

MERRILLSTONE™

Installation Guide Adhered Natural Stone Veneer



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Adhered Natural Stone Veneer

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What is Adhered Natural Stone Veneer (Merrillstone)?

Achieving an elegant appearance and durability in a stone building project begins with product selection. Merrillstone delivers genuine thin veneer stone and dimensional stone. Merrillstone's natural products are impervious to chemicals that might be found on a project site. Because of its durability, natural stone is much easier to clean, and there is no worry of defacing the product. Merrillstone's natural stone thin veneer is easy to install and can be confidently cut on-site to accommodate any installation.

This guide outlines our proven system for installing Merrillstone. We trust this guide will answer your questions and help make working on your project simple and enjoyable. Of course, if you have questions, please call (888) 878-6631 and one of our experts will be happy to offer advice.

Estimating the Job

1) How much stone do you need?

Estimating how much stone you'll need for your project is actually quite simple. You must first determine two basic things: 1) how much flat stone is needed and 2) how many corners you will need. That's it. As you can imagine, Merrillstone flats are used on all the flat areas of your job. Likewise, Merrillstone corners offer the ideal way to handle all outside corners of your project.

2) Determining square footage for flat areas

To determine the square footage of your project, simply multiply the length times the width. For example, if you are placing Merrillstone on a wall that is eight-feet tall and four-feet wide, the total square footage is 32 feet ($8 \times 4 = 32$). When you are taking your measurements, remember to subtract areas that will not be covered by stone (windows, doors, fireplaces, moldings, corners, etc.) from the total square footage.

3) Determining lineal footage for corners

Corners are sold by the lineal foot, which means you must calculate the total running feet of your project. Again, accurately calculating this number is easy. For example, if you have an outside corner that measures twelve feet from the starting point to ending point, you will need twelve lineal feet of Merrillstone corners. In your final calculation, subtract about 3/4 of a square foot from your flat areas for every linear foot of corners.

Preparing the Surface

Because every situation is different, Merrillstone is designed to adhere quickly, easily and powerfully to a variety of surfaces. The following section explains how you should prepare the surface of wood substrate, sheet rock and masonry.

1) Application to structurally sound wood substrate

a. Vapor barrier

If you are installing Merrillstone over bare wood, you must first attach building paper to create a vapor barrier. All weather-exposed surfaces need a weather-resistive barrier behind the exterior veneer that



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will provide a barrier to moisture penetration (See pg 9 for code regulations). To attach the paper, start at the bottom of the area to be covered and run the paper horizontally, ensuring that you overlap sheets by at least 4 inches. Use a small hand stapler to firmly tack the paper.

b. **Weep screed**

A minimum 0.019-inch (0.5mm) (No. 26 galvanized sheet gage), corrosion-resistant weep screed or plastic weep screed, with a minimum vertical attachment flange of 3 ½ inches (89mm) shall be provided at or below the foundation plate line on exterior stud walls in accordance with ASTM C 926. The weep screed shall be placed a minimum of 4 inches (102 mm) above earth or 2 inches (51 mm) above paved areas and shall be of a type that will allow trapped water to drain to the exterior of the building. The weather-resistant barrier shall lap the attachment flange. The exterior lath shall cover and terminate on the attachment flange of the weep screed.

c. **Metal lath or #17 gauge 1-½ inch woven wire mesh**

Once you have covered all surfaces that require a vapor barrier, you should attach a 3.4 pound self-furring metal lath or a #17 gauge 1-½ inch woven wire mesh. Use appropriate-sized galvanized roofing nails or staples, space the fasteners 6 inches on center, and make sure they are long enough to penetrate at least 1 inch into the supporting studs. Use a hammer to insert the nails. If you are using a woven wire mesh, we recommend using a pneumatic staple gun to accommodate the large spaces between wires. In either case, wire ends must be overlapped at least ½ inch. The wire must also wrap around all corners so that vertical seams are at least 16 inches from any corner. Installed properly, the wire mesh or metal lath provides a sturdy foundation for your scratch coat.

d. **Scratch coat**

To provide a rigid backing for Merrillstone, you should create a scratch coat. The scratch coat is simply a coat of mortar that is spread over the entire surface. To make your scratch coat, apply Type S Mortar (refer to “Mixing the mortar”, Step 2 in the following section) at least ½ inch thick across the area. Use a trowel to apply the mortar and a notch trowel or similar device to texture the surface. Once the surface is covered and is appropriately textured, allow the mortar to dry for at least 48 hours.

