THE ANATOMY OF A DURABLE & HEALTHY

MANUFACTURED STONE VENEER

INTRODUCTION

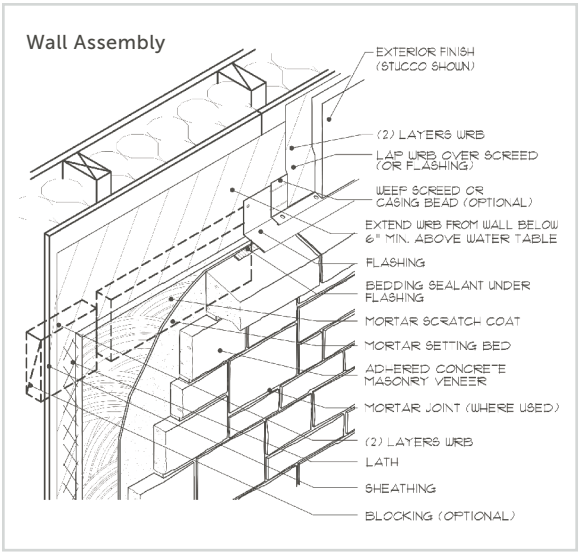
When looking at a stone wall it can be hard to decipher whether it's sourced naturally or manufactured. Often, even the most experienced eye has challenges seeing the difference. This attention to detail is a testament to the progress the manufactured stone industry has made over the past 60 years.

Commonly referred to as "faux stone" or "MSV," Manufactured Stone Veneer is a versatile product with endless creative design possibilities. Its use has seen steady growth over the years due to having many benefits over natural stone products along with aesthetically appealing designs that create beautiful results. Like all building materials, manufactured stone veneer needs to be installed, paired and integrated properly with other systems present in the wall or building. This article will touch on several aspects of using manufactured stone veneer to help designers, owners, and installers achieve a beautiful wall with long-term performance.

WALL PREPARATION

Manufactured stone veneer has been installed with success over both metal and wood framed walls. It can also be installed over masonry substrates of CMU block or brick and even poured concrete. This opens up options to beautify almost any building or landscape feature you might encounter. However, it is imperative that appropriate application steps are taken to prepare a wall to receive stone veneer.

Prior to any installation, it's important to evaluate the wall to assure it is in compliance with local building codes and not showing any evidence of structural failure or deterioration. If you have any questions or concerns about the wall, call an expert to evaluate it and prescribe measures to address any shortcomings. Make sure sheathing materials are gapped properly; typically they require 1/8" gap at all sheathing seams. Failure to provide this gap can lead to expansion forces cracking the veneer.



Source: MVMA Installation Guide

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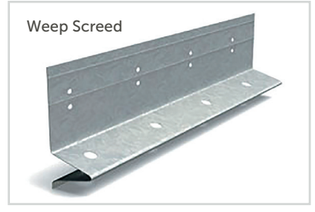
In framed construction, you will likely be looking at stud spacing of 16" on center and some type of sheathing material. While there are options that allow installation over "open stud" construction, that technique is limited to a relatively small geographic area and we will leave that topic for another article. To prepare a framed wall you will have to apply two layers of Water Resistive Barrier (WRB) and install a weep screed. Building codes define what materials are suitable WRBs but you might consider the following to help improve the performance of your wall. First let's talk about the two layers of WRB.

The first layer of WRB on a framed wall is referred to as the "Primary WRB." This layer is responsible for most of the draining of any incidental water that gets into the system. Good primary WRB is money well-spent. Consider some of the common properties in your decision like: vapor permeability, tear resistance, water resistance, perforated or spun bond, ease of installation, jobsite durability, fastener penetration risks and time exposed to UV prior to being covered. Pick a WRB that suits the weather and living conditions of your specific building. The second layer of WRB is referred to as the "Sacrificial Layer." The purpose of this layer is to protect the primary WRB from mortar adhesion and to create a small drainage plane between the two layers. While you should consider all the same properties in the selection of this material, you can save some money here as this layer has less to do.



Before installing any WRBs let's consider the "Foundation Weep Screed." Imagine a few drops of water between two layers of WRB. Gravity will play its role and cause those drops to descend to the bottom of the adhered veneer system. This water needs a location to exit. Borrowing from the stucco system building code requirements, a foundation weep screed is installed to provide this exit point and protect any framing materials that could potentially be damaged by water. While placement of this weep screed is a subject of some debate, the intent of the building code is clear. Installing a weep screed at the transition between foundation and framing protects these susceptible framing materials. The weep screed also acts to kick the water out from the building and provide the appropriate clearance from grade or a paved surface. In most cases, the weep screed is installed to provide a 4" clearance from grade or a 2" clearance from any paved surface. The weep screed is the first to be installed so that WRB materials can lap over its 3" attachment flange in shingle fashion.

