



# Lancaster Lime Works

**Installation Guide for Lime Mortar Products**



## Lancaster Lime Works™ Natural Lime Products

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### Installation Guide

#### Thank You for Purchasing from Lancaster Lime Works!

Our products are formulated from the results of decades of research and testing both in the laboratory and in real buildings of all kinds across America. Our natural, non-hydraulic lime is manufactured according to very stringent standards to produce a lime putty that is comparable to the longest lasting mortars of the world, technology that took thousands of years to develop.

Only in the last few decades have these historic mortars been understood in the context of modern materials science. What was once a closely guarded, secret technology that only a few possessed is now available to anyone who is willing to learn.

We are confident that, if you follow the correct installation procedures as outlined in this Guide, these products will provide superior performance and a very long life, just as they have for thousands of years wherever the finest, high-calcium lime putty was made.

#### Introduction To LLW Lime Products

Lancaster Lime Works™ products (including lime putty, lime stucco, lime mortar, and limewash) are made from “natural lime”. They are non-hydraulic, which means that they do not have the “setting” component that natural hydraulic limes (NHL), natural cements, and Portland cements do.

Hydraulic means a product will set as the result of combining it with water. It will also set under water. Non-hydraulic means that a product does not set as a result of being combined with water.

The LLW™ lime putty products are non-hydraulic, natural lime products. They set as they absorb carbon dioxide (CO<sub>2</sub>). Keeping them under water seals them from carbon dioxide, preventing them from setting.

When lime putties are exposed to carbon dioxide and allowed to dry, the calcium reacts with the CO<sub>2</sub> in the air in a process called carbonation, forming crystals around and between the particles of sand.

Reading, understanding, and following this Guide is essential to a successful installation of Lancaster Lime Works™ products. Because the technology of natural lime has fallen into disuse and is rarely understood, even by otherwise competent masons, architects, and conservationists, carbonating lime products are often misunderstood and treated like hydraulic lime products.



## The Fundamentals of Using Lancaster Lime Works™ Products

### 1. SAFETY.

Working with natural lime products requires the use of safety precautions and personal protective gear. **Lime is extremely caustic when it is wet.** It has a very high pH (12+), which will burn the skin and eyes. Protect yourself and all of those in the vicinity of any open-lime products or the tools used for installation. Avoid skin contact. Wear long sleeves, gloves, goggles and long pants. Flush eyes with clean water and seek medical attention. Please consult the Material Safety Data Sheets for more information.

Ordinary vinegar will neutralize the lime, keep onsite.

Protect horizontal surfaces around and below the work area. Lime mortar will corrode aluminum, copper, and other metals. Painted surfaces may be damaged also. Wood surfaces will be stained by it.

### 2. JOINT PREP.

Remove the existing joints to a depth of about twice the width of the joint. A 3/8" wide joint would need to be removed to a depth of 3/4". Power tools can be used for removal, but it is not recommended, as it is easy to damage the masonry units. If using power grinders, center-cut the joint and finish the removal with a chisel. Head joints (vertical) require extreme care with power tools.

Very hard or non-porous mortars, especially Portland cement mortars, should be removed entirely. Portland mortars tend to stop or restrict the movement of water in the masonry, so thoroughly dampening the masonry units (bricks or stones that the wall is built of) will be more difficult.

Just prior to pointing, mix the Mortar in a bucket with a drill and a mixing attachment, using one of the types pictured below. Carefully open the bucket of Mortar by removing the lid. Pour off any water from the top of the mortar, saving for possible reuse. Mix the mortar for 5-10 minutes at medium speed for best workability.





### 3. **MONITOR MOISTURE.**

Monitoring the movement of water in and through masonry is important to the successful installation of natural lime products. The job of the installer is to observe the moisture level in the substrate (material to which the lime will be always applied) and in the finished installation, even over evenings and weekends. Carbonation, the process whereby the mortar or plaster gets hard, occurs as the water moves out. It must be allowed to dry out, but not too fast.

### 4. **THOROUGHLY DAMPEN THE SUBSTRATE.**

“Substrate” means the wall or backing material to which the mortar, stucco or limewash is to be applied.

It is essential that the substrate (materials behind or under) be **thoroughly** wetted so that the water in the mortar can leave slowly into the air and not be sucked out from behind or underneath. This takes time and must be taken seriously and planned into the job. If the wall that is being pointed, chinked, plastered, stuccoed, or limewashed is not thoroughly dampened before installation, **the installation will fail.**

Lancaster Lime Works™ Natural Lime must not be allowed to dry out too fast. Dry, porous materials, such as dry bricks, mortar, sand, wood, and stones, have a very strong suction. When natural lime mortar is used in a dry porous substrate the water will be sucked out of the mortar too quickly. If the mortar dries too quickly, flash drying occurs, and it fails.

It is not enough to spray the wall down once or twice. It takes hours on thick, dry masonry walls to dampen the wall adequately. One test is to mist the wall and then notice what happens on the surface as soon as the misting stops. If it instantly dries up, keep wetting. If the water hangs there for a few seconds and the surface stays glistening, then you may have applied enough water.

### 5. **PROTECT YOUR INSTALLATION FROM FLASH-DRYING.**

Freshly applied mortar or stucco should be protected from drying winds, direct sunlight, and any environmental condition that causes rapid evaporation. Plastic or burlap can be used to break wind and shade a wall.

The best policy is to follow the sun around a building rather than letting the sun follow you. In other words, work on the south and west sides early in the day, and on the east side in the afternoon. Protect the sun side during the heat of the day, and mist areas that are drying too quickly.



