



Nottinghamshire
County Council

A Guide to Repointing Stone and Brickwork

Conservation of Buildings

Repointing is the process of taking out and replacing the mortar ('pointing') from the face of a masonry joint. Done properly, this helps exclude the weather and slow the deterioration of the wall. Regrettably, repointing is often undertaken unnecessarily or unsatisfactorily. Unnecessary repointing, however carefully done, risks damage to the edges of bricks or stones, as well as the loss of valuable clues to a building's construction and history.

Seriously decayed pointing will let moisture into the wall. Saturated masonry will deteriorate more rapidly and is likely to cause damage to interior plaster and woodwork.

The wrong type of repointing will also have serious consequences, causing further damage to stone and brickwork, trapping excess moisture and increasing the rate of decay. Cement based mortar should never be used to repoint historic walls, it is too strong, inflexible and impermeable.

Historic buildings were built in lime mortar which is flexible and permeable, and allows the building to 'breathe'. Lime mortar must always be used and repointing carried out carefully.

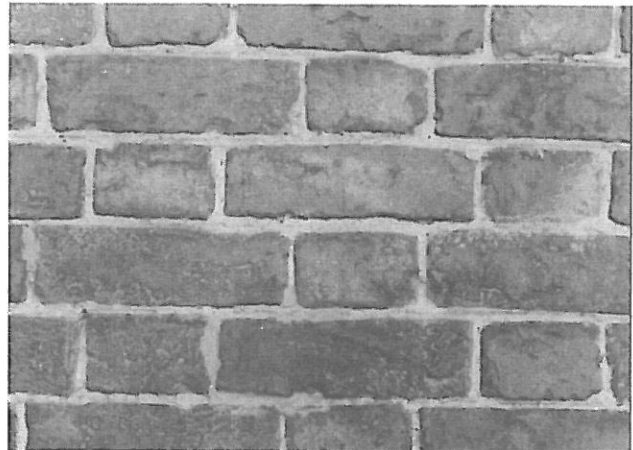


Old pointing which is sound and doesn't need repointing.

Is Repointing necessary?

This needs to be carefully assessed before starting. Generally speaking, if the mortar joint has weathered back to at least the equivalent of its width or is soft and crumbling, then repointing in those areas is advisable. Areas which are firm, and any that would need strong chiselling to take out the mortar, should generally be left. Complete repointing of an elevation is rarely needed or advisable.

Repointing Good Practice



Good repointing of brickwork.

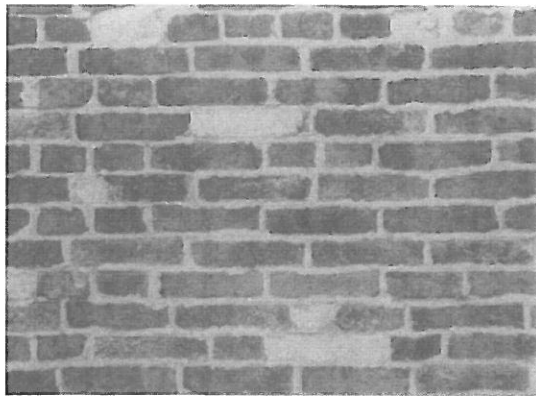
1. Joints should be carefully raked out to a depth at least equal to the width of the joint and, generally to a depth of not less than 40mm (just under 2 inches) in rubble stonework & 20mm (just under 1 inch) in brickwork (and fine ashlar stonework).

The repointing of very fine ashlar joints is generally not desirable due to the risks of disfiguring the appearance of the stonework. Where joints are wider in general ashlar work, finely crushed stone is often preferable to coarse sand as an aggregate. (Ashlar is stones cut to even faces and square edges laid in regular courses).

2. Rake out with a bent screwdriver or spike shaped tool, leaving the back of the joint square. Where hard patches of old mortar

are found then cutting out can be achieved using a plugging chisel and a 2½lb club hammer.