2) Application to interior sheet rock

Preparation for sheet rock application is virtually identical to wood substrate. However, because sheet rock does not require a vapor barrier, you can skip step 1 in the wood substrate example above. All other steps apply.

3) Application to masonry

If you are applying Merrillstone to clean, non-painted masonry, it is not necessary to use either building paper or mesh. Simply apply the veneer directly to the masonry. Prior to application, all painted or waterproofed masonry surfaces should be cleaned and sandblasted to provide a good bonding surface. You may also attach metal lath or #17 gauge stucco wire on top of a painted or sealed surface to create a sturdy bond surface.



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Preparing the Mortar

1) Mortar type

Merrillstone veneer requires the use of Type S mortar. Type S mortar is available pre-mixed at most home improvement stores, or can be made by following the mixing instructions below:

- 1 part cement
- .75 parts lime
- 4 parts sand

2) Mixing the mortar

Various mixing methods can be used depending on quantity and available equipment. For small jobs, you can use a *wheelbarrow as a mixing tub and garden hoe as a mixer*. Another common method is to use a ½ inch drill with a paddle mixer attachment to stir the mortar in a five-gallon bucket. For larger projects with multiple masons, we recommend using a drum or paddle mixer.

3) Mortar consistency

Proper mortar consistency is critical to your success. Mixed correctly, the mortar should easily adhere to Merrillstone. If too much water is used, the mixture will be soupy and the stone may not bond correctly. On the other hand, if you don't use enough water, the mixture will be crumbly. Dry and crumbly mortar does not firmly adhere to stone and most stones will quickly detach from the surface.

If you purchase pre-mixed Type S mortar, use the mixing instructions printed on the bag as your starting point. Adjust the blend until you achieve a paste-like consistency. If you are installing the stone in high temperatures, (usually over 90 degrees) you may need to moisten the back of each stone before application.

4) Coloring the mortar (See pg7-8 for examples)

Although many people choose a natural tint, mortar can be colored to suit your tastes. Powder and liquid tinting materials are available in a variety of colors. A word of caution: Most tinted mortar will dry to a different color. We recommend that you allow a sample to completely dry before committing to a color or using it on your project. Additionally, accurate measurement of pigment will help eliminate color variations from one batch of mortar to the next.

Installing Merrillstone

1) Selecting the right stone

All Merrillstone offers unique colors and features. Before you begin applying stone to your project, it's a good idea to spread the stone on the ground and look it over. This gives you the chance to compare colors and shapes and allows you to custom-design the overall look of your project. If multiple boxes are used, we recommend that you select stones from multiple boxes to achieve an even distribution of color.



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2) Applying the stone

Begin installation at the bottom. It is helpful to install a temporary ledge to keep stone off of the floor (usually ½ inch above floor for interior walls), or 4 inches above grade for exteriors. This will create a level starting point, and aid in speed of installation. Also, horizontal chalk lines are beneficial every 12" – 16" for the same reason.

Spread approximately ½ inch of mortar to the entire back of stone (leave no air pockets). With firm pressure, press stone into place with a slight "wiggle", allowing mortar to ooze around the outer edges of the stone. Take care to prevent mortar from getting on surface of stone.

Hold in place for a few seconds or until stone feels relatively secure in its wet mortar bed. Small stone chips or wood wedges can aid in immobilizing stones (remove before filling joints). Remove excess mortar from around stone using a trowel or tuck pointer.

3) Keeping the job clean

When it comes to laying stone, clean work makes easy work. Mortar on the face of stone hides color and is difficult to clean. Remember this: The more time you spend keeping stone faces free of mortar, the less time you'll have to spend cleaning your project.

4) Installing accessories

If your project requires accessories such as sills, jack arches, keystones, quoins, caps, hearths, or trimmers, you should install them before you install the Merrillstone flats. If you must install the flats first, make sure you leave enough space to accommodate the accessory and a joint.

5) Install corners first

Installing the corners first, makes for easy fitting. After establishing which corner piece will be used, apply a layer of mortar about ¾ inches thick to the back of the corner. Press the corner into position with enough force to displace a small amount of mortar. Hold the stone for a few seconds until the corner is set. Lay the corners so that the long and short sides are offset from one another or staggered. If a joint is desired, leave the appropriate spacing between the stones. Use a grout bag to apply a sufficient bead of mortar in the joint space.

