

### Three Coat Stucco - The Do's and the Dont's

I have a construction inspection and testing business in California. We respond to homeowner occupied rain related leaks for the large builders here in California. We provide water testing services to the construction industry and help them learn what leaks and what does not leak. This means I am water testing stucco every week. Usually I am responding to a "Window Leak". Typically, it is not the window component that is leaking, rather the materials around the window. Here on the West Coast the predominant exterior cladding for homes is stucco. I am often asked if I "like" stucco. I'll bet that I am asked that question a few times a month.

The answer is "Yes! I like stucco very much." I would use stucco on my own home and never suggest that someone avoid stucco. The benefits are many: durability, beauty, and energy friendly, to name three. Let's face it, when you can clad your home in cement, you have a very durable exterior face to your home. From my standpoint, it is a great way to manage water outside the home, thus avoiding leaks.

Like many things, however, there are pitfalls to avoid and rules to follow.

Let's go through a few of these now; Inexpensive precautions will save you a fortune!

First, the building envelope. This is a giant issue. Your building envelope needs to be water tight. It does not matter if you are using Tyvek Homewrap or Jumbo Tex Grade D 60 minute paper. Your building envelope needs to be able to guide water down to your screed at the base of the wall. "Down and Out" is the battle cry for water management.

You should always have 2 layers of your building envelope installed before the lath wire goes up. Why two layers? Because the top layer may act as a sacrificial layer. It may get damaged during construction, or in some cases the stucco may actually stick to it. But the layer below that one will still be there in its pristine condition to act as the "drain plane". Have you ever heard of the "drain plane"? The drain plane is the surface that guides water downwards. Water will always follow the path of least resistance. We design wall systems so that the path of least resistance is downwards. Our designed path is called the "drain plane". This is a huge issue to understand. ***Never build a stucco wall without completely understanding this issue.***

Water always travels behind stucco. In fact, more water travels behind stucco than you might imagine. We proved this theory in Anaheim Hills, California, about 10 years ago. We built a 20 foot long mock up wall assembly and installed 5 windows in it. We used 2 layers of Jumbo Tex building paper over open bay construction. We applied the lath wire with fur nails by hand and hammer. From the inside, between the studs, we cut holes in the building paper to expose the scratch coat of stucco. Three coats of stucco were applied over the course of 10 days and moisture curing was employed at the scratch and brown coats. A custom spray rack was built so that water could be applied to the entire surface of the wall at once.

After the water was applied to the outside surface, we were all amazed at how quickly we observed water to travel into the holes we cut in the building paper. In less than 2 minutes we saw water flowing behind the stucco. The water did not only travel downwards, but it traveled sideways, too! The volume of water we observed was shocking. It left everyone with the keen understanding of how important it is to create a water tight building envelope.

This means that, especially in open bay construction, shiners (Nails that miss the framing) can be disastrous. Additionally, any tear in the building envelope can spell trouble. When the home is fully sheathed, the risk is reduced, and the problems are just a little different. The sheathing manages the water outside better; Shiners are not the big problem as in open bay construction. However, the

sheathing can become damaged by decay and mold when it gets wet. If you are using OSB for your sheathing, then the water can soak it and render it useless. I have actually been able to poke my index finger through OSB that had been damaged from the rain because the building envelope was not correctly prepared. These problems you don't need, trust me.

To get a water resistive building envelope, there are a few suggestions. First, like we said earlier, use two layers of material. You can use two layers of Homewrap, or a layer of Homewrap and a layer of Grade D building paper (always use 60 minute paper) like Super Jumbo Tex, or two layers of Jumbo Tex. The Homewrap designed for stucco is great. However you will still want to provide a layer of Grade D 60 minute paper first. This is to protect against penetrations from your lath fasteners. I like Super Jumbo Tex 60 minute Grade D building paper by The Fortifiber Building Systems Group. I also like Tyvek products from DuPont. You must understand how to use these products correctly. The most common problem I see is with Tyvek. Contractors often do not understand how to cut the Tyvek and wrap it into rough openings, especially at the top of a window or door. The top flap of the Tyvek must be held up temporarily until the window or door is set and flashed. Only then may it be pulled downwards, over the window flashing and taped into place. I frequently see the Tyvek pulled into the rough opening on all four sides, then the window or door is set. This will leak. Trust me on this one. Do not do it! If you do not know how to properly use Tyvek, call your local Tyvek representative. My experience with them is that they are always glad you called and eager to help.

If you have another brand of building paper or homewrap you like, that is fine, use it. But always understand its designed use and install per the manufacturers instructions. If you are using Grade D building paper always use 60 minute paper. Unless you know to use 60 minute paper, your local distributor may load you up with 30 minute, or even 10 minute building paper. Pay close attention, and use 60 minute paper. Another problem I see routinely is reverse laps in Grade D building paper. This happens under windows and under items like shutter blocks. Remember that under windows, the building paper should be tucked up under the lower course of window flashing. You have minimum overlaps in building paper of 6 inches vertically and 2 inches horizontally. Do not use laps any less than these minimums.

