

LIMESTRONG BUILD™

HIGH PERFORMANCE POZZOLAN + LIME

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Using Limestrong Build™ Binder

OUR LIMESTRONG BUILD BINDER product is the lime binder part of lime plaster—plaster sand and water complete the ingredients. When mixed at proper ratios with sand and water, Limestrong Build (LSB) Binder produces a real-deal lime plaster, specifically the pozzolanic hydraulic lime (PHL) plaster type used by the Romans and subsequent generations of old-world builders in the millennia that followed.

LSB Binder is packaged and shipped WITHOUT the sand/aggregate component for economical reasons. LSB Binder is used for both the scratch and leveling (brown) coats of a typical three-coat lime plaster render. Because these two coats make up the majority of the plaster needed, there is a significant cost savings (in both weight and volume) to have the end user source the necessary plaster sand^[XR1] locally.

This Use Guide is intended to provide an introductory overview to using Limestrong Build Binder. Please read the various **instructional guides**^[1] referenced throughout this guide for complete and in-depth process information.

CALCULATING LSB BINDER NEEDED

Based on the total square footage of the job, the **coverage calculators** at limestrongbuild.com will provide both the total number of LSB Binder bags AND the yards of plaster sand needed for those bags. Also see the information under the COVERAGE subhead (page 04) in this document.

SOURCE THE SAND

Before mixing Limestrong Build™ Binder, acquire a stockpile of *the right sand*. For instruction on choosing the right kind and size/grade blend of sand for use in lime plaster, please carefully read our **Sourcing Sand** publication.

In brief, the right plaster sand combines three key characteristics: 1) the sand grains are sharp and angular, 2) the particles vary in size, and 3) the sand is clean—free of contaminants like dusty silt, powdery clays, and organic matter.

The ideal plaster sand is “manufactured sand,” found at sand and gravel operations and/or construction supply outfits. This sand has been crushed, washed, and grade (particle size) blended. Avoid using natural sand from stream beds, beaches or pits, as it tends to be rounded off by years of current and wave action and will not mechanically bind in the lime plaster matrix as is necessary. It also tends to contain too many contaminating fines.

TOOLS AND EQUIPMENT

Please reference the LSB Publication: **Plaster Tools and Equipment** for a complete breakdown of the tools and equipment needed. For example, use a mortar mixer for lime plaster, not a cement mixer.

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A visual breakdown of an ideal grade-blend for effective lime plaster sand. Blended grades, especially angular manufactured sands, create a very efficient void structure, which allows for better workability, better mechanical bonding, and proper vapor exchange (breathability) in the cured plaster.

FOOTNOTES [X]

[1] Full in-depth instruction and process information can be found in the **Lime Plaster Application Guide**, the **Mixing Limestrong Build Plaster** guide, and the **Troubleshooting Guide**.

CROSS REFERENCES [XR]

[XR1] See LSB Publication: **Sourcing Sand**

SURFACE PREPARATIONS

SCRATCH COAT. Before you start making mud (mixed plaster), check to ensure the surface is properly prepared to receive the scratch (first) coat. Limestone Build publishes a series of **substrate-specific application guides**^[2] that cover the requirements for surface preparations, pre-wetting (if necessary), and proper mix ratio richness for bonding lime plaster to various materials.

Preparing the surface of the scratch coat for the leveling coat is fairly straightforward—while still wet, the scratch coat is scratched, or scarified, with a stucco/plaster scratch tool to provide mechanical key for bonding the leveling coat.

LEVELING COAT. After allowing the scratch coat to cure (at least 3 days; longer is better—7 to 10 days is ideal, depending on atmospheric conditions), the scratch coat is pre-wet before applying the leveling coat.



KEY: It is important that all surface imperfections and leveling are made/corrected with the leveling coat. The quality (or lack thereof) of the work done with the leveling coat will show in the thin final finish coat. The leveling coat is typically applied thicker than the scratch coat.

To accept the thin finish plaster coat, the leveling coat must be finished with “tooth,” or mechanical key, but NOT as aggressively as the scratch coat. The leveling coat is not scratched or scarified, but rather worked to a roughened, sandy finish—enough to bind the thin finish coat, but not aggressive enough that it telegraphs through to the surface of the finish coat. Full instructions on creating the proper toothy surface on the leveling coat are provided in the **Lime Plaster Application Guide**. Allow the leveling coat to functionally cure—3 days minimum, 7 to 10 days is ideal—before applying the finish coat.

FINISH COAT. The third and final coat is the “finish” coat. It is applied thin (a sixteenth to a quarter-inch, depending on finish type desired) and used to provide the final surface texture and color. LSB Binder can certainly be used for the finish coat, but a finer finish sand blend will need be sourced or screened out of the sand stockpile. A simple, more straight-forward solution is to use one of our complete, ready-to-mix (includes the aggregate/sand) finish plaster types—**LSB Coarse Finish** (select when a deeper, rough-textured finish is desired), **LSB Fine Finish** (use when a slightly-textured to smooth finish is desired), or, for interior use over drywall^[XR2] (instead of paint), **LSB Interior Finish**. The Coarse Finish or Fine Finish types can be used either inside or out over the base lime plaster coats. The Interior Finish type can be used inside over drywall and a lime plaster basecoat.