6) Installing the stone

Cutting and fitting stones

There are a number of ways you can cut or trim stones. A circular saw with a diamond blade works well. In most applications where a joint is desired, ½ inch spacing is optimal. On the other hand, if a dry stack style is being used; little to no spacing is desired. Use your best judgment.

7) Placing and finishing joints

Joint placement

Joints are placed using a grout bag. It is essential that all joints provide a watertight seal. When grouting, use the same mortar you used to apply the stone. Once the grout bag is partially filled with mortar, twist the top so you can easily apply pressure. Squeeze the bag so that a generous bead of



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mortar is placed in the joint space. Grout must be placed in any areas or voids that remain once your stone is set.

Joint finishing

Finishing your joints is the final, yet critical step in your project. So how long should you wait before you begin working on your joints? A good rule of thumb is to wait until the joints are no longer wet, yet not too dry to manipulate. Here's a little test: If your mortar begins to crumble when you touch it, the joints are ready to be finished. Depending on temperature, joints are usually workable between 30 to 45 minutes after stone placement.

Use a striking tool to pack and remove excess mortar. Again, you must ensure that water is unable to penetrate the mortar joints. If any holes or voids are apparent, pack or fill them with mortar. After the joints are worked to the appropriate depth, use a wisk broom or automotive parts brush to clean and buff the joints.

8) Cleaning the project

If any mortar does contact the face of the stone, don't immediately wipe it off. Wait until the mortar becomes crumbly, and then lightly go over it with a soft bristle brush. Remember, if the mortar is not cleaned off the same day you work on your project, you may never be able to remove it.

Never use water to clean wet mortar because it will coat the stone with a foggy layer of mortar.

Optional Installation Methods (different grouting techniques, and mortar options)

Merrillstone natural stone veneer can be installed using a variety of techniques. These different techniques can enhance the look of the stone and your project, depending on what type of style suites your interest. **NOTE:** *The stone you select may turn out completely different depending on the mason and type of installation used. Color's may vary with grout style and appear different than samples suggest. We recommend having your mason install a mock-up first so you'll see how your stone will turn out when completed.*

1) Dry Stacked (no visible grout joint)

This method is accomplished by stacking the stones tightly together, with no mortar joint showing. Dry stacking will tend to take more time than the other alternatives, but the overall achieved look is well worth effort. **NOTE:** *Any Merrillstone texture can be dry stacked, however, some textures can be stacked tighter than others.*



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2) Standard Joint ($\frac{1}{4}$ " - $\frac{1}{2}$ " grout joint)

Standard joints typically range from $\frac{1}{4}$ " - $\frac{1}{2}$ " in size, but may vary depending on the type of stone you're installing. These are commonly used in larger ledgerstone, and limestone textures but by no means meant for just those, you can add a joint to just about any type of Merrillstone and it will change the look and feel of that texture entirely. Add colored mortar to a standard joint project and multiply your options even further.



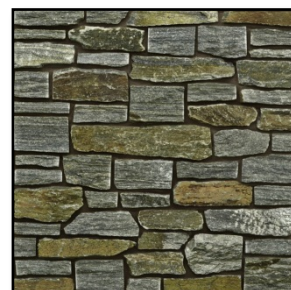
3) Over Grout (1" - 2" grout joint)

Over grouting would be the look you're going after if you like that larger joint or "old world" look. These joint sizes vary between 1"-2" or even larger if needed. This look tends to take more mortar for your project but effectively achieves that larger mortared joint you're seeking. You may also choose to add color to this type of installation to help tie in other colors on your project with the stone work.



4) Colored Mortar Grout

Coloring your mortar can change the way your stone looks entirely. In the examples shown you can see the difference it makes when against the same stone's in all examples. When adding color to the mortar it will enhance, and brings out the different colors in the stone depending on the color you add, and changes the appearance all together. When deciding and choosing the color for your project, we recommend using Lucky 7 Mortar Colors.



Building Code Requirements

Insure that all products and installations comply with your local building codes.

Shown on the next three pages are examples of common installation methods based on requirements of the 2009 International Building Code (IBC). This standard includes Building Code Requirements for Masonry Structures, TMS 402-08/ACI 530-08/ASCE 5-08 and Specification for Masonry Structures, TMS 602-08/ACI 530.1-08/ASCE 6-08. Since standards, codes, and conditions vary and are sometimes contradictory, contact your local Masonry Institute or building department to determine which method is best for your climate and your project.



