

Lucas E (1964) *Modern Practical Building Vol 2*. London, Caxton.

This summarises general thinking in the 1960s, a (slight) confusion of cement, cement-lime and lime mortars all seemingly allowable as suitable for similar purposes and with an emphasis on stronger mortars offering greater durability. The recommended mixes for ashlar, however, were generally weak and lime rich, as well as using limestone aggregates, and the first site of a cement-lime mortar less strong even than 1:3:12 – 1:4:16. This is the orthodoxy in the years before the onset of the 'Lime Revival'.

Brickwork, Materials and Bonds.

Lime Mortars.

Lime mortars are usually prepared in the proportions 1 part lime to 3 parts sand by volume.

For hand-mixing the sand is placed in the shape of a ring on a clean, watertight platform. The lime is placed in the centre, water is added, and the heap left to slake for about twelve hours. Thorough slaking is essential, otherwise the lime will expand and 'blow' in the mortar joints.

After mixing, the heap should be smoothed over the exterior with a spade, so that air cannot readily penetrate the interior. Non-hydraulic lime mortar so treated will keep in good condition for a period of up to seven days. It should be knocked up as necessary to bring it to a suitable plastic condition. Non-hydraulic lime mortar is not recommended for permanent walls, as it has little strength.

Moderately (*feebly*) hydraulic lime mortar should be used if possible on the day of mixing, or within twenty-four hours at the outside. If allowed to stand longer, the setting and hardening action will take place in the heap, and much of it will be lost when the mortar is used.

Strongly hydraulic lime mortar, such as a mortar made with blue lias lime, has a strong setting and hardening property. It makes a durable mortar if properly prepared, but must be used within a few hours of mixing. If allowed to stand for long, the setting action takes place before the mortar is used...Ground hydraulic limes should be slaked by mixing with damp sand to make a stiff mix. The finished mix is then prepared by adding further sand and water. The mortar should then be used within four hours. Any mortar left after standing for half a day should be rejected.

...Cement Mortars.

...The following is of adequate strength for all ordinary purposes: 1 part Portland cement to 3 parts sand by volume....There are disadvantages in a stronger mix....

Lime-cement mortar.

This is sometimes called *compo* or *gauged mortar*. It combines the advantages of lime and cement mortars, and for all ordinary work it is preferable to either. Setting and hardening of *compo* is superior to lime mortar and, though strength is not so great as cement mortar, it is adequate for walls and piers bearing normal loads. A great merit of lime-cement mortar is that it is not likely to develop shrinkage cracks (1:3 cement mixes will). It works easily off the trowel, and sound work can be done at a higher speed than with cement mortar...

The following proportions make a moderately strong mortar: 1 part Portland cement, 1 part non-hydraulic lime, 6 parts sand. ...

Retempering by adding water after the mortar has stood for some hours has a weakening effect, though re-tempering within twelve hours, using the minimum amount of water, is permissible where maximum strength is not important...

Sand.

Any clean sand is suitable for making mortar. It is desirable to use *graded sand*, by which is meant a mixture of sand particles from small to large....if very fine sand is used, more water is necessary, resulting in excessive shrinkage and some loss of strength.

MASONRY.

For *rubble walling* where, as has been said, the mortar supplies the chief bond, a good mortar is required. This should be composed of 1 part Portland cement to 4 parts sand.

Mason's putty is composed of 3 parts stone dust and 1 part lime putty. This is used for setting stones in wrought facing where the joints are required to be fine. The joints themselves are often grouted with neat Portland cement or with 3 parts stone dust mixed with 1 part Portland cement. For polished granite 2 parts sand to 1 part Portland cement is used...

Lime mortar consists of 3 parts clean sharp sand to 1 part slaked lime, which may be blue lias lime, grey chalk, or stone lime, pure or white chalk lime. Slaked lime is lime which has powdered owing to exposure to the air or from the addition of water. Grey chalk lime is used in the proportion of 1 part lime to 3 parts sand. Pure lime is used in the proportion of 1 lime to 3 ½ sand.

Lime putty consists of a mixture of fat lime and 3 parts by weight of water. *Fat lime* is derived from white chalk and forms a paste when mixed with water. It is pure white; rapid-slaking, slow-setting and non-hydraulic.

It is a mistake to use a strong cement mortar, except where an exceptionally strong, dense stone is used. For ordinary load-bearing masonry mix No.3 specified below is quite strong enough and is generally used for Portland stone and stones of similar density. The two weaker mixes are of adequate strength for ashlar and facing work.

The three mason's mortars following have been favourably mentioned by the Building Research Station:

- 1) 16 parts fine crushed stone (by volume), 4 parts lime putty or hydrated lime, 1 part Portland cement.
- 2) 12 parts fine crushed stone (by volume), 3 parts lime putty or hydrated lime, 1 part Portland cement.
- 3) 7 parts fine crushed stone (by volume), 5 parts lime putty, 2 parts Portland cement.

PLASTERING.

...The materials available are:

- 1) Portland cement, which has a strong setting action
- 2) Non-hydraulic or feebly hydraulic limes, which have no setting action or very little
- 3) Hydraulic limes with a strong setting action, but not so strong or so quickly developed as Portland cement
- 4) Sand, which provides the aggregate in many mixes
- 5) Gypsum plasters...which have a strong setting action. Some types can be used with admixtures of lime and/or sand, and some are used neat.

Portland cement. Normal Portland cement is used in lime-cement-sand undercoats for interior plastering and in all coats for exterior rendering. Portland cement gives strength, good adhesion and resistance to damp, but it shrinks on setting and for this reason mixes strong in cement should be avoided except under very damp or exposed conditions...

Limes. Traditional lime plastering is now obsolete owing to the length of time taken to slake the lime and the need to allow undercoats to set before applying the next coat – the setting takes several weeks. Gypsum and anhydrite plasters have largely replaced lime plasters.

Lime is chiefly used in the form of lime putty and hydrated lime powder, complying with BS 890. These limes have little or no strength. Their value is in making the mix easier to work, giving it a 'fatty' property, less liable to develop shrinkage cracks, more porous and so a better thermal and sound insulator, and in reducing the cost of the mix.

Hydrated powder lime, sold in 1 cwt paper sacks, is now widely used in plastering and rendering mixes. There are two methods of using it, as follows:

- 1) *Soaking to putty*: this is done by partly filling a suitable tank or container with clean water and then adding the lime powder to the water, stirring it to produce a thick, creamy mix. This should be allowed to stand for at least sixteen hours. Excess water will rise to the top and can be poured or siphoned away, leaving a putty which can be used in the same way as putty run from quicklime in a pit.
- 2) *Preparing coarse stuff*: this is done by mixing the dry hydrate lime powder with dry sand and then adding sufficient clean water to make a stiff mix, which should be left to stand for at least sixteen hours before use. The wet mix is called 'coarse stuff' and can be used with Portland cement or suitable plasters at any time within a few days, but it should be covered to prevent drying.

The two methods just described develop the maximum workability or 'fattiness' in the mix. It is possible, however, to use hydrated lime with other ingredients, first mixing dry and then adding water, and to use the mix at once. But it will not be so easy to work as those made by methods 1 and 2.