


A TECHNICAL ADVICE LEAFLET ON THE

Pointing

 of historic buildings
in South Gloucestershire

This leaflet is one of a series of non-statutory guidance notes produced by South Gloucestershire Council in support of its Local Plan policies relating to historic buildings.

Contents

page

| | |
|----------|---|
| 2 | Introduction |
| 2 | Mortars for historic buildings |
| 3 | When to re-point |
| 3 | What goes into a lime mortar |
| | - Lime |
| | 1. Non-hydraulic lime |
| | 2. Hydraulic lime |
| | - Aggregate |
| | - Other traditional additives |
| 5 | What should NOT be included in a lime mortar |
| 5 | Rake out the joints |
| 5 | Remove plant growth |
| 6 | Select a mix |
| 6 | Prepare the mix |
| 6 | Preparation of the joints |
| 6 | Application |
| 7 | Finishing |
| 7 | Climate |
| 8 | Matching in |
| 8 | Permissions required |
| 8 | Useful contacts |

This leaflet gives general advice on the pointing of historic buildings. It is not intended as a comprehensive guide or specification. Each property requires individual consideration. Prior to carrying out pointing of an historic building contact South Gloucestershire Council's Conservation department and seek independent professional advice.

Introduction

Pointing finishes the wall surface and closes the gaps between stone or brick on external walls to keep the surface weathertight. Once finished, the pointing acts sacrificially, encouraging the transfer of moisture and salts away from the principal stone and brick construction. Pointing is also important to how a building looks, and poor repointing of walls can have a serious and harmful effect on a building's appearance. Historic buildings do not have a 'shelf life'. If there are no inherent faults and they are regularly maintained and repaired using appropriate materials, they can be preserved indefinitely. The appropriate use of traditional lime renders and mortars on historic buildings contributes to their preservation, and helps to maintain the historic character and local distinctiveness of an area.



Mortars for historic buildings

Traditional mortars were made from lime and sand and/or other coarse aggregates, sometimes with additives such as brick or coal dust. The pointing acted as a 'sacrificial material' so that moisture within the wall would be drawn through the joint and evaporate, instead of through the brick or stone. The use of lime - a porous material - allowed the building to 'breathe'.

Modern mortars tend to be cement-based, and are usually harder than the surrounding brick and stone, and are impervious unlike lime mortars. This means that moisture is not transferred through the pointing, but through the brick and stone. When this freezes, the brick and stone decays instead of the pointing, leading to difficult and costly repairs, not to mention damaging the appearance of the building.

Another common problem is that water can freeze behind cement pointing and force it out. When this happens, the arrisses (edges) of the stone or brick are likely to break away, leaving joints exposed and spoiling the appearance of the wall.

Pointing for traditional buildings should always be lime-based, mixed to match the original mortar as closely as possible in colour and texture.

When to repoint

Pointing is often best done as localized repairs and not as a comprehensive job and failing pointing should be removed with hand tools. If pointing is forced out of joints by a chisel or angle-grinder the arrisses (corners) of the stone or brick can easily be broken. These softer broken edges are more susceptible to rain or frost damage, leaving the joints looking excessively wide. Where cement mortars are very hard, it may be more advisable to leave the pointing to fail naturally from frost action rather than force it out, because greater damage can be caused by trying to remove particularly hard mortar.

It is also important to recognise that a soft or weathered mortar may be doing a perfectly good job, and should not be removed just because it is soft.

Only re-point where it is really necessary. This may mean just pointing parts of a wall, but it is better to do this than risk long-term damage through forcing sound pointing off.

Avoid repointing unless the mortar in the joint has decayed to at least the depth of the original joint width

What goes into a mortar

Lime

Lime is the binding agent for the mortar and is used instead of cement. Lime is a staple of historic building construction and is used in renders, mortars and internal plasterwork. Due to its caustic properties, it requires careful handling, but once a lime render has set it is very durable. The benefit of using lime is that it allows for moisture to evaporate, and can accommodate limited movement without cracking. Lime render allows the building to 'breathe'.