Next, always flash every penetration in the envelope. Many builders think the small electrical penetrations and plumbing penetrations do not need to be flashed. I regularly see gable end vents that are not flashed or sealed. That's crazy! A gable-end vent is usually high on the wall where it will get heavy rain with wind. But for some reason, many builders think they can just nail it in place and not worry about it. Wrong. Worry about it. Flash it. Use sealant on the nailing flange just like you would a window.

Flash everything that goes through your building envelope.

Electrical boxes, plumbing, and light fixtures need to be flashed. A company called QuickFlash ([www.quick-flash.com](http://www.quick-flash.com)) has some great products for these items that are easy to use and not terribly expensive. I strongly urge you to use them. DuPont created a product called Flex Wrap. This is a great way to flash some of these areas, too. Lastly, you can look at Lightning Flash Corners ([www.tslabs.com/lightning-flash/](http://www.tslabs.com/lightning-flash/)) for help with some of these areas as well. But do not leave these areas un-flashed.

Next, lath penetrations. I suggest you hand nail with furring nails. Some contractors like to use pneumatic staples and shoot the wire on. I can simply tell you that, in my experience, this will create problems. These staples have 2 prongs, thus, two penetrations. They do not have the nice little cork wad to help keep water away from the hole. Plus, when a young guy gets that pneumatic nailer in his hand, he becomes Clint Eastwood. He shoots everything. Twice. Way too many penetrations. So I strongly urge you to hand nail your lath wire up, ensure every furring nail is perpendicular to

the wall, and the wad has compression to the solid substrate. If a shiner happens, seal it with a high quality sealant. Do not use sealant that says "easy water clean up" on the tube. And not silicone. I suggest a polyurethane type sealant (Rainbuster 900, OSI Quad, Moistop sealant or SM 7108) or one of the sealants with the new MS technology. I will supply a list of products I like at the end of this article. After the lath wire is up, have someone walk around and apply sealant on top of any furring nail that does not appear to go straight into the framing, or appears to not have good compression for any reason. All of your nails that apply the wire corners need attention, too. Remember, water will be traveling over this area. If you can see a hole in the paper you need to seal it. You should never be able to see wood from the outside, and never see daylight from the inside of your home after the building paper and lath wire are installed. Before the scratch coat is applied, take a walk through your home to ensure it is ready. Look for daylight from the inside and wood from the outside.

All your windows and doors need to be effectively flashed. I suggest quality flashing products by The Fortifier Building Systems group (Moistop Next, Fortiflash), DuPont (Flex Wrap and Straight Flash), Rainbuster products (Rainbuster 415 and Rainbuster 420) and Henkel OSI (OSI TeQ Flash). In terms of the flashing strategy, I suggest AAMA method B or B1 depending on your location and use of HouseWrap. Since this is not a window article, I will not go too deep into this issue; however, this issue is important to the stucco contractor because he is usually responsible for the water tightness of the home. Stucco contractors need to verify these products are correctly flashed and sealed before they cover them up (most contracts have a clause in them about covering the work of previous tradesman. If you cover it and it is wrong, you may have bought it).

At the base of your wall should be a metal stucco screed. There are two basic types: the kind with holes and the kind without holes. I like the kind with holes because I have seen them work effectively for many years and I have faith in them. I understand not everyone agrees with that. If you like the kind without holes, go ahead and use it. But if you paint the wall, especially with an elastomeric paint, do not paint over that lower seam where the metal and the stucco meet. If you paint over that seem, especially with the hole-less screed, you may block the escape route for water. Here is a special tip: if you are in a high wind area (second floor decks overlooking a lake or the ocean) use a SAF peel and stick flashing product on the nail fin of the screed. I suggest a 9-12 inch strip of SAF (RainBuster 415, Fortiflash Butyl, or DuPont Straight Flash) on the nailing fin of the screed and up the wall. In the event of a driving rain with high wind, this will give you some much needed protection.

When nailing up the lath wire, keep your fur nails "3 fingers" away from windows and doors. This will help ensure that the furring nails no not damage the nail fins of these products. Nobody should penetrate the nail fins of windows and doors except the window and door installer. They can do it because they are driving fasteners through wet sealant. Do not install a lath fastener into the corner of a 90 degree corner. This is because of the poor solid backing in this area for the fur nail. All fur nails should be applied into an area with solid backing, and be perpendicular to the wall with good compression to the cork wad.

The Stucco Mix is a concept to get right. You should NOT measure your sand by the shovel-full. Why? Different size shovels is a great reason. Different strengths of tradesmen is another reason. One guy may throw 8 pounds of sand with his shovel, while another guy might throw 5 pounds. You should make a box, a cubic foot is a good idea, and fill the box with the sand, and then add that sand to the mix. This is considered one part of sand. Typical mixes are 4 parts of sand to one part of cement for your scratch coat. Your brown coat

is usually 5 parts of sand to one part of cement. When you use the cubic foot box method you know exactly how much sand you are using. Always mix per the manufacturers instructions. Some stucco contractors swear that the mix of the sand in the scratch and brown coat should be the same. Others say that the brown should have more sand. I say check your local codes and manufacturers specifications. Usually more sand is better so I would go with more sand in the brown coat.

