LIME MORTAR COMPARED TO CEMENT EXPLAINED

WHY USE LIME?

In traditional construction, lime is as fundamental a material as timber, stone or brick. Lime is used for making building mortar, external render, internal plaster, lime wash and solid floors. Mortars made with lime putty cure slowly but result in strong, yet flexible, permeable and stable building fabric. However, after cement became universally available at the end of the 19th Century, lime putty came to be seen as slow and old-fashioned, and the immediate results obtained with cement were considered superior.

By the 1950s the use of lime in building construction had virtually ceased. Although cement has undoubtedly made possible buildings which could never have been constructed with lime, cement's consistent use in the repair of old buildings has led to increasing problems, especially with damp.

Both cement- and lime-based methods of construction work effectively when properly maintained, but a hybrid of the two - solid walls with a soft lime mortar core and hard cement pointing, for example - is doomed to eventual failure.

Today the use of lime putty is increasing as the damage caused by the use of cement in traditional construction and repair techniques becomes more widely known.

The Advantages of Lime over Cement

Lime-based buildings expand, contract and flex with changes in temperature and moisture. The use of lime also allows damp to be absorbed to a limited degree and then evaporate harmlessly away. Our ancestors accepted that rain and rising damp were bound to find a way into the walls of their houses, so they built them thick,

and the soft, permeable mortars and renders acted as a wick to draw the moisture out again.

Modern construction techniques generally rely on a cement mortar to create rigid foundations and walls which allow a minimum of movement and restrict the passage of moisture. (Movement in large areas of masonry is allowed by expansion joints.) Damp is kept out of the structure by damp-proof courses, cement renders, waterproof paints and cavity walls.

Although it might initially seem like a good idea to prevent the ingress of moisture with a hard, waterproof material such as a cement render, in practice such a rigid material cannot cope with the regular small movements of the old building: it becomes cracked (often microscopically) and water is drawn in anyway. As most of the wall surface remains covered with this waterproof layer, evaporation cannot take place and the amount of damp actually increases.

If lime-based masonry is pointed with a cement mortar which is less permeable than the stones or bricks (most cement mortars are), then the moisture will be forced out of the wall through the blocks themselves, causing erosion in that part of the wall which is

most difficult to repair. In frosty weather this leads to the rapid deterioration of both stones and bricks as the moisture in them freezes.

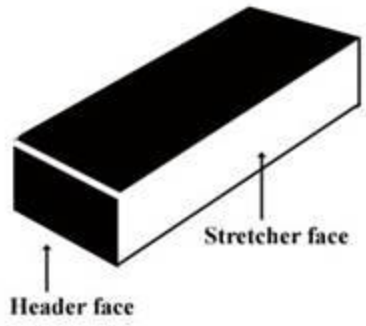
Where the cement pointing is harder than the stone or brick, deterioration may also be caused by the development of stress in the face of the wall. Stress arises because walls move gradually with changes in temperature and moisture content; old lime mortar in the core of the wall acts like a cushion, accommodating expansion and contraction, transferring loads onto the narrow depth of the wall which has been repointed. If the stone or brick is softer than the mortar, the edges of the stone will shear and 'spall'. (In modern construction this movement is accommodated by dividing large areas of cemented masonry into panels separated by flexible expansion joints usually filled with mastic.)

Even more damage has been caused to old masonry where the joints have been made to project beyond the face of the wall with a hard band of cement. Not only does this look wrong, but it also provides small ledges all over the wall face which encourage moisture penetration and promote decay.

J M Cluley building services will quote for any repointing or rebuild stone or brickwork and has wide knowledge working with lime mortars including heritage work in which further portfolio work can be shown to client upon request.

TRADITIONAL BRICKWORK BOND

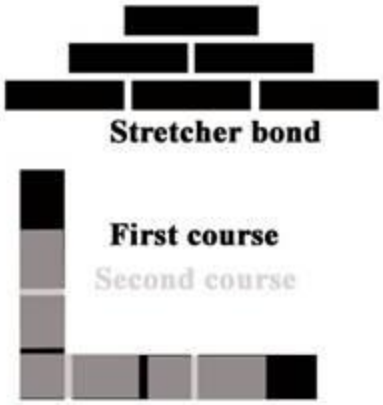
Bonding, or tying together individual bricks and blocks can be done in a number of ways. However, it is done it is imperative that the maximum strength possible for the task of the wall is obtained. Some popular bonds are shown below together with an explanation of where they are most likely to be used. Brickwork or blockwork bonding should be laid out dry before you start to make sure the bond works. Sometimes bricks should overlap the brick below it by half of its length (half bond). Some brickwork types use a quarter bond where one brick overlaps another by a quarter of the width of a full brick. Believe it or not, buying a pack of dominoes for three pounds, and practicing brickwork bonds with them can save you a great deal of time and money when it comes to building a retaining wall in the garden.



The Different Faces of a Brick

The long face that you can see in a brick wall is called the Stretcher face. The shorter "ends" are called Headers. Stretcher bond is the most commonly used in house construction because of the economy of bricks it allows and the speed in which this bond can be laid in most constructions which only require a single (half brick) skin.

Two stretcher walls can be built back to back and tied together using wall ties to form a double (single brick) skin. This type of tie is called a collar tie. This is a way of getting an attractive face on both sides of the wall but not the strongest method of producing a single brick wall as the ties between the skins are a weak point.

