frost. Lime mortar may require slightly longer curing times but the methods and principles are the same.
Where scaffolding is in place, fine mesh debris netting securely fixed to the outside of the scaffold gives basic protection to the working area slowing down strong wind whilst allowing good natural light for the works. Securely fixed haps or polythene placed over plywood sheeting on to the top of the scaffold from the wall heads or just below the gutters will ensure that rain does not wash down the face of the walls. Scaffolding should always be erected in such a manner as to allow the highest point of the building to be protected. In an ideal world, a temporary roof would be desirable, however the costs may be prohibitive. As regards external protection the work should be covered with hessian sheets, polythene or both. Polythene should never come in contact with the work. Accurate records of the minimum and maximum temperatures below the covers should be taken daily, with provision to record these over weekends and holiday breaks. To avoid rapid drying and consequent high shrinkage, especially in hot or windy weather conditions keep all work damp by repeatedly applying a fine mist of clean potable water, if necessary several times a day, until the mortar has hardened.

Re-pointing.

Before any re-pointing work is undertaken a survey of the building should be carried out by the supervising officer and the contractor to determine the precise areas to be re-pointed.
Often much of the old lime mortar raked out is sound and could, with advantage, have been left in place. Todays builder expects mortar to be strong, hard, dense and cement rich. Strength is perceived to be a prerequisite and soft lime mortars are often removed in the belief that the softness is a sign of failure. In other instances, entire elevations are re-pointed to provide a uniform colour, rather than re-pointing defective joints with a suitable and compatible mortar.
It is essential that all pointing is carried out to match previously approved samples. This will remove any tendency for artistic licence on the part of the builder. The finish achieved on mortar joints can have a dramatic effect on the performance and visual appearance of the completed work, although this is often not immediately realised, sometimes only being condemned after the scaffold has been taken down and the full visual impact becomes apparent.

Preparation

Joints should be thoroughly cleaned from top to bottom after pre-wetting the wall. Use brushes, low pressure compressed air or wash out the joints with a hose. Remove all loose materials and dust. This is important as dust that is left in the joints will deplete the bond.

Application

Mortar should be plastic and workable but as stiff as possible. It should be pushed into the back of the joints in layers, avoiding large volumes of deep filling at all times. On rubble elevations, pinning stones should be used to fill wide and deep joints in the same style as the original build. This will reduce the volume of mortar required and will assist the process of setting and final full carbonation. A good yardstick is to keep the joint thickness to no more than a "finger" thick, if the joints are wider than this they should be pinned with compatible matching masonry.
A "well filled" joint is close to flush with the surrounding masonry or to the weathered edge. Recessed joints define the masonry components and detract from the appearance of the wall, becoming a feature in themselves. Historically the common practice was to fully flush point and line out rubblework.

Finishing

To ensure good compaction and adhesion within the joint, the mortar can be tamped firmly back with a stiff bristle brush as it starts to firm up. The timing of this is critical. If it is carried out too soon after placing, fines in the mix will be drawn to the surface and will form a dense skin, inhibiting the proper curing of the mortar. Once the surface of the mortar is firm (usually the next day) lightly scraping the surface to expose the aggregate can improve the appearance of the mortar and make the joints less visible. This process should not be undertaken before the surface has stiffened or mortar will be smeared onto the face of the stone. Brickwork has a number of specific joint finishes too numerous to go into in this general guide, but the principles of timing the finishing of the joint still apply.
The fines in the mix will determine the finished colour, therefore a wide range of natural colours is

achievable without pigmentation. The whiteness of St Astier limes ensures the best colour reproduction of the chosen aggregate.

Re-pointing dense impervious masonry.

Some masonries, such as granite, basalt etc. and dense impervious bricks require special consideration. Due to their very nature these materials have little, if any, moisture absorption and therefore moisture is transferred to the joints.

In these circumstances the choice of mortar and method of application and finishing is very important.

The joints are more vulnerable to the effects of wetting during placing and immediately afterwards until a full set and carbonation has taken place. Using St. Astier NHL mortars will ensure setting without having to rely completely on carbonation. Dryer mixes will be possible, avoiding free water in the joint cavity and consequent de-bonding effect. The vapour permeability of NHL mortars will ensure moisture evaporation.

Joints should be filled to flush, never recessed. Recessed joints will leave ledges for the accumulation of water that will keep the mortar joint wet for longer periods and accelerate the decay process.

Whilst feebly hydraulic limes were often used for the building of walls with impervious masonry the construction period usually left sufficient time for the joints to set up and cure before exposure to rain. Re-pointing is a much quicker process and more hydraulic materials are almost always a better option.

