



**Installation Procedures
& Techniques**

DUTCH QUALITY STONE™

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Disclaimer

This guide addresses generally accepted methods and details for installation of Adhered Concrete Masonry Veneer. To the best of our knowledge, it is correct and up to date. However, this document is designed only as a guide; and it is not intended for any specific construction project. **MVMA makes no express or implied warranty or guarantee of the techniques, construction methods, or materials identified herein.**

It is understood that there are alternative means or methods that might be required and/or recommended based on project conditions, manufacturer's recommendations, or product characteristics.

Details in this guide that address the Adhered Concrete Masonry Veneer and its interface with the building components are not intended as specific recommendations for the construction of the interfacing building components.

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Masonry Veneer Manufacturers Association (MVMA) represents the adhered concrete masonry veneer industry's manufacturing companies and their suppliers. The mission of the organization is to advance the growth of the manufactured masonry veneer products industry through proactive technical, advocacy, and awareness efforts.

This guide for builders, architects, designers, masons, installers, and other construction professionals illustrates typical applications of adhered concrete masonry veneer.

It is the responsibility of all architectural and construction professionals to determine the applicability and appropriate application of any detail to any specific project.

Adhered Concrete Masonry Veneer (ACMV) - Lightweight, architectural, non load-bearing product that is manufactured by wet cast blending cementitious material, aggregate, iron oxide pigments, and admixtures to simulate the appearance of natural stone.

Note: The MVMA recognizes there are many names used to describe adhered concrete masonry veneer products. Manufactured stone veneer is used commonly throughout the industry and by some manufacturers. In the International Building Code, Adhered Concrete Masonry Veneer products are referred to as Adhered Masonry Veneer. In the ICC-ES Acceptance Criteria, AC51, the product is called precast stone veneer. This guide will use DQS (Dutch Quality Stone) when referencing the product.

CMU - Concrete Masonry Unit.

Fasteners - Corrosion resistant hardware used to secure lath and flashing material to wall system.

Flashing - Material used to restrict the seepage of moisture around any intersection or projection of materials in an assembly.

Lath - Corrosion resistant mesh building material fastened to the substrate to act as a base for adhering plaster or mortar.

Mortar - A workable paste mixture of cementitious material, water, and aggregate used to bond masonry construction materials together and fill spaces between.

Mortar Grout - Mortar mixture used to fill joints and cavities in masonry construction.

Mortar Scratch Coat - Base coat of mortar used in installation. Cross raked to improve bond of subsequent mortar layers.

Mortar Screen - Sheet material designed to prevent the mortar scratch coat from filling the drainage space.

Mortar Setting Bed - Mortar used to adhere the ACMV to the substrate or scratch coat.

Sealer - Mortar used over ACMV to protect against staining and moisture of the building.

Wall System - The constructed exterior or interior vertical framework and substrate of the building.

Water Resistive Barrier - Material used to restrict the transmission of moisture to the surface behind.

ANSI Accredited Evaluation Service - An ANSI accredited third-party organization that issues an evaluation report affirming a specific building product meets building code requirements.

International Code Council - Evaluation Service (ICC-ES)
An organization that performs technical evaluations on building products, components, and construction methods for building code compliance. In the case where the building code is silent or ambiguous as to a product's requirements or a specific construction method, ICC-ES may develop "Acceptance Criteria" (AC) for the product or construction method. www.icc-es.org

International Building Code (IBC) - Building code that provides minimum requirements for safety, health, and welfare of life and property from hazards of the built environment. The provisions of this code apply to the construction, alteration, addition, replacement, repair, use, and occupancy of all buildings except one and two family dwellings, and multi single-family townhomes not more than three stories in height. www.iccsafe.org.

International Residential Code (IRC) - Building code that provides minimum requirements for safety, health, and welfare of life and property from hazards of the built environment. The provisions of this code apply to the construction, alteration, addition, replacement, repair, use, and occupancy of detached one and two story dwellings and multi single-family townhomes not more than three stories in height. www.iccsafe.org

ANSI - American National Standards Institute. www.ansi.org

AC38 - ICC-ES Acceptance Criteria for Water Resistive Barriers.

AC51 - ICC-ES Acceptance Criteria for Pre-Cast Stone Veneer.

AC275 - ICC-ES Acceptance Criteria for Glass Fiber Lath used in Cementitious Exterior Wall Coating or Exterior Cement Plaster (Stucco).

ACI 530 - Building Code Requirements for Masonry Structures (ACI 530\ASCE 5\TMS 402). This standard is produced through the joint efforts of the American Concrete Institute (ACI), and the structural Engineering Institute of the American Society of Civil Engineers (SEI/ASCE) through the Masonry Standards Joint Committee (MSJC) and the Masonry Society (TMS).

