



Formosa Manufactured Stone Installation Instructions

Formosa stone siding is designed for strength, longevity, and attractive visual appeal. To get the best out of these fine lines of quality stone siding, Formosa has outlined the basics of how to install manufactured stone siding.

How to Install Manufactured Stone Siding: Two Approaches.

Installing Formosa Stone siding can be subdivided into two basic approaches: the standard grouted and overgrouted procedure, and the jointless or “dry stacked” procedure of installation. The first procedure allows for visible grout lines between all siding stones. The second fits stones flush, leaving no room for grout lines. There are some overlaps when comparing the two procedures and Formosa has stipulated all of the differences in this document where necessary herein.

What Are Flats and Corners?

Flats and corners are the units you’ll be working with when looking to find out how to install manufactured stone siding. Flats are applied to walls, and are measured and ordered by the square foot. Corners are measured and ordered by the *lineal* foot, and are applied to outside corners. It is the corners which add dimension to a manufactured stone siding project, used around windows and door openings.

How Much Manufactured Stone Siding Will I Need?

When beginning to explore how to install manufactured stone siding, the following issues should be made clear:

1. *What is the total square footage of the project?* Determine this by multiplying the total length by the total height of all surface areas to be covered. Then, simply deduct the total area of any empty spaces – doorways, windows, etc.
2. *What is the total lineal footage of all corners?* Measure the lineal footage of all corners, including those of windows and doors.
3. *What is the square footage of all flat stones which is required?* To define this figure, multiply the lineal footage of the stones determined above by $\frac{1}{2}$. One lineal foot of corner stones equals approximately half of the square footage for flat stones. Subtract the corner square footage from the total project square footage. This final figure will provide the total number of flat stones required.

After the totals are determined, it's always a good idea to order extra to allow for reasonable breakage during shipment, onsite breakage, and also for the purposes of trim pieces.

How Do I Prepare The Surface?

Sheetrock, wallboard, plywood, paneling, etc.

Apply a weather-resistant barrier which is equal to the U.B.C standard number 141 for Kraft waterproof building paper, or asphalt-saturated rag felt. Apply all surface coverings horizontally, making sure that the upper layer is lapped over the lower by at least two inches. In the case of vertical joints, make sure that the overlap is at least six inches. After the preparation of the surface has been done, install a 2.5lb diamond mesh expanded metal lath or 18 gauge woven wire mesh. When installing siding on an exterior, use a galvanized metal lath. Use of a non-galvanized lath should be restricted to indoor installations only. Overlap lath sides by no less than $\frac{3}{8}$ ". Do the same for lath ends, only do so with a full one inch overlap.

Use galvanized nails or staples to attach the lath, 6" on centre vertically and 16" on centre horizontally. After being sure to attach the lath with the small cups facing upwards, penetrate the studs to a minimum of one inch. Wrap metal lath continuously around all outside and inside corners, to a minimum of 16". When this is done, apply a $\frac{1}{2}$ " thick layer of mortar over the metal lath to act as a scratch coat. Then, let it set.

Open Studs

When installing manufactured stone siding over open studs, apply a galvanized paper-backed $\frac{3}{8}$ " rib-expanded metal lath to the studs, and use galvanized nails or staples in 6" increments. Apply the nails or staples vertically on stud centers with a minimum 1" penetration. Overlap the lath sides by no less than $\frac{1}{2}$ ", and lath ends by no less than a full inch. For installations over metal studs, use corrosion-resistant, self-tapping screws with a $\frac{3}{8}$ " head. The screws should allow for a $\frac{3}{8}$ " penetration. When this is done, apply a $\frac{1}{2}$ " thick layer of mortar over the metal lath to serve as a scratch coat. Allow 48 hours for the scratch coat layer to set.

Metal Panels

The prep process for installing manufactured stone over metal panels is similar to that of sheetrock, wallboard, etc, found above. When installing over metal panels however, the metal lath should be installed using self-tapping screws with a 3/8", much like you would over metal studs, also described above. Similar to that process, make sure that the screws allow for a 3/8" penetration. For the application of a scratch coat, follow the instructions described for an installation over metal studs.

Brick, Block, Concrete, Other Masonry

When installing manufactured stone over a clean, unsealed, unpainted, and untreated masonry surface, no prep is specifically required. For added insurance however, use a metal lath and scratch coat to minimize any chance of cracking or bond failure. Without a lath, it is imperative that masonry surfaces be entirely free of any agents which may affect bonding. Newly poured concrete should be closely examined for form oil or any type of release agents. To do this, spray the surface with water. Should the water bead up, or run off, the presence of such elements may be likely. When looking to eliminate these agents, use a wire brush, acid etch, or consider the application of a metal lath with a scratch coat (as above).

