Lancaster Lime Works

Lime Putty Guide

Safety

Working with natural lime products requires the use of safety precautions and personal protective gear. Avoid eye and skin contact.

Lime is extremely caustic when it is wet. It has a very high pH (12), which will burn the skin and eyes. Once carbonated, lime becomes pH neutral. It is absolutely required and essential to protect yourself and all of those in the vicinity of any open lime products.
Please consult the Material Safety Data Sheets for more information.
Ordinary vinegar neutralizes lime, keep onsite.

Using Lime Putty

Lime putty is the base ingredient for building in the 19th century and before. These include lime mortar, lime stucco, lime plaster, and limewash. Making the first three requires mixing putty with sand.

Lime mortar, stucco, and plaster must maintain a consistent proportional mixture of lime and sand. This proportion must be determined for any sand used. All sands are not the same. Sands have different particle shapes and distrubutions. This means that the void area between the particles varies from sand to sand.

Choose your sand carefully. Sands found at the local masonry supply are often not suitable for use with natural lime products. They are chosen for use with Portland cement, a very hard and brittle binder that does not depend particularly on the characteristics of sand for its strength.

Sands should have a mix of large pieces, medium particles, and fines. If graphed, the different particle sizes will form a curve line shaped like a bell. The bell has smaller amounts of the large and fine particles on either end, and larger amounts of the middle sizes. This is called the particle size distribution. LLW can provide you with this information for your sand.

The amount of lime used with a given sand is determined by the void space between the particles. The lime should be just enough to coat each particle of sand, but no more. Too much lime, and the finished mortar will not have the necessary strength under pressure. Too much sand, and the finished mortar will tend to fall apart, be unworkable, and won't weather well.

The Void Space Ratio Test

Determining the void space ratio of a sand is a simple test. The test requires pure alcohol and very dry sand. Ideally, the alcohol used should be 200-proof to eliminate water that can skew readings. Cheap 190-proof grain alcohol [e.g. Everclear] will do the trick in a pinch.

If necessary, dry the sand in an oven at 200°F for 30 mins. Cool to ambient temperature.

Fill a beaker with clean dry sand to 100 mL. Tap the container until the sand is densely packed down. Measure out the alcohol. Add the alcohol until it just wets the top of the sand.

Measure the amount of alcohol added to assess the void space in the aggregate. For example, for 100 ml of sand it took 30 ml of alcohol to wet the sand, you would have approximately a 1 lime to 3 sand ratio.

Once the void space ratio is determined, a mix can be made. The fineness of the sand is determined by the application. Base coats of plaster and stucco utilize coarser sands. Topcoats use finer sands.

Use a Vertical shaft mixer. (Avoid false economy: The mixer cost will be well worth the labor saved and the thoroughness of mixing). Do not use rotating drum or barrel mixers; these do not adequately mix lime mortar. Small batches can be made using a powerful drill and mixing paddle, this is difficult.

Add sand and lime alternately to the mixer while it is running. Unless sand is extremely dry, water will likely not be needed. (Lime gets more liquid and workable the longer it is mixed.) If the mixture is crumbly after 15 minutes of mixing, add a small amount of water (about 8 ounces for a 15-gallon mixer load).

Remember excess water leads to shrinkage! The more added, the harder you will have to work to compress the mortar later!

Mix for a minimum of 20 minutes. Don't worry about over-mixing. Motor heat or mixing in direct sunlight may cause mortar to dry during prolonged mixing. Watch the water content. When thoroughly mixed, lime mortar should be fairly dry to the appearance, but spreadable similar to cream cheese. Again "dry" mortar, "wet" substrate is the goal.

If not used immediately put the mixed mortar into buckets and cover with an inch of water.

Please don't hesitate to contact LLW. It is important that this process be done correctly for a successful installation. See the **INSTALLATION GUIDE** for more information.