Limestone Build Finish plasters are packaged in 32 lb. bags, ideal for mixing smaller batches—a single bag and two gallons of water can be mixed in a five-gallon bucket. This small-batch approach allows for fine-tuned batch control for consistency in building surface textures as well as color management (if adding colorant to the finish coat). Complete information on achieving various finish textures is detailed in the both the **Lime Plaster Application Guide** and **Using Limestone Build Finish Plasters** publications.

APPLY MASKING. Remember to protect sensitive surfaces by thoroughly and adequately masking off areas that don't get plaster. Lime plaster can stain unprotected surfaces—floors, wood, unglazed tile, stone or brick veneers. Other important pre-application preparations are covered in the **Lime Plaster Application Guide**.

MIXING LIMESTRONG BUILD BINDER WITH SAND AND WATER



The mixing process—step by step—is fully detailed in the LSB Publication: **Mixing Limestone Build Plaster**. The **KEY** to getting consistent mixed-mud batches is repeating the proper steps in the right order with the right ingredient ratios batch after batch. The mud needs to mix long enough to completely hydrate and “fatten” to the smooth-working consistency that lime plaster is known for. The mixing guide also includes testing techniques for determining the right working stiffness/stickiness/consistency. Page 03 of the mixing guide provides the ingredient ratios for each coat—LSB Binder : Plaster Sand : Water.

FOOTNOTES [0]

[2] As series of brief guides specific to various substrates (building materials) that can be covered with lime plaster are available from the limestonebuild.com website (listed in the Application Guides section). It is critical that the surface is properly prepared to bind with the lime plaster...and those requirement vary from substrate to substrate.

CROSS REFERENCES [XR]

[XR2] See LSB Publication: **Application over Drywall** (Interior Finish Only)

COLOR. Color can be added to the finish coat using either liquid or dry-powder pigments. Another option to colorizing the plaster coat is to apply a limewash^[XR3] to the cured plaster surface.

The Limestone Color System uses eight core dry pigment colors to make a variety of shade/color combinations. Color recipes (ratio of color pigment to single bag/batch of finish plaster) can be chosen from our standard palette of 21 colors^[3] or can be custom developed. For custom color formulations, two options are available: develop a custom shade/color yourself by following the guidelines in the Custom Color Formulation Guide, or use Limestone's Custom Color Service, wherein Limestone develops a custom color recipe based on a customer-provided swatch from either the Benjamin Moore® or Sherwin-Williams® color libraries.

Full details for mixing in liquid or dry pigments into the finish coat are detailed in the both the **Lime Plaster Application Guide** and **Using Limestone Build Finish Plasters** guides.

STORAGE AND USE WINDOW

Once mixed, Limestone Build plasters remain usable for 3 to 5 days IF stored tightly covered and kept cool (but not allowed to freeze). A pozzolanic hydraulic lime (PHL) plaster—being slightly hydraulic—is strongly affected by temperature. If stored in warm-to-hot conditions, the mixed plaster mud will set faster than if stored in cool, above-freezing temperatures. Within the 3-to-5 day window, retempering^[4] may be necessary to return the mud to an ideal working consistency.

APPLYING LIMESTRONG BUILD PLASTER

Lime plaster can be applied with a stucco sprayer or by hand with a hawk and trowel. Refer to the **Lime Plaster Application Guide** for complete instructions.

METHOD: SPRAY APPLICATION. Spraying on lime plaster using a texture or stucco sprayer^[XR4] is both efficient (faster application) and advantageous to a good bond—substrate-to-plaster or plaster-to-plaster.

How stiff to mix the mud for spray application is dictated by what works best through the sprayer rig. A fairly stiff (well mixed and fat) mud provides the best end result. In other words, batch the mud just soft and fluid enough to run through the sprayer rig. Too stiff and it bridges up in the hopper and won't readily flow down into the air stream for ejection through the ports. Too wet and it sags on the wall, is hard to trowel-tighten to a consistent coat height, extends curing time, and exacerbates shrinkage cracking.

The spray application should be followed by troweling to press-contact the plaster more completely to the substrate, tighten and consolidate the plaster, and to even out the thickness of the coat over the wall section. Avoid overworking, or slicking, the plaster surface. Remember to first thoroughly and adequately mask off areas that don't get plaster.

METHOD: HAWK AND TROWEL APPLICATION. Move mud from the mud board (or bucket) to the hawk with a scoop or a kite-shaped mason's trowel. The hawk is easiest to use and balance when the mud is loaded, carried, and balanced in the center of the hawk. Tip the hawk into the trowel and skim the mud with the trowel to load the trowel, then transfer the mud on the trowel immediately to the wall.