Lime render allows a traditional building to 'breathe' in the way that it was designed

Building lime is traditionally made by burning chalk or limestone in a kiln, to produce quicklime. Water is then added to the quicklime and once enough water has been added a lime putty will be formed. The process of adding water to quicklime to produce lime putty is known as slaking. Slaking is a dangerous process but fortunately lime is now available in a prepared form and no longer has to be slaked on site.

There are two types of lime available:

1. **Non-hydraulic or fat lime.** This is the most widespread form of lime used, particularly for pointing and internal plasterwork. Non-hydraulic lime stiffens and eventually hardens by reacting with carbon dioxide; a process known as carbonation. Non-hydraulic lime is most commonly available as lime putty, which is supplied to site covered by a thin film of water in air tight tubs, to minimize the risk of carbonation. It will not set under water.

Most builders merchants supply a dry form of non-hydraulic lime which can be used like lime putty if allowed to soak in water for a while. Known as 'dry-hydrated' lime or 'bag lime', it is generally considered to be inferior to



Wall pointed with lime mortar. The mortar is old but not failing and does not need to be replaced.

Lime mortar



lime putty, as it can have been stored for a very long period of time, and an unknown proportion will have reacted with carbon dioxide by the time it reaches the site.

Lime putty should be at least three months old before use, and continues to improve with age (if stored correctly). Hydrated lime on the other hand starts to deteriorate from the moment it is made. It is important to ensure that if using bagged hydrated lime, that this is not too old. Invariably, the lime sold at builders' merchants will be bagged dry lime, and could be many months, if not years old, and the quality may be poor. Good quality, non-hydraulic lime putty is superior and should be used wherever possible. There are an increasing number of specialist lime suppliers.

2. **Hydraulic lime.** This will set under water owing to a clay or silica found with the lime. It is harder than non-hydraulic lime, and can be as hard as cement. The strength should be checked before use. Hydraulic lime is usually supplied as bagged (dry/hydrated) lime.

Modern hydrated/bagged hydraulic limes, marketed as 'natural hydraulic limes' (NHL), are classified in three ascending numerical grades of compressive strength at 28 days, expressed in Newtons per millimetre squared, as NHL 2, NHL 3.5 and NHL 5. These grades are broadly equivalent to the old classifications of 'feebly', 'moderately' and 'eminently' hydraulic limes respectively. 'Feebly' hydraulic lime has properties close to non-hydraulic lime, whereas 'eminently' hydraulic lime can be as hard as modern cement (although, unlike cement, they maintain good water vapour permeability and the ability to accommodate movement).



Aggregate

Sand can be as important to a successful mortar mix as lime. Many of the original sources of sand for the South Gloucestershire area are no longer available, so finding a reasonable colour/texture match is important. Normally a well-graded, sharp sand is used.

It is important that all sand is well washed, and kept clean whilst on site. Marine sand and dredged sand will always need washing before use. Stone dust is sometimes used to match historic mortars.

Some specialist companies can analyse existing mortars so that a close match can be achieved when repointing. The Council's conservation officers should be able to advise on how to contact them.



Other traditional additives

Traditional additives to assist setting included brick dust and china clay and are known as pozzolans. Their performance can be unpredictable and may cause a render to fail by precipitating too fast a set.

A number of specialists can now provide ready mixed lime mortars. These are usually supplied in tubs or plastic sacks and can be stored indefinitely if protected from the frosts. Special mixes incorporating particular sands or hair can be made on request.

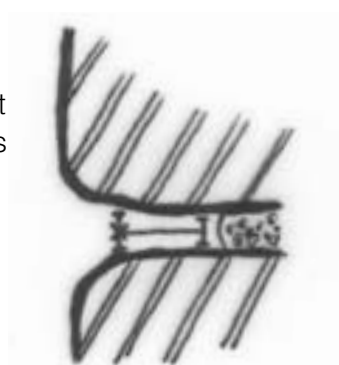
What should NOT be included in a lime mortar

When re-pointing traditional buildings small quantities of cement should never be added to lime mortar mixes to help it set. Cement will restrict the movement of moisture from the building and not allow it to 'breathe'. This can lead to the stone or brick becoming saturated with water and decaying. Most of the stone used in the South Gloucestershire area is soft, and even a weak cement mix will be too hard for most. If a quick set is required, it will almost always be better to use a weak hydraulic lime.