In masonry construction, building codes do not require application of a WRB or a weep screed. However most manufacturers and code officials will still require stone be installed meeting the same clearance requirements. There is nothing that precludes installation of a WRB in these applications, but by doing so you will likely lose the option to adhere directly to the masonry. Installation of lath is also optional unless you have applied a WRB or need the lath to address a questionable bonding surface. Examples of some questionable bonding surfaces include: sealed masonry, painted masonry, dirty surfaces, extremely smooth surfaces or masonry that has been covered by a non-bondable WRB.

WATER MANAGEMENT PRINCIPLES

There are three principles that come into play in water management of a wall system. First is a "barrier system" which claims to stop water at the exterior face of the cladding. Second is a "concealed barrier system" which employs a second material further into the wall to drain/manage water. Most adhered veneer systems fall in this second category where the WRB is the concealed barrier. The third is a hybrid of the concealed barrier system called a "Rainscreen," which utilizes the same concealed barrier (WRB) but also provides a larger physical air space between the WRB and the cladding. This installation method is required in a few climates of North America. With this technique, the designer can obtain nearly unobstructed liquid water drainage and ventilation drying. Even in jurisdictions that don't require this method, we find users view it as a belt-and-suspenders approach that can protect them against failed WRB or flashing-installation details, condensation risks, and to ensure overall health of the wall system.

LATH—"*THE SKELETON OF THE SYSTEM*"

The stucco industry has been using lath for centuries and much has been written and standardized on this topic. If the framing in framed construction is the skeleton of the building, then lath is the skeleton of the adhered veneer system. ASTM Standard C1063 goes into great detail regarding the specifics of proper lath installation. This standard can be supplemented by an article written by Gary Maylon called ***Expanded Metal Lath Installation for the Application of Portland Cement Stucco. The Eight Deadly Sins.***

The point is lath installation is critical. Fasten lath to framing so the weight load of the adhered veneer system can be transferred to framing. Use the appropriate length fastener to obtain no less than ¾" penetration into framing. Fasteners should be spaced 6" on center and into framing. Lap lath 1' at vertical and horizontal seams and cause those vertical seems to occur at framing locations. At both inside and outside corners, wrap the lath past the corner to the next framing member approximately 16" down the wall.

You have many choices when it comes to lath. These include expanded metal lath, woven wire lath, welded wire lath, fiberglass lath and even some plastic choices. Since this component is so critical to the performance of the system, this is not a good place to cut corners. As you make your choice, consider that manufactured stone, mortar and lath can weigh up to 25 lbs/sq ft, and lath with its attachment will carry this load to framing. Select a manufacturer that can provide proof of compliance to the appropriate ASTM material specification.

SCRATCH COAT

Scratch coat provides two primary functions. First, by fully encapsulating the lath with a mortar scratch coat, the amount of water and air that can reach the lath is minimized. This functions to extend the corrosion resistance of the lath (in the case of metal). The second contribution is for total weather resistance of the wall. The mass of the total scratch coat combined with setting bed mortar and stone units provides the capability to manage water through absorption and evaporation. The scratch coat should be ½–¾" thick. And, by using a self-furred lath or a lath furring fastener, the lath should be centered near the middle of this mortar thickness. Reinforcement in the center of the mortar provides the optimum crack resistance. Failure to fur the lath will make it difficult to obtain the required scratch coat thickness and does not allow the reinforcement to function to its fullest extent.

SETTING BED & ACHIEVING GOOD BOND

Building codes require that all adhered veneer achieve a minimum bond strength of 50 psi. This is not an overly stringent requirement and can easily be achieved with a few key guiding principles.