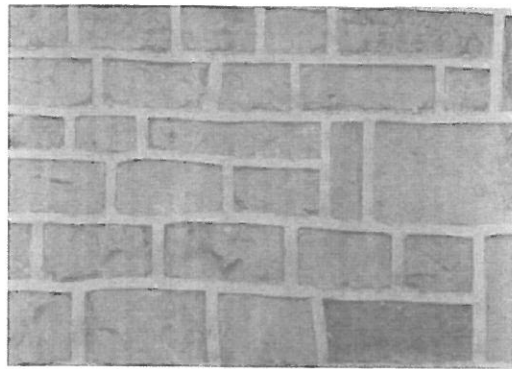
3. Mechanical cutting out with discs is not a desirable method due to the risk of damage to the edges of stones and bricks. They must not be used on listed buildings.
4. Thoroughly wet with a brush or spray the cleaned joints and the face areas around the joints.
5. Push in the new mortar from a board or 'hawk' and press it well into the joint with a 'pointing iron' to ensure it is filled. Work towards existing mortar.
6. Fill the joints with mortar until it is flush with the face of the stones or bricks. Do not cover the edges of the stones or bricks no matter how uneven they are.



Never patch bricks with cement mortar – always cut out and renew damaged bricks.

7. Do not over work the mortar while it is wet this will only encourage it to spread on to the surface of the stone or brick. Mortar 'feathers' that have spread onto the surfaces adjacent to the joint will dry out rapidly and can be brushed off later, leaving virtually no mortar-staining.
8. When the mortar is setting, but before it is too hard, stipple the surface with a stiff bristle brush (tapping is preferable to dragging). This will achieve a roughened texture for appearance and better weathering.
9. **No pointing should be done either in frost or when frost is likely to occur.**
10. Pointing should be protected against

drying out completely for 7 days by covering, and occasional gentle wetting if necessary (wetted hessian is a good method).



Very bad raised ribbon pointing.



Good repointing of stonework.

Mortar Materials

Always avoid a cement/sand only mix for old buildings. The mix should always be lime based.

Sand

Modern cement mortar is mixed using only fine-grained sand (usually sold as 'soft' or 'builders' sand). **This is not appropriate for lime mortar.**

Coarse sands, such as those sold as 'sharp' or 'washed', should be used for all but the finest jointed brickwork and stonework. They should be mixed with the finer 'soft' or 'builders' sand in proportion of at least 1 coarse to 3 soft.

The largest sand grains should be no coarser than 4mm. Coarse sands must be washed and evenly graded. The colour of the sand will affect the mortar and should be appropriate to the work. Coarse sand is usually mid-dark brown but soft sand is often available as either red or yellow.

Lime

This is available in 3 main types:

1. Matured Lime Putty

Putty is sold wet and in tubs, it is generally a high quality product, but expensive. It is usually sold 'matured' referring to the length of time it has been since it was 'slaked'. The longer matured the better, 6 months is the usual standard for a good quality lime. Lime putty should always be used for internal plasterwork and can be used for exterior mortars and renders. If used in a mortar it is advisable to use a 'pozzolan' additive which acts as a catalyst to help the mortar set and improve its durability. Pozzolans include materials like Pulverised Fuel Ash (PFA), metakaolin Metastar 501, Trass from Germany, and HTI (ceramic 'high temperature insulation'). They should be added at a ratio of 10% to the mortar just before use, as it will immediately start off the setting process.

2. Hydrated lime

This is the dry powder you are likely to be sold at the DIY store or local builder's merchant. It is commonly used in cement mortars as a 'plasticiser' (WARNING: this does not constitute a 'lime mortar'). Hydrated lime can be used for proper lime mortars (without cement) but we recommend that lime putty is used instead (see below). If Hydrated lime is chosen then for the best result the lime should be converted to lime putty by the addition of water. Add the lime powder to water in a suitable clean bin and mix to achieve a thick cream. Keep for at least 24 hours before use as a putty – the longer it is left to 'mature' the better the lime will become (ensure the lime is completely covered by c.2cm of water). Use of a pozzolan as indicated above is recommended.

Good Practice for mixing lime putty

For best and consistent results with either the Lime putty (1) or Hydrated Lime (2) the sand and lime putty should be thoroughly and evenly mixed beforehand with just sufficient water to achieve a plastic fatty consistency. Putty is best mixed in a paddle mixer, by hand on a board or in a bucket, but **not a standard cement mixer**. The mixture is called 'coarse stuff' and should be stored in bins with airtight lids, or wet sacking cover, for a week before use. It can be "knocked up" and gauged with the pozzolan when required for the work.