Rake out the joints

Joints should be cleaned out before repointing, to a depth at least one-and-a-half times the width of the joint. If the joint is not raked out enough the mortar will fall out. Joints should be raked out using hand tools. If this proves really difficult, it is likely that the existing mortar is sound, and there is no need to repoint.

Never use angle grinders to clear out joints as they often damage arrisses of the stone or brick.




Rake out the joint to a good depth


Remove plant growth

Ensure that all plant growth is removed, but avoid using liquid weed killers as they can cause problems with the stone or brick. The full extent of plant growth can be seen if the plants are cut back well before removal, and the roots allowed to dry out.

You need to treat fibrous or small roots – which are to remain within walls to prevent regrowth. Weed killers should be checked with tree Officers for approved poisons for tree stumps. Remember, however, that the felling or lopping of trees may need separate consent.



The harmful effects of cement on a stone wall. The cement is harder than the stone, causing the stone to weather away and leaving the pointing standing proud of the stones.



Plants are easier to remove if cut back first

Select a mix

The rule is to ensure that the mortar is not too strong for the stone or brick surface that is to be pointed. Most historic buildings in South Gloucestershire are made of relatively soft stone, and usually a non-hydraulic lime putty will be appropriate.



Mixes for lime mortar are usually 1:2.5 - 3.5 lime:sand.

The mix should be chosen taking account of the level of exposure, type of stone or brick, choice of sand and whether any original pointing survives which can be matched. Even if there is already cement pointing on a historic building a lime-based mortar should normally be used for any new pointing, preferably using a non-hydraulic lime putty.

Prepare the mix

Lime mortars can be mixed using a paddle mixer, or by hand. If mixing by hand, make sure that the lime is properly chopped into the sand, with no unmixed lumps of lime left over. Cement-mixers are not ideal for lime mortars as their action tends to leave unmixed lumps of lime which can cause the mortar to fail later.

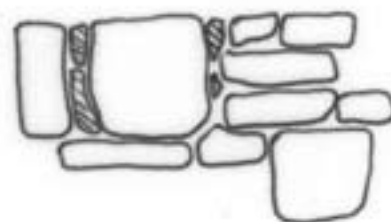
The mixed mortar should have a sticky consistency but not be wet. A useful test of its consistency is to see whether it will stick to the underside of a trowel.

Remember that even in putty or powder form, lime has a caustic action. Avoid all contact with skin or eyes and wear appropriate clothing.

Preparation of the joints

Once the joints are cleaned out to the appropriate depth (see previous page), they should be thoroughly wetted before pointing, to make sure that the stone or brick wall does not draw moisture out of the mortar pointing.

If the joint between the stones is unusually wide it might be helpful to use small filler pieces of stone placed between them.



Filler pieces can help if the joint is too wide

Application

Mortar should be applied to the wetted joint using a suitable pointing iron with a straight, narrow blade, making sure that it is properly compacted. The joint should be filled to run level with the surface of the stone or brick.

Avoid using trowels where the joint is narrow as the blade does not allow the mortar to be pushed far back enough and it may not be properly compacted.

Finishing

The mortar should normally be pushed back very slightly from the face of the stone or brick whilst wet, using the pointing iron or a stiff, dry brush. Tamping back with a brush once the mortar is slightly drier will make sure the mortar is compacted, and create an open texture, with exposed aggregate. The finished joint should show the arrises of the stone or brickwork, but run parallel with the face of the wall. Avoid too much of a recessed joint as this is not a historic detail and also leaves the stone or brick arrises vulnerable to frost damage.