ASTM International - Previously American Society for Testing and Materials. ASTM is a developer of technical standards for products, systems, and services. www.astm.org

ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.

ASTM C270 - Standards Specification for Mortar for Unit Masonry.

ASTM C482 - Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement.

ASTM C847 - Standard Specification for Metal Lath.

ASTM C1032 - Standard Specification for Woven Wire Plaster Base.

ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement Based Plaster.

ASTM D226 - Standard Specification for Asphalt Saturated Organic Felt Used in Roofing and Water Proofing.

Abbreviations

ACMV - Adhered Concrete Masonry Veneer
Blk'g - Blocking
DQS - Dutch Quality Stone
Lbs. - Pounds
Mfr's - Manufacturer's
Min. - Minimum
OSHA - Occupational Safety and Health Administration
psi - Pounds per Square Inch
P.T. - Pressure Treated (Wood Preservative)
Req'd - Required
SAF - Self Adhering Flashing
WRB - Water Resistive Barrier

Wall System	Water Resistive Barrier	Lath	Fastening	Scratch Coat
<p>Wall Type: Wood or steel stud, no more than 16" O.C.</p> <p>Rigid Sheathing: Gypsum Wall Board Plywood OSB Concrete Board Fiber Board</p> <p>Note: Non-rigid insulation board over rigid sheathing is limited to max 1/2" thick</p>	<p>Minimum 2 separate layers #15 felt (ASTM D226 No. 15, Type 1)</p> <p>Or</p> <p>Minimum 2 separate layers Grade D Paper (ICC-ES Acceptance Criteria AC38)</p> <p>Or</p> <p>1 layer house wrap (ICC-ES Acceptance Criteria AC38), and 1 layer Grade D paper (ICC-ES Acceptance Criteria AC38), or #15 felt (ASTM D226 No. 15, Type 1)</p> <p>Note: One layer of paper-backed lath meeting the requirements of Grade D paper may qualify for one layer of WRB.</p>	<p>2.5 lb. or 3.4 lb. self-furring corrosion-resistant lath (ASTM C847)</p> <p>Or</p> <p>18 guage woven wire mesh (ASTM C1032)</p> <p>Or</p> <p>Alternate lath acceptable with a product evaluation acceptance report showing compliance to ICC-ES AC275.</p>	<p>Corrosion resistant fasteners (ASTM C1063) min. 1" into wood framing member or 3/8" through metal framing member.</p>	<p>Mortar, nominal 1/2" thick, Type N or Type S meeting ASTM C270.</p> <p>"Scratch" surface when "thumbprint hard"</p>

Wall System	Water Resistive Barrier	Lath	Fastening	Scratch Coat
<p>"Open Stud" Construction</p> <p>Wood or steel, no more than 16" O.C.</p> <p>No Sheathing or Insulation Board only (open studs):</p> <p>Note: Non-rigid insulation board over rigid sheathing is limited to max 1/2" thick.</p>	<p>Minimum 2 separate layers #15 felt (ASTM D226 No. 15, Type 1)</p> <p>Or</p> <p>Minimum 2 separate layers Grade D paper (ICC-ES Acceptance Criteria AC38)</p> <p>Or</p> <p>1 layer house wrap (ICC-ES Acceptance Criteria AC38), and 1 layer Grade D paper (ICC-ES Acceptance Criteria AC38), or #15 felt (ASTM D226 No. 15, Type 1)</p> <p>Note: One layer of paper backed lath meeting the requirements of Grade D paper may qualify for one layer of WRB.</p>	<p>3.4 lb. self-furring 3/8" ribbed corrosion-resistant lath (ASTM C847)</p> <p>Or</p> <p>18 guage woven wire mesh (ASTM C1032)</p> <p>Or</p> <p>Alternate lath acceptable with a product evaluation acceptance report showing compliance to ICC-ES AC275.</p>	<p>Corrosion resistant fasteners (ASTM C1063) min. 1" into wood framing member or 3/8" through metal framing member.</p>	<p>Mortar, nominal 1/2" thick, Type N or Type S meeting ASTM C270.</p> <p>"Scratch" surface when "thumbprint hard"</p>

