

Cement, concrete and mortar

cement - lime - sand - aggregate. ballast - mortar - concrete

Below are details of concrete and mortar for different applications, how to estimate quantities and what these quantities mean. The various mixes are quoted as volume ratios, however the individual components are normally sold by weight, so a little calculation work is required.

Cement in concrete and mortar creates its strength by chemical reaction, it is not like wallpaper glue which 'dries out', it 'goes off'. In fact, if the concrete or mortar should 'dry out' before the chemical reaction is substantially complete, it will fail. Likewise if it is subjected to a frost, it can also fail.

Concrete/mortar will take months to reach its full strength however after about 24 hours it should be fairly hard and after 4 or 5 days, the strength should be enough to stand up to normal punishment.

The various components:

Cement: For normal 'around the house' types jobs, Ordinary (or Portland) cement is required. This is normally available in 50kg bags, although smaller 25kg bags are increasingly becoming available to take account of the UK manual handling regulations. Try not to buy more cement than you need as it cannot be stored for very long. Some special cements are available (i.e. quick drying) which may be required for special situations.

Lime: Lime is sometimes used in cement and reduces the amount of water drawn into the bricks, thus preventing the cement from drying out too quickly and shrinking. The main types of lime are:

- hydraulic - which sets by combining with water.
- Non-hydraulic - this hardens by drying out.
- Semi-hydraulic - which is a half-and-half, it mainly needs to dry out but has some hydraulic properties.

Each type is available as either hydrated lime and quicklime - hydrated is more convenient to use as it has been processed ready for use. Hydrated hydraulic lime must be used straight from the bag. Hydrated semi- or non-hydraulic are better to use after soaking in water for 24 hours - stir it into water and leave it overnight - the lime sinks to the bottom and excess water can then be poured off. Mix the lime with the sand before adding the cement.

Sand: Two types of sand are available but are not interchangeable in all applications, whichever type is being used, always pass it through a sieve before use to remove any small stones etc.

Soft sand (or Builders sand): a smooth sand, non-gritty, loamy and with cohesive properties, can be used for:

- Bricklaying mortar
- For bedding paving slabs
- For rendering walls

Sharp sand: this has a gritty feel and is similar to that used to condition soils and potting composts, can be used for:

- Concrete
- For rendering floors and walls

Aggregate (also referred to as ballast): is used for concrete and consists of various sized particles from fine grains of sand to small stones. Aggregate is normally graded by size of the largest stones; 10mm Aggregate will have been sieved through a 10mm mesh to remove all larger stones.

Mixes:(see bottom of page for render/stucco mixes)

Mortar	sand : cement	sand : lime : cement
general building (above ground)	5:1	5:1:1
general building (below ground)	3:1	6:1:1
Internal walls	8:1	9:2:1
Concrete	Ballast : cement	Sharp sand : cement
Foundations, drives, floor slab, other heavy duty	5 : 1 (20mm Ballast)	
Foot paths and thin sections	3.25 : 1 (10mm Ballast)	
Paving less than 50mm (2 inch), bedding for slabs		3 : 1

Volume/weight conversion

Cement	1 cubic yard	= 21.6cwt
	1 cubic metre	= 1.4 tonne
Lime	1 cubic yard	= 10.8cwt
	1 cubic metre	= 0.7 tonne
Sand	1 cubic yard	= 25 cwt
	1 cubic metre	= 1.7 tonne

Aggregate(ballast)

The weight of Aggregate depends upon the proportion of solid stone and can vary between 20 to 27 cwt per cubic yard. For practical purposes, the sand volume/weight conversions can be used.

Storage

Cement and lime - keep undercover and dry. Cement will tend to absorb water and turn hard if left for any long periods in high humidity.

Sand and Ballast - small quantities can be stored in heavy duty plastic bags. Larger quantities should, ideally, be stored on a solid base. If it has to be stored on earth, place a lining of some sort on the earth before the sand/ballast is deposited - this will prevent the sand being absorbed into the earth and the earth into the sand. Try to keep the pile covered when not

being used, this will ensure that local pets will not contaminate the top side as well as preventing any rain from washing some of it away - but do not let the pile get too dry as this may cause problems when it is being used.

Stucco and Rendering mixes

The terms 'Render' and 'Stucco' are almost interchangeable; Render generally being UK terminology and Stucco, American. However, the mixes below are specific as they are slightly different, Stucco generally having less sand.

Various stucco mixes:

	hydrated lime	sand	cement	hair or fibre
Traditional Simple Soft Lime Stucco	1 part	2 part		
Soft Lime Stucco with fibre (3 layer)				
Base Layers (2)	1 part	3 parts		6 pounds per cubic yards
Finish Layer	1 part	3 parts		
Note: Portland cement is not included in this mix; however, its use will increase the workability of the mix and decrease the setting time, the amount of Portland cement added should not exceed 1/3rd part .				
Soft stucco	5 part	10 part	1/8th part	
Traditional Natural Cement/Lime stucco	1 part	3 parts	2 parts Natural cement	
Portland Cement stucco	2-3%	3 parts	1 parts Portland	

Various rendering mixes:

	hydrated lime	sand	cement
Cement/Lime Render	not more than 15% of the cement's volume	5 parts	2 part Portland
The same basic mix was used for all layers, but the final layer should contain more lime than the underlayers.			
Cement Render		5 parts	1 part Portland
