

MANUFACTURED STONE VENEER INSTALLATION GUIDE



Installation drawings are available at estoneworks.com

INTRODUCTION

Environmental Materials LLC takes pride in being the leader in our industry. As a founding member of the Masonry Veneer Manufacturers Association (MVMA), we have helped to develop the highest standards for the installation of manufactured stone veneer, as seen here in our installation guide.

WORKMANSHIP

This installation guide assumes that construction personnel have knowledge of the materials described and their proper methods of installation. Prior to commencing activity related to the scope of this guide, review all adjacent products and other subcontractor's work that precedes the installation of manufactured stone veneer to ensure that proper workmanship is reflected and that there are no recognizable errors or deficiencies.

BUILDING CODE REQUIREMENTS

This installation guide is intended for use with Environmental Materials LLC manufactured stone veneer and accessories. Environmental Materials LLC installation instructions follow the requirements set forth in ASTM C 1780. Building code requirements vary from area to area. Check with local authorities for building code requirements and/or site specific drawings for your area and application. Carefully read all sections of this guide before proceeding with your manufactured stone veneer application.

SAFETY REQUIREMENTS

- Construct and maintain scaffolding in strict conformity with manufacturer's recommendations and OSHA regulations.
- In accordance with OSHA regulations, provide fall protection for installers exposed to fall hazards.
- Confirm installer compliance with OSHA regulations by reviewing written safety programs and training documentation. Environmental Materials LLC installation team complies with all OSHA regulations and will provide documentation upon request.

Disclaimer: This installation guide follows published MVMA and IAPMO specifications. Check your state building guidelines and codes for additional installation information.



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MATERIAL REQUIREMENTS

MANUFACTURED STONE VENEER

1. Environmental Materials LLC stone veneer is engineered from Portland cement, light weight aggregates, mineral oxide and chemical additives. The product is engineered to achieve a specified strength, color, texture and resistance to effects of weathering.
2. Environmental Materials LLC manufactured stone veneer is engineered in various shapes and patterns to simulate natural stone and is installed in a non-load bearing veneer and trim capacity (e.g. drip ledge and quoins, caps etc.).
3. Thickness: $\frac{5}{8}$ " to $2\frac{5}{8}$ "
4. Weight: maximum of 15 lbs. per square foot
5. Environmental Materials LLC manufactured stone veneer product integrity test results are available upon request

FLASHING / WEEP SCREEDS / CASING BEAD / MOVEMENT JOINTS

The weep screed should be corrosion resistant metal minimum 0.019" or No. 26 galvanized sheet gauge, or a plastic weep screed minimum 0.050", and with a minimum vertical attachment flange of $3\frac{1}{2}$ " wide. All flashing and metal detail pieces should be manufactured of corrosion resistant material.

Verify that all flashing, including roofing kickout flashing, have been properly installed. Although roof flashings are not part of the wall cladding system, they are necessary for proper moisture management. Flashing material should extend above horizontal terminations, roofing material and drainage planes or drainage products. All flashing material should be integrated with water resistive barriers to prevent moisture penetration into structure. The WRB should overlap the weep screed flange.

A minimum $\frac{3}{8}$ " space, adequate sealant, and optional casing bead should be utilized where there is concern for dissimilar material separation.

Control Joints & Expansion Joints – Do not install manufactured stone veneer over these joints.

MATERIAL REQUIREMENTS

WATER RESISTIVE BARRIER (WRB)

Minimum two separate layers of any of the following: No. 15 felt complying with ASTM D 226 for Type 1 felt, or Grade D paper (ICC-ES AC38), or house wrap (ICC-ES AC 38), or any combination two separate layers of these materials. One layer paper-backed lath meeting requirements for Grade D paper may be substituted for the outer layer. Install WRB in a shingle fashion, starting from the bottom of the wall. The inner layer of WRB should be installed, along with flashings, to create a drainage plane. The outer layer of WRB is intended to keep the scratch coat from contacting the inner layer of WRB. The upper layer of WRB should lap on top of the lower layer by a minimum of 2". The vertical joints of WRB must be lapped a minimum of 6". Inside and outside corners must be overlapped a minimum of 12" past the corner in both directions. The WRB should be installed in accordance with manufacturer's recommendations and be integrated with all flashing accessories, adjacent WRBs, doors, windows, penetrations and cladding transitions.



RAINSCREEN

Rainscreen building techniques have been used in construction for many years. These techniques are typically used to improve the escape of incidental water and decrease drying time. Rainscreen products (such as drainage mats or formed polymer sheeting) or construction techniques (such as strapping or furring) that create a capillary break/air space between the cladding and the primary water resistive barrier can be effectively incorporated into manufactured stone veneer applications. Refer to the rainscreen / drainage system manufacturer's recommendation for applications with manufactured stone veneer wall systems. Building codes may allow a single layer of WRB when a designed drainage space is incorporated in the wall system (e.g. rainscreen).