The quality of your sand is a big issue. You must use clean sand. Pay the extra money for clean sand designed for use with stucco. I have heard of guys trying to save money and going to the beach to dig free sand. This is a visit to crazytown. Never do anything like that.

A great way to avoid these concerns is to use manufacturers pre-mixed stucco. You take the risk out of a poor mix. That way you have the full backing of the supplier behind you. If things get ugly, and you are in court someday, and you testify your sand mix was done by a "shovel-full method", you might as well break out your checkbook as you finish that sentence.

Next is the concept of moisture-curing your stucco. This is another big issue. Your scratch coat should be 3/8" thick and it should be moisture cured for 2 days before the brown coat is applied. What is moisture curing? It is the idea that the stucco stays "moist" during the curing period. In different climates, you may have to wet the stucco at different intervals. Washington state may need it once or twice a day due to their environment; Texas and Arizona may need it 4 or 5 times a day. This is simple, just a hose with a spray attachment and spray the stucco. You can get fancy and set up spraying systems with timers too if you are that type. But if you do not moisture cure your stucco, your stucco will not cure correctly. Problems will result.

Here is a special note: if you are in a windy area your stucco can "Hyper-cure" meaning cure too fast due to the wind. This can be devastating. I have seen stucco that was more like sandy chalk due to Hyper-curing. Moisture curing is critically important in these windy areas.

Next, apply the brown coat 3/8" thick. After the brown coat is applied, you should not be able to see any wire protruding at the surface of the stucco.

Moisture cure the brown coat for 2 days. If your stucco manufacturer gives you a different curing time than the times I just listed, go with the manufacturers recommendations. They will all urge you to moisture cure their stucco. After two days of moisture curing your brown coat, you let it stand for the "dry curing" process. This dry curing should be a minimum of 5 days. Testing has indicated that 10 days is optimum. If you schedule it properly the extra time should not be an issue. I urge you to dry cure for 10 days after the moisture curing is completed. Remember, the brown coat is perfectly water resistant if cured correctly. Water does not pass through the brown coat of stucco unless there is a crack in it. Proper curing practices help to prevent cracks in your stucco, thus reducing water intrusion. Keep in mind that even when perfectly applied, there will be cracks in stucco. We want to minimize cracks. To eliminate cracks would be about as feasible as curing world hunger.

Now your color coat is easy. It is 1/8" thick and goes on after the brown has cured. Your final assembly should be 7/8" to 1" thick. Nothing less. Your local code will say a minimum of 3/4" thick is acceptable. Do not believe it. You should consider 7/8" to be your minimum thickness.

Many contractors want to paint their stucco with an elastomeric paint. The current generation of elastomeric paints are fine and allow for some breathing of the materials. I am fine with this idea as long as the escape route for the water at the base of the wall is not obstructed. I have seen homes where the elastomeric paint was rolled under the screed metal and the water that got behind the stucco was trapped. That is a dangerous condition. Water will follow the path of least resistance, and when the screed is obstructed, that will usually be to the inside of the home. This is a shame, given that so much money was spent on expensive materials, yet water still came into the home. The materials may be the best money can buy; if they are used incorrectly

they will not be of much value as they are stripped away from the wall with an electric hammer. Elastomeric paint should not be used as the “remedy” for leaks. That theory holds that the paint will keep water from getting behind the stucco. I do not believe that is possible. A condition I see just about every month is the metal screed being buried by the patio concrete or the landscaping. If you bury the screed, the water will back up into the home. Remember, as a minimum dimension, the screed should be 2 inches above the walking surface and 4 inches above earth. Another condition I regularly see that creates problems stucco walls is the absence of kick-out flashing at the edges of roof where the roof edge abuts a wall system. The absence of kickout flashing will overwhelm the building envelope with water. Even a wall correctly prepared may fail due to the absence of kick out flashing. Also, where the roof fascia board terminates against a taller wall system flashing is required between the wall and the fascia board end. I like metal flashing here, however many contractors use SAF membrane here. Just ensure it properly overlaps the building envelope below it in water-board fashion. Another important tip is to NEVER apply a SAF membrane on top of the lower nail fin of a window. Water will eventually get into wrinkles and gaps in the membrane and eventually force the adhesives to fail. Water will fill up behind the SAF membrane and eventually enter the home. If you are going to place SAF products on the window nail fins, just do it to three sides and leave the bottom nail fin alone.

When applying SAF membranes, always use a J-roller (<http://tllabs.com/j-roller-for-self-adhered-flashing-products/>) to achieve good adhesion to the substrate. This is a great tip because J-rollers are cheap and easy to use. They will reduce wrinkles and improve adhesion. They allow you to get your moneys worth out of your expensive SAF membrane products. Primers are a good idea as well. I would never discourage a primer. In some conditions a primer may be required. Check with your SAF supplier about their requirements for a primer.

If you follow these guidelines, your stucco experience should be great. Stucco is a fine material that will give your home a very long, useful life. Good luck!

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