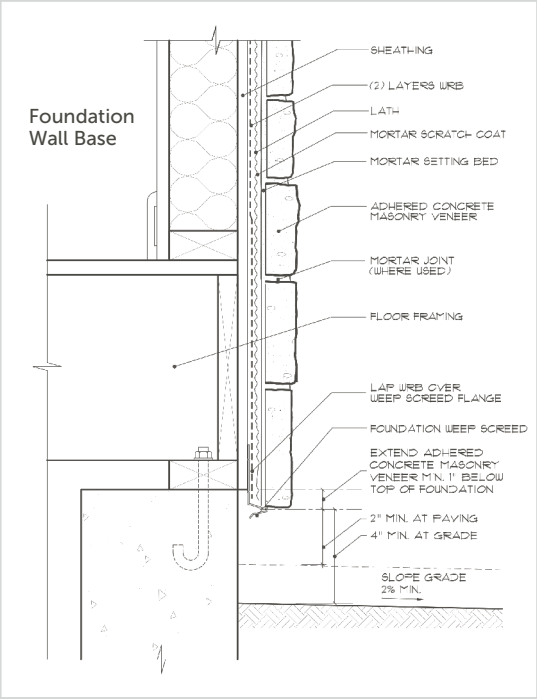
- **Prepare the stone units.** Make sure they are clean and any loose material is scrubbed from the back with a wire brush.
- **Address weather conditions.** Hot/dry weather will require you to dampen the back of each stone unit and the scratch coat. Mortar manufacturers have some specific instructions for these conditions. Cold weather conditions will require materials to be heated and the application to be tented and heated during installation and while curing.
- **Pick quality mortar.** Regardless if you mix mortar from scratch or buy pre-mixed just-add-water mortar, pick a quality product that meets the requirements of the stone manufacturer you are installing. Mix and install it per the manufacturer's requirements.
- **Mix the mortar right and know when it's trash.** Your setting bed mortar should be mixed wet enough that a trowel covered with it can be inverted and the mortar will remain adhered to the trowel. Only mix what you can use in the working time of the mortar. Re-temper the mortar as prescribed by the mortar manufacturer and applicable ASTM standards. When the working time has expired, dispose of remaining mortar and mix a new batch. Bond is too important to take any chances here.
- **Select the application method that works for you.** The options commonly used are:
    1. Trowel mortar onto the wall in approximately 5 sq ft area, ½–¾" thick and press stone unit into the mortar with a slight rotation back and forth as you set the stone.
    2. Apply a thin layer of mortar to the back of the stone, pressing it completely into the texture. This is like buttering bread when you have high cholesterol. Apply a second back-buttered layer, again covering entire back of stone to a ½–¾" thickness and press onto prepared scratch coat.
    3. A combination of both previous methods.

The goal of this step is to create a uniform layer of mortar on the wall that supplements the mortar of the scratch coat from the standpoint of weather resistance. It also provides the minimum 50 psi shear bond strength required by building code. You should not have voids within the mortar layers that could capture water. Captured water can freeze and cause units to de-bond. Captured water can also lead to efflorescence and find a way into the building. Remember to always provide a full setting bed of mortar.

COMMON MISCONCEPTIONS & COSTLY MISTAKES

There is no substitute for experience, testing and following instructions. Over the years, techniques and best practices for installing manufactured stone veneer have evolved. Here are a few common misconceptions:

- **The doughnut method:** This is an application where the setting bed mortar is applied in a ring around the outside of the unit. The theory was that the void in the center would provide "suction" to help the stone stay on the wall. The fact is less mortar bonded to the stone and a large void to catch water are detrimental to the installation.



Source: MVMA Installation Guide

- **Failure to maintain proper clearance:** Running stone to or below grade might look more realistic but is a potential violation of building code and could impact warranty coverage. Clearance is required to allow drainage, prevent moisture from wicking up the wall, minimize soil staining and efflorescence and, in some jurisdictions, provide termite inspection zones.
- **Lath lap/overlap:** Failure to lap lath correctly, especially at corners, can lead to cracking.
- **Anti-freeze/accelerators in mortar:** Be very careful with these chemicals. Some can lead to efflorescence problems and others may impact corrosion of lath. Contact your mortar or stone manufacturer for more details.
- **Installation on stair risers:** While this application dresses up a stairway, it's not practical when the appropriate clearance (2") is provided from the paved surface, the step. This application is a water management challenge and can lead to exposure to de-icing chemicals. All of which can impact the performance of the stone and warranty coverage.
- **Proper capping:** Good water management principles govern transitions between materials. Flashing these transitions is required and capping is also critical. Manufactured stone veneer is no exception. Cap your installation with a material that overhangs the stone installation by 1–2". If possible, provide a drip edge or kerf to force water to drop off your capping material promptly.

MAINTENANCE FOR LONGEVITY

Each manufactured stone veneer manufacturer publishes specific care and maintenance requirements. Most will have positions on sealing, cleaning, efflorescence, de-icing chemicals, use in pools or fountains, and power washing. Read and understand all of these before proceeding as they can have drastic impact on performance and warranty coverage

CONCLUSION

The products available to you today as manufactured stone veneer are endless. The design options and variations are robust and will add the curb appeal everyone wants. Take the time to evaluate your suppliers and read all the installation materials available to you. Ask questions and understand the "why" behind certain requirements. Decisions regarding materials you use and how they will be installed can make it a project you will always be proud of, yielding years of pleasure for you and your customers.

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