KEY: When applying plaster, the loaded trowel is always moved in an **upward stroke**. The next loaded stroke starts lower (overlapping the tail of the previous) and moves up. By working in repeated, overlapping up-strokes, the mud stays on the trowel until pushed onto the wall. At the completion of each stroke, move the trowel in a sweeping circular motion to one side, which helps break the suction between the trowel and the mud and does not pull the mud back off the wall.

Work with a wet edge, blending one section of work into the next. Complete an entire wall or wall section before moving on.

FOOTNOTES [0]

[3] See the Standard Palette at limestonebuild.com/color-system.html

[4] Retempering means to take plaster mud that has stiffened and work it back to a creamy, usable consistency by stirring/mixing it either with a trowel on the mud board, with a drill and mixing-paddle attachment in a mud tub, or returning the mud to the mixer. Often, it is necessary to add a little water as well. Lime plaster can be retempered for up to 24 hours without adversely affecting final bond strength.

CROSS REFERENCES [XR]

[XR3] Refer to the LSB Publication: **Coloring Plaster with Limewash** for more information.

[XR4] See LSB Publication: **Plaster Tools and Equipment**

APPLICATION THICKNESS. The thickness of the **scratch coat** depends on the substrate to which it is being applied (see substrate-specific guidelines), but is typically applied at one-quarter (1/4) to three-eighths (3/8) of-an-inch for most substrates. Rough, variable-surface substrates like strawbale require a thicker coat to get adequate scratch-coat coverage. Avoid going over recommended thickness for the substrate, as this makes the cure time more lengthy and difficult and puts more weight on the wall than is necessary.

Apply the **leveling coat** at three-eighths (3/8) to one-half (1/2) of an inch in thickness. If additional thickness is needed in some areas—to get things straightened up and up to level and looking good—apply the additional plaster as another layer in those places, allowing the previous leveling layer to cure for 3 to 5 days before adding the subsequent leveling layer.

COVERAGE

Calculating the surface coverage of a bag of LSB Binder is greatly affected by the following factors:

- 1) Coat type—scratch or leveling.
- 2) Texture-depth of substrate (scratch coat). For example, substrates such as straw bale, lath-covered wood or EPS foam, mortar-stacked cement blocks or poured hempcrete all present a different texture that the scratch coat must fill and bind to.
- 3) Mud-mixture richness. For example, a leveling coat uses a sand-to-binder volume ratio as high as one-part LSB Binder to 2.5 parts sand. A rich scratch coat, on the other hand (for straw bale or hempcrete) calls for one part binder to one-part sand.
- 4) Applied coat thickness and consistency of depth.
- 5) Application method. Spray applications take more plaster, as inevitably, some material is spent as over-spray and ends up on the masking materials or shot past the edges.
- 6) Care of application. Depending on the skill and care taken during application—whether taken from hawk to trowel to wall or follow-behind troweling of a sprayed-coat, some material ends up on the ground.

The ONLINE CALCULATORS available on the limestrongbuild.com website will provide coverage estimates based on the various parameters chosen—square footage, coat type, application thickness, application method, and substrate. These calculated estimates will provide the number of bags needed to complete the job. Best to order a bit more material for contingencies (like waste-loss and the occasional over-applied thicknesses).

CURING LIME PLASTER

Proper curing at each coat stage is critical to the overall functional success and longevity of the lime plaster render. For a complete discussion of curing, see the Curing Lime Plaster section of the **Lime Plaster Application Guide**. Some key points:



- Cure time between coats depends on thickness of the coat and the atmospheric conditions, which could be anywhere from 3 to 5 days to twice that. An ideal lime plaster cure is attained in 7 to 10 days. Don't rush it. Lime plaster gains strength as it cures: the better the cure before next coat is hung on, the better the overall strength and performance of the plaster rendering overall.

- Because of the way lime plaster cures—via a molecular-level chemical reaction that requires time and adequate internal moisture to work properly—the surface of the curing plaster **MUST** be kept misted and moist.

- Temperature affects cure rate. Curing times tend to be faster in warm weather (as long as moisture is present in the plaster) and slower in cold weather. Also, the curing plaster must not be allowed to freeze—especially during the first 24 hours of curing.



- A successful cure is significantly easier to attain with good planning. Think through it—how, when, and in what wall/surface order you're going to approach the application. What is the best time of day to work on each wall? Consider the climate and season, and in particular, the expected temperatures, wind speed and direction, shade coverage, and so on. How will the wall be protected from rain and surface-drying winds?

SAFE USE PRECAUTIONS



Limestrong Build™ Finish plasters contain hydrated (slaked) lime, which (because of a high pH) is somewhat caustic. Breathing the powder dust can also cause respiratory irritation. BE SMART. Protect yourself. In all situations, if irritation develops, seek medical attention. Please read our **Safe Use Precautions and Treatments** publication for information on protecting and treating skin, eyes, and breathing function.