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Material Requirements

Weather-Resistive Barrier

(Only required for Steel or Wood Studs with Sheathing for Exterior Uses)

2009 IBC, paragraph 1403.2 – All weather-exposed surfaces need a weather-resistive barrier behind the exterior veneer that will provide a barrier to moisture penetration. According to the Commentary to the Code, this assembly has three parts: “a water-resistive barrier installed over the substrate; flashings at penetrations and terminations of the exterior wall finish and a means of draining moisture that may penetrate the finish back to the exterior”. The Commentary states that this drainage plane may be “as complicated as a rain-screen pressure-equalized type of exterior assembly or as simple as providing discontinuities or gaps between the surface of the substrate and the back side of the finish, such as through the use of non-corrodible furring”.

TMS 402-08/ACI 530-08/ASCE 5-08 – Exterior Veneer is required to have a backing system that resists water penetration. This means that the exterior sheathing needs to be covered with a water-resistant membrane unless the sheathing is water-resistant and the joints are sealed.

Weep screeds

A minimum 0.019-inch (0.5mm) (No. 26 galvanized sheet gage), corrosion-resistant weep screed or plastic weep screed, with a minimum vertical attachment flange of 3 ½ inches (89mm) shall be provided at or below the foundation plate line on exterior stud walls in accordance with ASTM C 926. The weep screed shall be placed a minimum of 4 inches (102 mm) above earth or 2 inches (51 mm) above paved areas and shall be of a type that will allow trapped water to drain to the exterior of the building. The weather-resistant barrier shall lap the attachment flange. The exterior lath shall cover and terminate on the attachment flange of the weep screed.

Metal Lath and Fasteners

2009 IBC 2510.4 – Corrosion Resistance – Metal lath and lath attachments shall be of corrosion-resistant material. The type and weight of metal lath, gage and spacing of wire in welded or woven lath, the spacing of supports, and the methods of attachment are given in the ASTM Standards referenced in IBC Tables 2506.2 and 2507.2.

"Corrosion-resistant" are materials that are inherently rust resistant or materials to which an approved rust-resistive coating has been applied either before or after forming or fabrication.

For galvanizing requirements, see ASTM A 153 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

ASTM C 1063 – Lath shall be applied with the long dimension at right angles to the supports, unless otherwise specified. (Section 7.10.1.2)

Metal lath shall be lapped in at the sides (horizontal joints), or nest the edge ribs. Lap metal lath 1 in. at ends (vertical joints). Wire lath shall be lapped one mesh at sides and ends. Where end laps occur between the framing members, the



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ends of the sheets of all types of lath shall be laced or wire tied with 0.0475 in. galvanized, annealed steel wire. (Section 7.8.2)

TMS 402-08/ACI 530-08/ASCE 5-08 – Backing shall provide a continuous, moisture-resistant surface to receive the adhered veneer.

Backing is permitted to be concrete block, concrete, or metal lath and Portland cement plaster applied to masonry, concrete, steel framing, or wood framing.

Mortar

2009 IBC

1405.10– Adhered masonry veneer – Adhered masonry veneer shall comply with the applicable requirements in 1405.10.1 and Sections 6.1 and 6.3 of ACI 530/ASCE 5/ TMS 402.

TMS 402-08/ACI 530-08/ASCE 5-08

6.3.2.4 - Adhesion developed between adhered veneer units and backing shall have shear strength of at least 50 psi based on gross unit surface area when tested in accordance with ASTM C 482, or shall be adhered in compliance with Article 3.3 C of ACI 530.1/ASCE 6/TMS 602.

ACI 530.1/ASCE 6/TMS 602

3.3 C. Placing adhered veneer

1. Brush a paste of neat Portland cement on the backing and on the back of the veneer unit.
2. Apply Type S mortar to the backing and to the veneer unit.
3. Tap the veneer unit into place, completely filling the space between the veneer unit and the backing.
Sufficient mortar shall be used to create a slight excess to be forced out between the edges of the veneer units.
The resulting thickness of the mortar in back of the veneer unit shall not be less than 3/8" nor more than 1 - 1/4".
4. Tool the mortar joint with a round jointer when the mortar is thumbprint hard.

