

Repointing Mortar Joints - Some Important Points

1. Match previous mortars:

- binder - if the original was lime, then use lime;
- sand - seek to match colour, grain size, grain shape and grading;
- match finished appearance of original joint - flush, struck, tuck pointed, etc;
- match mix proportions - traditional mixes were commonly 1:3, lime:sand.
- where the composition of the original mortar is unknown, analysis by a recognised materials testing laboratory can assist in the formulation of the new mortar. Heritage Victoria can provide names of labs experienced in this work.

2. But you may need to modify the mortar mix:

- because of the nature of the limes or sands available; or
- to make it weaker (sacrificial) to control salts; and
- more porous to promote evaporation (breathing); or
- to make it slightly stronger by adding pozzolanic materials.
- sacrificial mortars might be 1:3.5, or 1:4, (lime:sand); or possibly 1:3:16, or 1:3:20 (cement:lime:sand) for more exposed locations;
- adjust mix by adding lime putty (not water) to make sharp sand more workable, or to account for fine grained sands; e.g. 1:3 » 1:2.5 » 1:2 as sands get finer or sharper.

3. Some mortars should not be matched:

- hard cement repointing of original lime mortar may need to be replaced in lime;
- where good breathing is needed, 'mason's putty' (lime, whiting, linseed oil ± fine sand) may be too impermeable.

4. Lime mortars are best made with slaked lime putty:

- slaked lime putty is more workable (buttery or creamy) than dry hydrated lime;
- prolonged maturing of putty before use leads to finer particle size and better working properties, these are even more important for plaster and limewash;
- lime putty mortars are stronger than those made with dry hydrated lime, and more elastic than those made with dry hydrated lime;
- the workability of dry hydrated lime can be improved by running it to a putty in water;
- the longer it can be kept (sealed) before use, the more workable it will become.

5. Sands should be washed clean, be sharp and well graded:

- washed clean to remove all clay and organic material;
- sharp (more angular in shape) to ensure good bond to adjacent masonry;
- well graded so that there is a range of coarse, medium and fine particle sizes;
- sands of a uniform grainsize (whether coarse or fine) lead to higher void ratios and require more lime to fill the voids;
- finer grained sands have greater surface areas requiring proportionally more lime;
- dry sand makes for a better bond between lime putty and sand;
- damp sand may produce too wet a mix for good repointing work.

6. Mixing mortars:

- lime mortars are best made by pounding and chopping the lime putty into the sand with a mason's hoe (larry), or with a roller pan mixer;
- conventional cement mixers can be used, but require wider blades; and
- adding heavy balls, such as used in milling, to force the lime and sand together;
- do not add water to the mix - there is enough in the lime putty;
- lime putty should be drained of any free water, and only putty-like material used;
- lime mortars can be mixed well ahead of use, kept sealed and then 'knocked up';
- knock up with a mason's hoe, by beating with the end of a mattock handle, by beating and chopping with a spade, or using a roller pan mixer, but do not add water.

7. Raking out old mortar:

- failure of most repointing is due to inadequate raking out of joints;
- thin feathered out pointing does not adhere well, fails rapidly, traps water;
- rake out to at least 25 mm - the depth should be twice the width of the joint;
- rear of joint should be square, with clean sides;
- never widen original joint, no matter how narrow;
- use correct tools - hacksaw blades, skates, quirks or plugging chisels;
- chisels must be sharp - tungsten tipped if possible;
- clean out joint with compressed air, or low pressure water spray.