Painted, Sealed, or Treated Masonry

All surfaces must be stripped of any surface elements to ensure a proper bond. Do this by wire brush, sandblasting, acid etching, or water blasting. Alternatively, you can attach a metal lath with scratch coat as above.

How Do I Prepare the Mortar?

Mortar should be set to a firm, yet workable consistency. It shouldn't be either too runny or too crumbly. Here is a guide to how to mix mortar for manufactured stone siding:

1. Mortar Mix For A Grouted Joint Installation

Mix Type N Mortar:

- 2 parts masonry cement
- 3 to 5 parts masonry sand
- water

Or

- 1 part Portland cement
- 1 part lime
- 3 to 5 parts masonry sand
- water

Mix Type S Mortar

- 3 to 5 parts masonry cement
- 5 to 7 parts masonry sand
- water

Or

- 2 parts Portland Cement
- 1 part lime
- 5 to 7 parts masonry sand
- water

For additional visual effects, you can add color to either variety of mortar using iron oxide pigments. See your local retailer for brands, pricing, and other valuable information. Always read the labels on any products you buy, and follow instructions carefully, including those that relate to safety best practices.

2. Mortar Mix For A Jointless or “Dry Stacked” Installation

A. Suggested Mix

- 3 parts Portland cement
- 2 parts thinset mortar* (see note below)
- 7 parts masonry sand water

B. Alternate Mix #1

- 2 parts Portland cement
- 1 part lime
- 7 parts masonry sand
- Bonding agent and water - pre-blended, 1:1

C. Alternate Mix # 2

- 3 Parts Type-S masonry cement
- 7 parts masonry sand
- Bonding agent and water - pre-blended, 1:1

***Note – latex modified thinset used for exterior use, meeting ANSI-A118.4 – For exterior use only.**

For the best visual results, joint lines in a dry-stacked installation are best hidden by color matching the stone base. This can be done by coloring the mortar. Ask your retailer about the best products, read the labels, and follow instructions carefully.

VERY IMPORTANT: The mortar mix for a standard grouted installation may be used for the initial scratch coat in a dry-stacked installation, but **MAY NOT** be used when applying the manufactured stone siding.

How Do I Install Manufactured Stone Siding?

The first step is to double, and triple-check local building codes. These will of course vary from location to location, but remain to be a vital component before proceeding. Second, installing Formosa manufactured stone siding will only be a success when it is done on a structurally sound surface. Please ensure that your structure is sound well before you commence. When these initial considerations are taken into account and confirmed, follow all instructions carefully.

General Best Practices

Be sure to protect your siding and your structure overall by diverting water run off. Use cant strips, gutters, and flashing to keep run off from staining stone surfaces over time. Minimizing run-off can also prevent freeze-thaw damage. The use of siding caps can further prevent these forces from damaging the manufactured stone siding. Standard corner pieces or flats should not be used on exterior horizontal planes. When installing manufactured stone siding on retaining walls, appropriate drainage considerations should be made a priority to avoid long-term damage. Waterproof all retaining walls from the fill side.

Installing Formosa manufactured stone in areas subject to being submerged should be avoided. Areas which are subject to harsh chemicals, including chlorine, should also be avoided as prospective installation points. These agents can discolor the stones.

A Dry Run

Due to color variation, a good strategy before applying the manufactured stone permanently is to lay out a 25 sq.ft., selection of stone siding to gain an overview of your particular batch. Try and choose stones from each box in your batch. Once you've established the sizing and color variations you'll be working with in this "dry run", you'll be able to gain the proper balance for how the finished surface will appear. This will also allow you to try a number of different layouts which best suit your project, and ensure that the stones will fit together correctly.

Laying Manufactured Stone Siding on a Substrate

For each of the installation procedures – standard grout joints and dry-stacked – There is a fundamental difference in where you will start. For the standard grout joint installation, you will be applying the stones from the top down, in order to keep the stones as clean as possible. For the dry-stack installation, you will apply the stones from the bottom up. For easiest fitting for both, install the corners first, each corner having both a long and short return. Alternate the corners in opposite directions on the wall corner.

Make sure that all surfaces are exactly level. Chalk lines should be snapped every 4" to 8" in order to ensure this. When fitting the stones in a grout joint style, make sure that the grout joints are a uniform size. Leave a consistent 1/2" or narrower space around each stone. Long, uninterrupted joint lines should be avoided. Stagger both the horizontal and vertical joint lines frequently.

Trimming and Setting

Formosa manufactured stone siding can be easily trimmed using a hatchet, mason's trowel, or wide-mouth nippers. More precise cutting can be done by way of a carbide saw or diamond saw. Any trimming or cutting done should be turned so as not to be visible; down when below line of sight, and up when above. Covering cuts or broken edges can be done using color-matched grout.