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Experience is the final test in monitoring the moisture level, but here are some things to look for:

- Always be alert for your material “flash-drying” once it is applied. Flash-drying here refers to the surface (mortar, stucco, or limewash) turning white and becoming dry to the touch quickly (within a few hours or less of) when it is applied. This is a failed installation and should be removed and redone.
- LLW Lime Products should dry out slowly and evenly over a 24–48-hour period.
- Very thin stucco coats or pointing very narrow joints are the most difficult to monitor. Pay careful attention to these types of installations. Start with a small area to get the correct amount of moisture, and don’t be afraid to start over if it flash-dries.
- If areas of the installation are drying faster than others, mist with pure water. Often in the summer, surface misting should be done a few times over the first 24 hours depending on environmental conditions.

### 6. USE IT DRY.

The carbonation process works best if the product is used in the driest state that is workable. Excess water leads to shrinkage. Watered down, thin mortars and plasters must be compressed as they dry to keep them from shrinking. Work with as dry a mortar as possible while adequately dampening the substrate.

This is a very different working experience for masons that are trained in laying brick with Portland mortar. Wet your bricks first by dipping or soaking in water, depending on how porous they are. Let them stand for a few minutes out of the water before laying so that their faces can dry. With dampened bricks and stiff mortar, the bricks are easy to level and adjust and require much less attention later to keep the mortar from flash-drying.

If the mortar is overly stiff, which it will be when it sits for an hour or more, water should not be added to thin it down. The solution for overly stiff mortar is to re-mix it with a powerful drill mixer in a bucket. This works it back into a smooth workable mix. If that doesn’t work, lightly mist, only adding enough water to make it workable. We recommend pouring the water off the top of premixed mortar or stucco before use. Save the pour-off water in a bucket in case small amounts need to be added back later.

If the mortar is made too wet, spread it out on a piece of plywood placed at an incline to allow excess water to run off, soak into the plywood, and evaporate slowly. Do not leave the mortar like this unchecked for more than an hour or carbonation may begin.



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### **7. ABOUT WATER.**

Lancaster Lime Works™ products are made with pure, potable water. Any water that is used by the installer for dampening the substrate, misting the installation, or mixing should be potable and free of chlorine, iron, and pollutants. Chlorine will evaporate from water if left to stand in open containers for a day. Water filters should be used where water sources are polluted.

### **8. PROTECT YOUR INSTALLATION FROM FREEZING.**

Lancaster Lime Works™ products must be kept from freezing once they are installed. New installations must be protected from freezing for as long as it takes to dry out and carbonate. This will be variable, depending upon the thickness of the installation and the environmental conditions. Water behaves differently below 40° Fahrenheit (4° C.), so evaporation and carbonation are much slower. There is no magic number of hours that it takes for natural lime products to cure because it depends on the amount of moisture in the masonry, the moisture in the air, the temperature, air movement, and the thickness of the application. Do not attempt installation unless temperatures are above **40° F.** for at least two weeks AND the material is protected from any danger of frost. The installation should be uncovered above 40 degrees F. to allow proper drying and carbonation. The best temperatures for installation are between 40- and 70- degrees Fahrenheit. The mortar must dry before freezing.

### **9. DON'T APPLY TOO THICK OR TOO THIN.**

Installation with hand tools only. Do not use a mortar bag. For pointing, the joints must be filled completely. Using a slicker fill the joints with mortar. Use pressure to push it against the back of the joint. Pushing the mortar with force to compress the sand particles firmly together. Compression is key to avoid cracking. If the mortar cracks, before it has set, compress the cracks together. Do not slick the surface. Slicking the surface slows the carbonation process.

### **10. DRYING.**

Lancaster Lime Works™ Natural Lime must be allowed to dry out or the CO<sub>2</sub> (carbon dioxide from the air) will not have access to the lime to cause it to harden. CO<sub>2</sub> moves in as the water moves out. Keeping a wall too wet, or keeping it wet for too long prevents carbonation. Let the installation dry slowly. Finish the joints before they get completely hard to desired profile. To achieve a weathered finish, use a vegetable brush and hit the joint, knocking the mortar back, “weathering” the joint. A slicked joint is not recommended as it slows the carbonation process and is generally not considered historically accurate.



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### 11. **CLEANING.**

Use only white vinegar or water to clean the brick after the mortar has completely dried. Use it sparingly and try not to apply vinegar to the joints themselves. Do not use muriatic acids or other conventional masonry cleaners. Acids react with the lime and create salts, which are then absorbed by the masonry. This can result in efflorescence and other problems. Rinse vinegar thoroughly from the wall after cleaning.

- ***Do not apply sealers or waterproof chemicals of any kind. Breathability is critical because moisture needs to escape, and Lancaster Lime Works Natural Lime Products allow fast evaporation of moisture from masonry, keeping the masonry drier with less chance for mold, mildew, and wood rot on the interior***

### The Fundamentals

#### **“Down & Dirty”**

1. Lime is extremely caustic when it is wet—protect your eyes and skin. Protect objects and people below.
2. Monitor the Moisture before, during, and after installation.
3. Thoroughly dampen the substrate starting 24 hours before.
4. Install with pressure. Don't slick.
5. Be prepared for problems and provide extra protection in hot and cold weather. Curing stops below 40° F.
6. Let it dry out ***slowly***.
7. Keep stucco coats between 3/8” and 5/8” thick.
8. Use clean water for misting and mixing.
9. Use mortar and stucco as dry and stiff as possible.