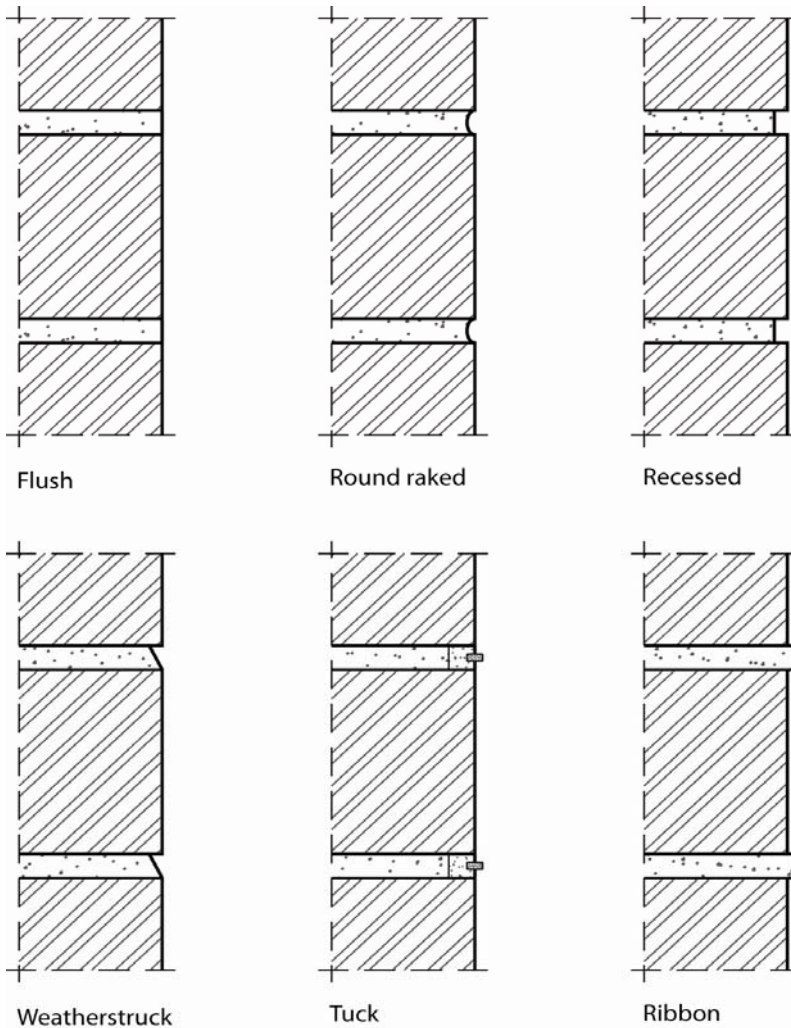
8. Pre-wetting:

- pre-wet masonry thoroughly, to control suction and prevent premature drying of mortar;
- for many old (porous) walls it will be necessary to wet the wall the day before, and then several times on the day, the last shortly before placing the new mortar;
- walls should be thoroughly damp, but not glistening with water.

9. Pointing up joints:

- a relatively stiff, dry mortar mix is much better than one that is too wet;
- packing a joint requires compression of the mortar, not just placing with a trowel;
- use considerable force to compact mortar tightly into the joint;
- don't overwork by dragging the tool as this brings too much lime to the surface;
- always fill any deep voids, pointing only the outer part of a joint will trap water;
- use correct tools - jointing irons (keys) that fit into the narrow joints, or plasterer's small tools for wide joints in rubble walls;
- narrow joints - use a stiff dry mix carefully, or tape either side with masking tape.

Pointing diagram



10. Finishing the joint:

- match known previous joint finish (struck, tuck, etc), otherwise use plain flush finish;
- lightly scrape off excess mortar with a trowel or small tool;
- tamp joint with a stiff bristle brush to prevent shrinkage, expose sand, remove laitance, increase surface area - do this when just still possible to push a fingernail into mortar
- spray with fine water spray as soon as tamping is complete.

11. Curing:

- good curing is an essential part of making durable lime mortars;
- water must be present for the curing process to occur which is why mortars should be kept damp during curing;
- protect mortars from adverse weather conditions, eg too hot, too windy, or too wet;
- stage work around a building to avoid hot sun on new work;
- ideally work only below 25°C;
- spray with water several times a day and cover with damp hessian for at least a week, preferably ten days;
- improved results can be achieved by then allowing a week's drying (protected from rain), then wetting again thoroughly.

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Heritage Victoria in partnership with the Heritage Office, New South Wales Department of Planning and the Heritage Branch of the South Australian Department for Environment and Heritage is preparing a larger technical guide on mortars and pointing for heritage places.

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