LATH

All lath and lath accessories must be made of corrosion resistant material. All lath material must be self-furred or use self-furring fasteners. The following materials may be used: 2.5 lb./yd² self-furred metal lath meeting ASTM C 847 or 3/8" rib, 3.4 lb./yd² self-furred metal lath meeting ASTM C 847 or 18 gauge (or heavier) woven wire mesh meeting ASTM 1032. Other approved lath may be acceptable for use with manufactured stone veneer provided the lath meets an appropriate ASTM standard or the lath product has an evaluation acceptance report from an ANSI Accredited Evaluation Service showing compliance with IAPMO. Metal lath should be applied horizontally per manufacturer's instructions and should overlap 2" with a minimum of 1" on the horizontal and vertical seams. The ends of adjoining lath places should be staggered. Metal lath is usually installed with the lath cups facing up. Metal Lath should be installed right side up. Lath should be wrapped around inside and outside corners a minimum of 12" and to the next framing member. Lath should be fastened every 6" vertically and maximum 16" horizontally into the framing members and similar spacing on concrete wall surfaces. Do not end lath at corner framing. Alternate lath should be installed per manufacturer's instructions.

MATERIAL REQUIREMENTS

FASTENERS

Corrosion resistant fasteners (staples, screws or nails) must be used to secure flashing and lath. For wood framing, corrosion resistant staples, nails or screws/washers may be used and must penetrate a minimum of $\frac{3}{4}$ " into framing members. For metal framing or panels, corrosion resistant, self-tapping screws may be used and must penetrate $\frac{3}{8}$ " through metal stud or panel with heads or washers large enough to not prevent pulling through lath. Spacing of fasteners is recommended to be a maximum of 6" vertical and should be 16"-24" horizontal on the studs.

For Masonry walls or panels, corrosion resistant concrete screws or powder actuated fasteners (or cap fasteners), may be used with heads or washers large enough to prevent pulling through lath.

MORTAR

Any of the following mixes may be used:

1. Mix 1:
 - 1 part Portland cement
 - 1 part lime
 - 4.5 parts sand
 - Potable water
2. Mix 2
 - 1 part type S Masonry cement
 - 2.25 parts sand
 - Potable water
3. Mix 3
 - 1 part type N Masonry cement
 - 2.25 parts sand
 - Potable water
4. Premix Mortar
 - Premixed mortars must meet the requirements of ASTM C 270 for type N or type S. Check with the mortar manufacturer to determine if the premixed mortar is suitable for installation of manufactured stone veneer and it meets building code requirements of 50 psi shear bond when tested in accordance with ASTM C 482.

SURFACE PREPARATION

WALLS AND WALL SYSTEMS

Verify structural and surface integrity of existing wall prior to installation.
Manufactured stone veneer units must only be applied to structurally sound walls.

MASONRY WALLS, POURED-IN-PLACE CONCRETE WALLS AND CONCRETE TILT UP PANELS

Must be free of dirt, waterproofing, paint, form oil or any other substance that could inhibit the mortar bond. These surfaces must have a rough texture to ensure a mortar bond. Acid washing, sand/bead blasting, pressure washing or a combination of these methods may be necessary to achieve the required bondable surface. If a bondable surface cannot be achieved, attach lath and scratch coat before installing manufactured stone veneer.

EXISTING MASONRY SURFACES

Must be evaluated for mortar and face integrity and must be free of dirt, waterproofing, paint or any other substance that could inhibit the mortar bond. Surfaces may be cleaned by pressure washing, acid washing, sand/bead blasting or a combination of these methods to achieve a bondable surface. If the surface cannot be cleaned, attach lath before applying the mortar scratch coat.

OPEN STUDS, NON-RIGID SHEATHING

Must be prepared with 3.4 lb. lath and can utilize paper backed lath over top of another layer WRB.

EXTERIOR RIGID CONTINUOUS INSULATION (RIGID FOAM INSULATION)

Lath attachment methods described in this guide are generally considered acceptable when manufactured stone veneer is installed over continuous insulation up to 1/2" thick. Installation of manufactured stone veneer over continuous insulation greater than 1/2" thick generally requires an engineered fastening system to be provided by the building designer.