New lime mortar pointing correctly finished. The mortar is slightly recessed from the face of the stone, and brushed and tamped back to create an open texture and expose the aggregate.

The finished pointing should never project in front of the stone or bricks (ribbon pointing), or be double struck (beak jointed). Even single struck pointing is very unusual before the mid C19.

For rough walling the joints can also be 'bagged'. This means that a piece of sacking is dragged along the joint to push the mortar back, and to help compact it, usually done when the mortar is slightly dry.

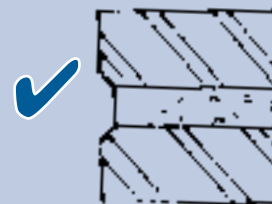


Incorrect ribbon pointing in hard cement. The pointing is finished proud of the stones, creating a harsh and untraditional appearance.

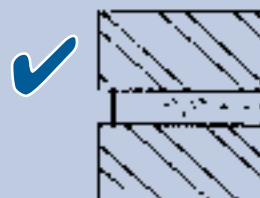
Climate

Weather has a big part to play in successful lime pointing, which should never be attempted in frosts. If the weather is dry or windy or warm, it is usually best to keep spraying the surface of the mortar to avoid a surface-only set. All new lime render or pointing must be allowed to dry out slowly as if it dries out too quickly this can cause failure.

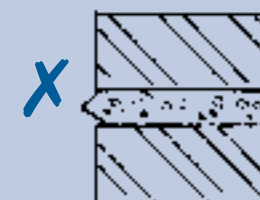
Keep newly-pointed walls covered with damp hessian to allow a proper set



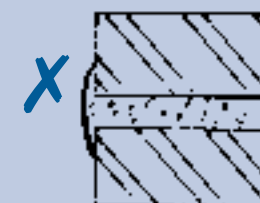
Correct - the pointing is finished just behind the arrises of the stone or brick.



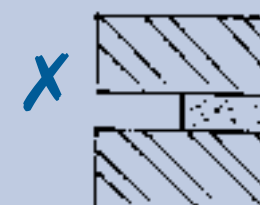
Correct - the pointing is slightly recessed from the face of the stone or brick.



Incorrect - beak pointing.



Incorrect - pointing is too proud and spread over the face of the stone or brick.



Incorrect - pointing is too far recessed within the joint.

Matching in

New areas of pointing can look very obvious on an old wall and there are various techniques to help tone the brightness down. Soot washing is one of the most reliable but needs to be done gradually. Teabags, manure and yoghurt are other popular 'ageing' materials, as they encourage the growth of algae.

Avoid using dyes and pigments in the mortar mix itself, as these can affect the setting of the mortar and over time can discolour to become very obvious.



Manure has been applied to the new lime mortar pointing in order to encourage algae growth which will 'age' the appearance of the new pointing.

Permissions required

Pointing can affect the character and appearance of a building. If your building is listed, you may need to apply for Listed Building Consent to repoint. Contact the Council's Conservation Team for further advice.

A sample panel of pointing may also have been required as a condition of consent. Remember to allow enough time for this to be prepared and inspected before work starts on site.

Useful Contacts

The Council's conservation officers can be contacted on 01454 863464/5. Otherwise useful information is given on the website at www.southglos.gov.uk

A number of companies also run lime training days for professionals, contractors and home owners. The Council's Conservation Officers should be able to advise on local courses.

English Heritage publish specialist technical advisory leaflets which are available free from english-heritage.org.uk.

The Society for the Protection of Ancient Buildings (S.P.A.B.) also have a useful website at www.spab.org.uk and offer technical advice to their members (tel: 0207 377 1644).



This information can be made available in other languages, in large print, Braille or on audio tape.

Please phone 01454 868004 if you need any of these or any other help to access Council services.

For more information about this publication contact 01454 863467

Produced by South Gloucestershire Council
Design+Print Services
ref: 5012/12/09

Printed by South Gloucestershire
printed on recycled paper

75% Post Consumer Waste

Date of Publication December 2009

www.southglos.gov.uk