3. Naturally Hydraulic lime (NHL)

Sometimes this is sold simply as 'Hydraulic lime' which makes it easily confused with 'Hydrated lime' (see above). Hydraulic lime will always display NHL and a number on the bag. This refers to the clay content of the lime and is an indicator of the level of chemical set. The chemical set is similar to the setting characteristics of cement but not as rapid. It can be used as a substitute for cement (bearing in mind the use of coarse sand referred to above), but it requires greater aftercare and attention to ensure it does not dry out before it has fully set (see point 10 under 'Good Practice' above). NHL 3.5 is a 'moderately' hydraulic lime appropriate for very exposed positions, for most re-pointing nothing stronger than a 'feebly' hydraulic should be used (NHL1).

Good practice for mixing Hydraulic lime mortar

Hydraulic lime of NHL 3.5 or less can be mixed and stored for a short period before use. The lower hydraulic limes (NHL 1-2) can be left for up to 4 hours and 'knocked-up' prior to use. This will aid the setting process. Moderately hydraulic mortars (NHL 3.5) should not be left more than an hour or two before use.

Table highlighting the main points with respect to each type of lime.

	Lime Putty	Hydrated Lime	Hydraulic lime (NHL)
Pros	<ul style="list-style-type: none"> • Good quality • Highly 'breathable' • Flexible • Sacrificial • Historically authentic 	<ul style="list-style-type: none"> • Cheap • Widely available • Can be turned into putty 	<ul style="list-style-type: none"> • Quality acceptable • Easy to mix • Cheaper than putty
Cons	<ul style="list-style-type: none"> • Expensive • Better mixed by hand or paddle mixer 	<ul style="list-style-type: none"> • Poor quality • Should be converted to putty • Better mixed by hand or paddle mixer 	<ul style="list-style-type: none"> • Inflexible • Less breathable • Less authentic

Mortar Mixes

Appropriate mixes will depend very much on the type of stone or brick to be repointed. Suitable general guide mix is:

1 : 3 lime to sand

Water : must be clean.

Gauging : measuring proportions of the materials should be done accurately. Separate measuring containers should be used for lime putty and the sand.

Mixing

Lime putty: This is best mixed in a paddle mixer, by hand on a board or in a bucket, but not a standard cement mixer.

Hydraulic lime: can be mixed in a cement mixer.

Water: the mix should not be made too wet, enough water should be added to allow the mortar to stick to an upturned wooden hawk. It should not be sloppy.

Problems & remedies

Problem	Cause	How to avoid
Mortar cracks	Mortar too wet	Less water in mix
	Mortar was not compressed sufficiently	Press mortar tightly into joints
	Mortar dried out too quickly	Pre-wet joints & protect afterwards
Mortar dried but not hardened/set	Insufficient pre-wetting of masonry	Spray joints thoroughly with water one hour before, and 10 minutes before pointing
	Wall not protected from wind and/or sun	Always cover with Hessian and dampen if hot/windy
	Mortar damaged by frost before setting	Never point when frost is likely

Tools for the job



Brick Pointers (left) or 'pointing irons' are not widely available at DIY stores but some builder's merchants and a number of on-line sites sell them. They come in a variety of widths from 3/8 inch; 1/2 inch; 5/8 inch.



Wooden **hawks** are useful but not easily found, they can be made by attaching a short piece of broom handle to a 6 inch square board. Alternatives include a plastic plaster's trowel or just a piece of wood.



Churn brushes get their name from their use for cleaning out milk churns. They are just right for 'stippling' the mortar joints but are not widely available on the high street. A stiff bristled dust pan or scrubbing brush will suffice if the bristles are hard enough.

long handle churn brush



More detailed information on repointing can be obtained from:

The Society for the Protection of the Ancient Buildings, 37 Spital Square, London E1 6DY. Ask for: *SPAB Technical Leaflet No. 5* or the following by John Ashurst: '*Pointing Stone and Brick Walling*' and '*Mortars Plasters and Renders in Conservation*'

There are also a number of web sites with repointing advice:

www.periodpropertyshop.co.uk/acatalog/Repointing.html
www.mikewye.co.uk/mikepointng.htm
www.womersleys.co.uk/pdfs/pointingwithfatlime.pdf