CLEARANCES

- On exterior stud walls, weep screeds and other base flashings should be held a minimum of 4" above grade or a minimum of 2" above paved surfaces such as driveways, patios, etc. This minimum can be reduced to 1/2" if the paved surface is a walking surface supported by the same foundation supporting the wall.
- On exterior stud walls where the manufactured stone veneer continues down a concrete or CMU foundation wall, and where a weep screed is incorporated into the wall-to- foundation transition, at the bottom maintain minimum 2" clearance from grade, or 1/2" clearance from a paved surface.
- On exterior stud walls where the manufactured stone veneer continues down a CMU foundation wall, with WRB and lath installed down the weep screed at bottom, maintain minimum 4" clearance from grade, or 2" clearance from a paved surface.
- Where manufactured stone veneer is applied over an exterior concrete or CMU wall, maintain 2" clearance from grade or 1/2" from a paved surface.
- Over an exterior concrete or CMU wall that is not enclosing conditioned space (e.g. landscape walls, pillars, columns, etc.) maintain minimum 2" clearance from grade or 1/2" from a paved surface.
- Where manufactured stone veneer meets a roofline, maintain minimum 1/2" clearance from surface of finished roof.

INSTALLATION OF MANUFACTURED STONE VENEER

Prior to commencing installation of manufactured stone veneer, ensure that the WRB and flashing are properly installed and integrated with each other. Before installing the manufactured stone veneer, it is recommended that a minimum of 25 sq. ft. is laid out at the jobsite so there are a variety of sizes, shapes and colors from which to choose. Mixing manufactured stone veneer sizes, shapes, textures and colors will allow for variety and contrast in the design to achieve the desirable finished project.

MORTAR SCRATCH COAT

After the lath is installed, apply a nominal $\frac{1}{2}$ " thick layer of mortar ensuring the lath is completely encapsulated with mortar. The mortar should be applied with sufficient pressure and thickness to fully embed the lath in the mortar. Total scratch coat thickness is comprised of $\frac{1}{4}$ " mortar embedded into and behind the wire lath and $\frac{1}{4}$ " mortar on the face of the wire lath. Once the mortar is thumbprint hard, scratch (score) the surface horizontally to create the mortar scratch coat.



Moisture curing the mortar scratch coat may help reduce cracking and ensure proper hydration during curing. Before applying manufactured stone veneer, the mortar scratch coat can be dampened so that the surface appears wet but free of standing water. It is acceptable to install stone on a fresh mortar scratch coat once it has obtained a workable texture such as thumbprint hard.

GROUT JOINTS

The back of each manufactured stone veneer should be entirely buttered with mortar to a nominal thickness of $\frac{1}{2}$ ". Cover the entire back of the manufactured stone veneer, not just the perimeter. Buttered manufactured stone veneer should be firmly worked onto the scratch coat and slid slightly back and forth or with a slight rotating motion to set the manufactured stone veneer. Achieve mortar squeeze out in a volume which results in a full setting bed which covers the scratch coat completely. With the proper mortar mix, moisture content, and scratch coat preparation, the installer will feel the mortar start to grab within a few seconds of the setting movement process. At this point, no further movement of that manufactured stone veneer should be made as bonding will be broken.



If the manufactured stone veneer is inadvertently moved after initial set has begun, it should be removed, mortar scraped off the back of the manufactured stone veneer and scratch coat, and then reinstalled following the application process. Install manufactured stone veneer from the top down when possible to minimize cleanup requirements.

Grouting may be done with a grout bag, filling joints to the desired depth, ensuring that mortar is forced into all voids. Grout should be "thumbprint hard" before raking the joints. This curing time before the grout is ready will vary significantly with temperature and humidity. Use a wooden raking stick or pointed tool to rake the joints to the desired depth. Extra precaution should be taken while raking so the surface of the manufactured stone veneer is not damaged. Clean off the remaining grout debris on the manufactured stone veneer surface with a dry, soft-bristled brush. To prevent mortar smearing, DO NOT use a wet brush to treat uncured mortar joints.

INSTALLATION OF MANUFACTURED STONE VENEER

PANEL PRODUCTS

Environmental Materials LLC panel products are intended to replicate the characteristics of natural materials. It is not intended to have perfectly flush edges as do some alternative products. Uneven planes or deviation in the substrate and framing will likely impact the end product or aesthetic value.

When installing panel products, follow all instructions above for flashings/weep screeds/casing bead/movement joints, WRB, lath, fasteners, mortar, clearances, mortar scratch coat, grout joints.

In addition, the following items are important with the panel products:

Make sure that the weep screed at the base is level insuring the first course of panels is level. It is a good idea to make periodic checks managing straight courses.

- A. Corner bead is recommended at outside corners to create a crisp, scratched corner able to receive the panels.
- B. Mortar scratch coat should be an even plane.
- C. Mortar scratch coat, if allowed to dry, must have lines raked into the mortar.
- D. The entire back of each panel must have mortar applied to it.
- E. Once the panel is set in place, do not adjust after 3 seconds to assure the mortar bond is not broken.
- F. Spacers are recommended in-between each panel to insure uniform joint size. The recommended joint size is a nominal $\frac{3}{8}$ " - $\frac{1}{2}$ ".