Joints should be raked back to approximately 25mm, thoroughly cleaned, including the top and bottom faces of the beds, ready for the new mortar. Pinning stones should not be removed, but if they are loose, they should be removed and put back during the re-pointing. Where a wall has previously been re-pointed and the pinning stones have been lost, suitable replacements should be used. The walls should be well washed to remove any dust and loose friable material making sure that the entire elevation is cleaned down to prevent staining on the walls. Impervious masonry should be dry when the work commences, however the original backing mortar should be kept damp.

Re-pointing ashlar masonry.

Ashlar masonry should not be re-pointed unless there is evidence of open joints. It is very difficult to re-point ashlar masonry without causing unsightly damage.

Protective tape should be applied to the joints of fine ashlar work before mortar is pushed into place. The vertical joints almost always require greater amounts of filling than the bed joints, due to the lack of compaction and filling when building. Loose mortar should be carefully raked out of fine joints using a tool such as a hand-held hacksaw blade.

Mechanical removal of defective mortar can be particularly damaging and is too risky to be used in most situations. Mechanical tools should not be used on historic masonry except in very experienced hands and the use of bolsters or quirks for cutting out mortar joints should be avoided. Fine carving chisels or specially made tools should be used to remove hard dense over pointing.

Ashlar joints are usually no more than 1-3mm wide. It has become common practice to "pare point" or "ribbon point" these joints because they are so difficult to fill. Should re-pointing be necessary, joints should be carefully removed to a depth of 10-20mm and re-pointed using a feebly or moderately hydraulic ashlar pointing mix available form St Astier distributors (see Ashlar Joints). Where the arises of the stone have become rounded or damaged from previous repairs the weathered edge or a very slightly recessed joint produces a visually more acceptable finish.

When re-pointing ashlar masonry the mortar should be brought out to the edge of the masonry, taking care not to smear the face. Mortar is normally inserted into fine joints by pressing it into place with a flexible blade or spatula. The mortar needs to be inserted to an adequate depth and it will be necessary to push it back into place with the thin edge of a blade when working on very fine joints. Where possible the full depth of the joint should be filled with mortar, however in some situations, where the joint gets wider away from the face, it may be necessary to grout very deep joints (see Grouting).

Pointing deep joints should be done in layers of 20 - 25mm at a time, allowing the preceding layer to take up before applying the next. Very badly worn or damaged edges may require surface repair (see Lithomex) in a compatible mortar to reduce the visual impact of the traditionally very white ashlar mortars, and new joint lines struck and pointed.

Some re-pointing NHL mortar mixes

Joint type	Joint size	Pre-mixed mortar	Lime	Sand	Ratio Lime : Sand
Ashlar / Tuck joint	1-5mm	Ashlar / Tuck pointing mix or EcoMortar type F NHL2 EF or EcoMortar F NHL 3.5 EF in exposed areas	NHL 2 NHL 3.5	0.8mm to 0.075mm	2 : 1 1 : 1
High porosity masonry	5-10mm	EcoMortar type C NHL 2 TF or EcoMortar NHL 3.5 TF in exposed areas	NHL 2 NHL 3.5	1-2mm to 0.075mm	1 : 2 1 : 2.5
	10-20mm	EcoMortar type C NHL 3.5 M	NHL 2 NHL 3.5	3-5mm to 0.075mm	1 : 2 1 : 2.5
Medium porosity masonry	5-10mm	EcoMortar type C NHL 2 TF or EcoMortar NHL 3.5 TF in exposed areas	NHL 2 NHL 3.5 NHL 5	1-2mm to 0.075mm	1 : 2 1 : 2.5 1 : 2.5 or 3
	10-20mm	EcoMortar type C NHL 3.5 M	NHL 2 NHL 3.5 NHL 5	3-5mm to 0.075mm	1 : 2 1 : 2.5 1 : 2.5 or 3
Low porosity masonry	5-10mm	EcoMortar type C NHL 2 TF or EcoMortar NHL 3.5 TF in exposed areas	NHL 3.5 NHL 5	1-2mm to 0.075mm	1 : 2.5 1 : 2.5 or 3
	10-20mm	EcoMortar type C NHL 3.5 M	NHL 3.5 NHL 5	3-5mm to 0.075mm	1 : 2 1 : 2.5or 3
Floor tiles or stone slabs	1-5mm	EcoMortar Type C NHL 3.5 EF	NHL 3.5 NHL 5	1-2mm to 0.075mm	1 : 2 1 : 2 or 2.5
	5-10mm	EcoMortar Type C NHL 3.5 F	NHL 5	3-5mm to 0.075mm	1 : 2

For further Guidance, contact your St Astier Distributor.