Always use the proper safety equipment when cutting the stones.

Setting Manufactured Stone

Apply a ½” thick layer of mortar to the entire back of the stone using a mason’s trowel, pressing the stone firmly into place to the prepared surface. Squeeze the mortar out around the edges, using a gentle wiggling action as you press, making sure that you are getting a good bond.

Edges must be sealed to ensure a good bond in the case of a dry-stacked installation.

Make sure that the edges are properly sealed with mortar. Follow the steps listed below in order to ensure success:

- When it comes to applying mortar, add a generous amount to the back of each stone, allowing much of the mortar to squeeze out around the edges of the stone as you press firmly into the prepared surface.

- Remove the excess mortar using a mason’s trowel, while filling in spaces along the exposed edges at the same time. This will help to better seal the stones, and make the subsequently set stones much more tightly fitted.

- Apply a thin amount of mortar to the edges of all previously installed adjacent stones using a grout bag before continuing with the next stone.

Should any mortar get on the surfaces of any of the stones during installation, do not attempt to wipe off the wet mortar as this may permanently stain the stone. Wait until the mortar is dry and crumbly, allowing you to remove the excess mortar more easily and with less mess. You can remove dry mortar in this way using a whisk broom.

Wetting the Stone and Substrate

In certain hot and dry climates, or when the surface or stone is very hot, it may be necessary to wet the stone to gain best results when installing manufactured stone siding. Under very hot conditions, the stones tend to absorb the moisture from the mortar. To prevent this, spray water on the surface of both the substrate and the stone itself, or otherwise dip each stone into water. Allow time to dry, to minimize excess surface moisture. For jointless/dry-stack installations, the need to add moisture will be more common. During installations in cold conditions, all surfaces need to be protected from below-freezing conditions for best results.

Grouting the Joints

When it comes to grouting the joints when installing manufactured stone siding, there are a number of techniques available to you. Each technique renders a unique look, and all complete the look and feel of natural stone to all manner of siding projects.

1. Standard Joints (Raked)

Lay each stone side by side approximately one-finger width apart. A grout bag is used to fill the resulting joints with mortar, which forces the mortar into the spaces between the stones.

2. Dry-Stack Joints

Each stone is laid as close together as possible, giving the illusion that no mortar was used to set them. When looking to achieve this look, it is still beneficial to fill as many minute spaces as possible to ensure that the edges are sealed correctly. Color-matched grout will be an attractive option to maintain the look of the manufactured stone which is grouted in this way, and see to the practical requirements called for as well. As above, seek the advice of local retailers to find out what products will serve your needs most effectively.

3. Overgrout Joints (sack finish)

For those who are looking to create an “old world” look for manufactured stone siding, this method of grouting is gaining in popularity for many in getting an aged look. The grout is laid to purposefully overlap the stones, widening the joints to give the whole surface a random pattern. When applying the grout, overfill the joints to achieve the effect. An advantage to this approach is that broken stones or stones with chipped edges can still be used when installing manufactured stone siding. Overgrouting makes it easy to hide what would be considered visual defects to a more tailored grouting job. It also means getting more out of your batch.

Finishing the Joints

It will take the joints about 30-60 minutes to become firm under regular conditions. After the joints do become firm, rake out any excess mortar in view of your desired depth, making sure that the edges of the stones are adequately sealed. Be sure not to do this too soon, as you will run the risk of smearing the mortar. When all joints have been cleared of excess mortar, clear the surface of dried mortar from the stone surfaces with a whisk broom. This should be easy enough, once the mortar has dried over this brief period. However, be sure not to leave it too long, as it may set. Don't use wet brushes or sponges to clear off excess mortar. This may cause permanent staining on the surface of the stones. Also, never use wire brushes or acid-based chemicals as these may also permanently affect the look of the stones.

Cleaning and Completion

Once the stones have been installed and the mortar has set, a typical cleaning solution comprised of water and granulated detergents may be employed to keep the stone surface clear of grit and dirt. Use a soft bristle brush. For environmentally friendly solutions, consult your local retailers about the best products used specifically for cleaning manufactured stone siding, and follow all instructions on the labels of any products you buy.

Sealing manufactured stone siding from Formosa is not necessary. However, some installers choose to use sealers for on-grade installations as a precaution to minimize the possibility of staining. A general rule to choosing sealers for manufactured stone siding is that the chosen product should allow the stone to breathe. Penetrating breathable sealers can be found at local retail outlets. Seek the advice of the experts on which products are the most suitable to manufactured stone siding. When applying sealers, the best strategy is to test it on a chosen portion of the surface, and to observe the results on a limited scale. This will allow you to find out what the result will be overall.