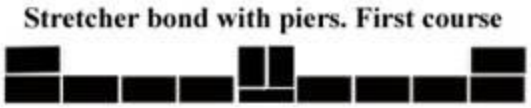


Stretcher Bond, First Course and Second Course

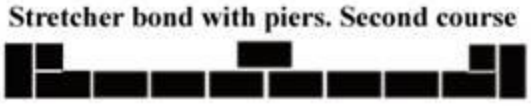
Stretcher bond uses 60 bricks to the square metre in a half-brick, or single skin wall. This is obviously doubled to construct a double skin, or One-brick wall.

You can see clearly in the diagrams how each brick in the stretcher bond overlaps the one below it by half of its length. Turning corners with stretcher bond is simply a matter of placing one brick at right angles to another. This automatically continues the half bond. To finish off the ends of the wall a brick is broken in half (half batt) and laid to keep the end of the wall in line vertically.

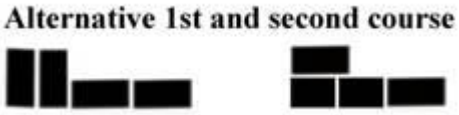
Stretcher bond is not the strongest of bonds however and if a wall of any length is built, piers must be inserted to maintain strength.



First Course of Bricks Laid

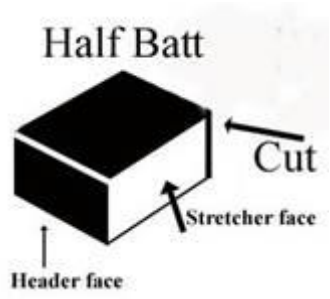


Second course of bricks laid

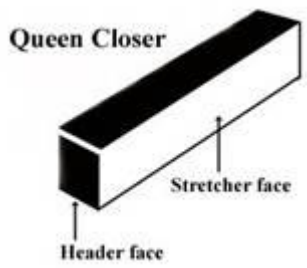


Alternative First and Second Course

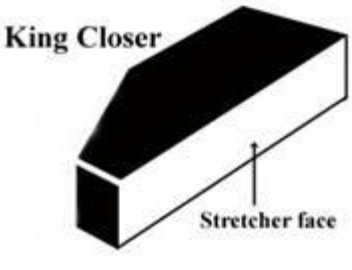
There are two ways to end a stretcher wall with piers. The first, above, shows the use of a half-batt in alternate courses while the diagram, left shows the use of a three-quarter batt.
In some brickwork bonds a gap develops which is not the same size as a full or half brick. In these cases a brick is cut to fit the gap and this cut brick is called a closer. Some bonds do not work at all without closer's and the same size/type of closer is used in every (or every other) course. Where the closer has common usage it is often named, and “King” or “Queen” closer's are often seen as are half and three-quarter batts.



Half Butt



Queen Closer

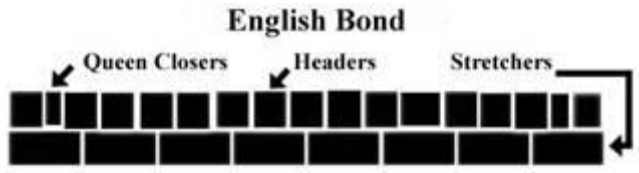


King Closer

English Bond:

English bond (also known as Ancient Bond) requires quarter bond work in its construction of a course of stretcher bricks and a course of header bricks laid alternately. It is the strongest brickwork bond. It is however, one of the most

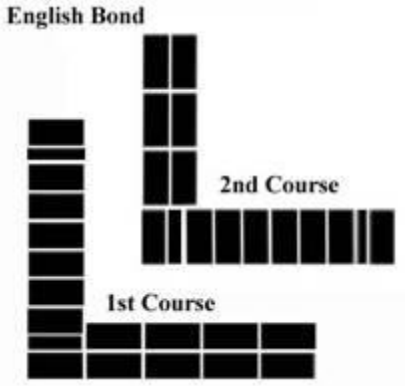
expensive because of the labour time. The Victorians, when building many of their classical gardens, introduced a variation on



English Bond

English Bond, called English Garden Wall Bond which introduces the course of headers in between five courses of stretchers. This maintains the strength, looks attractive and is cheaper and quicker to build.

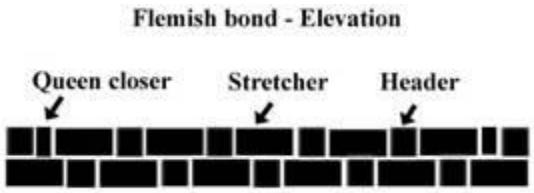
It can be seen from the diagram that English bond requires closures on each course to maintain the bond. This type of closure, a brick cut down the middle of its length, is called a Queen Closer.



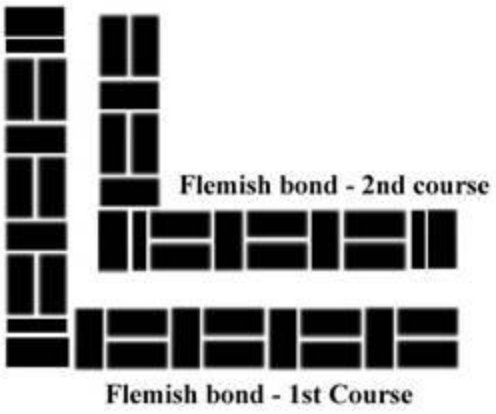
First and Second Brick Course

Flemish Bond

Not quite as strong as English Bond but used for is visual affects, Flemish Bond is laid using stretchers and headers alternately in each course to give it a quarter bond finish. Flemish Bond also has a "garden wall" variant in so much as the number of stretchers in between the headers can be increased.



Flemish Bond - Elevation



Flemish Bond Fist and Second Course