INSTALLATION OF MANUFACTURED STONE VENEER

JOINTLESS OR DRYSTACK

The back of each manufactured stone veneer should be entirely buttered with mortar to a nominal thickness of 1/2". Cover the entire back of the manufactured stone veneer, not just the perimeter. Buttered manufactured stone veneer should be firmly worked onto the scratch coat and slid slightly back and forth to set the manufactured stone veneer. Achieve mortar squeeze out in a volume which results in a full setting bed which covers the scratch coat completely.

With the proper mortar mix, moisture content and scratch coat preparation, the installer will feel the mortar start to grab within a few seconds of the setting movement process. At this point, no further movement of the manufactured stone veneer should be made as bonding will be broken. If the manufactured stone veneer is inadvertently moved after initial set has begun, it should be removed, mortar scraped off the back of the manufactured stone veneer and scratch coat, and then reinstalled following the application process.

In some manufactured stone veneer installation conditions, a bond enhancing modifier or bonding agent may be used. It must comply with the requirements of ASTM C 1384.

INTERIOR APPLICATIONS

Interior applications in dry, protected areas, for manufactured stone veneer are similar to exterior applications with the following alternatives:

- Two layers of WRB are not necessary behind the lath and scratch coat. A single layer of WRB may protect moisture sensitive materials during manufactured stone veneer installation, but is not required.
- Cement backer board complying with ASTM C 1325 may be substituted for other substrates (e.g. wall board or plywood), WRB, lath and scratch coat. The cement backer board should be installed per the manufacturer's instructions. Latex-Portland cement mortars complying with ANSI 118.4 may be used for installation of manufactured stone veneer to cement backer board. Follow the mortar manufacturer's instructions.

Additional conditions for interior applications include clearances at transitions of the manufactured stone veneer to other materials or surfaces such as floors or ceilings should allow for potential differential movement, but the criteria in the clearances section are not necessary. Flashings, weep screeds, and casing beads are not necessary.

COLD WEATHER APPLICATIONS

Manufactured stone veneer applications should be protected from temperatures below freezing (32°F). The installation area should be heated to keep the temperature at 32°F and rising.

HOT WEATHER APPLICATIONS

If the environmental conditions during installation exceed 90°F (32°C) additional water may be needed on the scratch coated surfaces and the backs of the manufactured stone veneer being applied.

MAINTENANCE AND CARE

SCUFFING

Surface scuffing is a normal occurrence on all natural and manufactured stone and is caused by processing, transportation and handling. This is a natural attribute that can add to the aesthetic appeal of the stone. Light scuffing may be removed by following the cleaning procedures outlined in this document.

CLEANING

Dirt and other particles can be removed from manufactured stone veneer surfaces by lightly scrubbing using a soft bristle brush. Avoid pressure washing or applying acid or chemical-based (petroleum) cleaners to the manufactured stone veneer as permanent damage may occur and will void the manufacturer warranty.

EFFLORESCENCE

Efflorescence is a white crystalline deposit that is composed of salts, lime and other minerals. These deposits may become visible on many types of building surfaces such as concrete, stucco, grout, masonry, brick, natural stone, clay, ceramic tile and even wood. The salts and minerals are water-soluble and generally come from the ground or where cementitious or alkali substances exist and travel to the surface, using moisture as their carrier, and when the moisture evaporates, what is left behind are salts and minerals on the surface.

On occasion, efflorescence may occur with manufactured stone veneer. In situations where this happens, it can be removed from the surface of the product once it is dry by lightly scrubbing the face of the stone using a soft bristle brush and clean water. The area should then be rinsed to remove residue. In severe situations, a solution of 1 part white vinegar and 5 parts clean water can be utilized; however, this may void the manufacturer warranty. Efflorescence will go away over time as salts, lime and other minerals migrate to the surface and are removed or the product is no longer subject to repetitive water saturation. In situations where water exposure is frequent and cannot be avoided, a breathable penetrating sealer can also be used to minimize water penetration and saturation of the manufactured stone veneer. Such sealing **WILL VOID THE MANUFACTURER WARRANTY**. See “SEALING” for complete details.

SEALING

Sealing manufactured stone veneer will **VOID THE MANUFACTURER WARRANTY** and is not required nor recommended.

If a customer chooses to utilize a sealer, a high quality, breathable concrete sealer is suggested. Allow the manufactured stone veneer to cure a minimum of 10 days in 50°F, or warmer, weather before sealing. **CAUTION:** Some sealers will change the appearance, including the color, of the manufactured stone veneer. The sealer to be used should be tested on several sample pieces before applying to a completed project. Sealers should be applied in accordance with the temperatures and conditions stated by the sealant manufacturer.

Disclaimer: This installation guide follows published MVMA and IAPMO specifications. Check your state building guidelines and codes for additional installation information.