Stone Dimension and Area Restrictions

TMS 402-08/ACI 530-08/ASCE 5-08 (paragraph 6.3.2.1) The maximum thickness of adhered veneer units is 2-5/8" (measured horizontally as installed). No side of the veneer unit can exceed 36 inches in length and the overall face area of the stone unit may not be greater than 5 ft². Adhered veneer units may not weigh more than 15 pounds per square foot.

Application to Stud Construction

Merrillstone units must be applied to open studs spaced a maximum of 16 inches on center (406 mm) or over existing wall surfaces of exterior plaster (stucco), wood siding, or wood sheathing backed by studs spaced a maximum of 16 inches (406 mm) on center.



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Open studs must be covered with wire backing and a water-resistive barrier in accordance with IBC Section 1404.2 or IRC Section R703.2, or a weather-resistive barrier in accordance with UBC Section 1402.1. For installations over wood siding or wood sheathing, a water resistive barrier must be installed over the wood siding or sheathing in accordance with IBC Section 2510.6 or IRC Section R703.6.3. Installations over exterior plaster walls require a water-resistive or weather-resistive barrier, in accordance with the applicable code, behind the plaster.

Weep screeds must be installed at the bottom of the wall and at all horizontal terminations of the Merrillstone Adhered Veneer. The weep screed must comply with, and be installed in accordance with, IBC Section 2512.1.2., IRC Section R703.6.2.1. In addition, the weep screeds must have holes with a minimum diameter of 3/16 inch (4.8 mm) spaced at a maximum of 16 inches (406 mm) on center.

A 3.4-pound-per-square-yard (1.84 kg/m²), self-furring, metal lath or No. 17 gage [0.0539 inch (1.37 mm)], 11/2-inch (38 mm) hexagonal woven-wire mesh must be installed over the water-resistive or weather-resistive barrier. The lath or mesh must be fastened to each of the wall studs at 6 inches (152 mm) on center vertically. For wood studs, fasteners must be galvanized nails, with diameter and penetration as shown in Table 1 of this report, or minimum No. 16 gage [0.063 inch (1.6 mm)] galvanized staples of sufficient length to penetrate the studs a minimum of 13/8 inches (35 mm). For steel studs, fasteners must be No. 8 wafer head screws of sufficient length to penetrate the studs a minimum of 3/8 inch (9.5mm). Wood studs must have a minimum specific gravity of 0.42. Steel studs must be 20 gage [0.033 inch (0.84 mm) bare-metal thickness], minimum.

A 1/2-inch-thick (12.7 mm) scratch coat of Type S mortar must be applied over the lath or mesh and allowed to cure for at least 48 hours before the mortar setting bed is applied. The scratch coat must be moistened and a 3/4-inch-thick (19.1 mm) Type S mortar setting bed must be applied in areas of approximately 10 square feet (0.929 m²). The Merrillstone units must be lightly but firmly tapped into the mortar setting bed to ensure bond while the mortar is soft and pliable. Alternatively, the setting bed must be applied to the back of each veneer unit and the unit pressed into place. In either case, the mortar setting bed thickness and consistency must allow the mortar to be squeezed out around all edges of the veneer unit to assure full bond. All joints must be tooled.



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Additional Information

Sealing the stone

Exterior surfaces can be sealed with a quality masonry sealer. You can either choose a “wet look” sealer or one that you won’t see like “Natural” or “Satin”. Again, the choice is yours. In some cases, sealer is used to make stone colors appear more brilliant.

Regardless of the type of sealant you choose, always follow the manufacturer’s instructions for appropriate application.

Follow local building codes

Insure that all products and installations comply with your local building codes.

Avoiding harsh conditions

Merrillstone is not recommended for surfaces that are subjected to running water. All exterior Merrillstone installations should have a drip ledge, cap, flashing or an eave properly installed to prevent water from running down the finished surface. Surfaces subjected to extreme conditions, coupled with regular freezing and thawing, often exhibit surface impairment and lack structural integrity.

Warranty

Merrillstone® is a thin cut natural stone, quarried from many regions of the country. Due to the nature of this natural material, minor surface flaking & cracks are to be expected, and unavoidable. Merrillstone® is a product of nature, and therefore subject to possible variations in color, veining, granularity, and pitting. These imperfections are inherent with some of our profiles but are superficial, and will not affect the integrity of the stone long term.

Natural Stone (Merrillstone®) offers no product warranty.

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