Wall System	Water Resistive Barrier	Lath	Fastening	Scratch Coat
<p>Clean Concrete, Masonry / CMU, or Stucco</p> <p>Note: walls / surfaces must be clean and free from release agents, paints, stains, sealers, or other bond-break materials, that may reduce strength of mortar adhesion.</p>	<p>Note: A WRB may be needed to prevent moisture from penetrating the wall.</p>	<p>Install lath if question or concern regarding ability of veneer to adhere to wall:</p> <p>2.5 lb. or 3.4 lb. self-furring 3/8" ribbed corrosion-resistant lath (ASTM C847)</p> <p>Or</p> <p>18 gauge woven wire mesh (ASTM C1032)</p> <p>Alternate lath acceptable with a product evaluation acceptance report showing compliance to ICC-ES AC275)</p>	<p>If lath is applied, use corrosion resistant fasteners (ASTM C1063).</p>	<p>If a scratch coat is required use a nominal 1/2" thick, Type N or Type S mortar, meeting ASTM C270.</p> <p>"Scratch" surface when "thumbprint hard"</p>

Wall System	Water Resistive Barrier	Lath	Fastening	Scratch Coat
<p>Existing Concrete, Masonry / CMU, Stucco, or Brick (structurally sound)</p> <p>(e.g. painted or not clean)</p>	<p>Note: A WRB may be needed to prevent moisture from penetrating the wall.</p>	<p>2.5 lb. or 3.4 lb. self-furring 3/8" ribbed corrosion-resistant lath (ASTM C847)</p> <p>Or</p> <p>18 gauge woven wire mesh (ASTM C1032)</p> <p>Alternate lath acceptable with a product evaluation acceptance report showing compliance to ICC-ES AC275.</p>	<p>If lath is applied, use corrosion resistant fasteners (ASTM C1063)</p>	<p>If a scratch coat is required use a nominal 1/2" thick, Type N or Type S mortar, meeting ASTM C270.</p> <p>"Scratch" surface when "thumbprint hard"</p>

Wall System	Water Resistive Barrier	Lath	Fastening	Scratch Coat
<p>Metal Buildings or other surfaces / wall construction not listed above.</p> <p>See manufacturer for recommendations regarding sheathing.</p>	<p>See manufacturer for recommendations</p>			

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 DQS to ensure that proper workmanship is reflected and that there are no recognizable errors or deficiencies.

Building Code Requirements

Building code requirements vary from area to area. Check with local authorities for building code requirements for your area and application.

Project Site Requirements

Always follow proper job site safety requirements when installing DQS. Follow all OSHA requirements when installing DQS products.

Flashing

Install flashing type and location in accordance with local building code requirements. All flashing and flashing accessories must be corrosion resistant materials and integrated with the WRB materials. Flashing must be installed at all through wall penetrations and at terminations of DQS installations.

Weep Screed

Weep screeds must be manufactured of corrosion resistant metal with a minimum of 0.019 inches or a minimum No. 26 gauge, or a plastic weep screed minimum 0.050", and with a minimum vertical attachment flange of 3 1/2" wide. Alternate methods of flashing may be used if approved by a building official.

Rainscreen Drainage Plane Systems (Optional)

Dutch Quality Stone veneer does not require the use of a rainscreen drainage plane system for all applications. However, some building codes now require the use of rainscreen drainage plane systems behind cladding materials such as manufactured veneer.

If you are installing veneer in these areas or wish to provide additional protection against entrapped moisture, use a rainscreen drainage plane system with the following characteristics:

- The material should be a minimum of 6mm thick and should not exceed 10mm in thickness.
- The material should be non-absorbent.
- The material should resist compression.
- The material should consist of a two-ply design with a filter fabric (e.g. spunbonded polypropylene) to prevent the scratch coat from clogging the drainage path.
- The rainscreen drainage plane material should be rot and corrosion resistant.
- If a strapping system is to be used it should be designed by the architect or an engineer.

- The rainscreen drainage plane should be installed on the WRB with the polystyrene drainage plane against the building paper and the filter fabric facing the weather. A metal lath should be installed directly on the filter fabric and attached with either construction nails or a staple gun (to code). A scratch coat is then applied to the metal lath before installing veneer.

Water Resistant Barrier or Weather Resistive Barrier (WRB)

It is recommended to use **two separate layers of WRB in all applications** where WRB is specified. The WRB must meet the requirements of ICC-ES AC308: Acceptance Criteria for Water-Resistive Barriers. When using Grade D paper, a 60 minute rating is recommended. Felt paper must be clearly marked that it meets the requirements of ASTM D226 for #15 or #30 asphalt saturated felt.

- It is acceptable to use one layer of housewrap covered by a second layer of wrb meeting the requirements above. The WRB should be free of tears or holes.
- It is acceptable to use one layer of WRB on interior applications.
- Felt meeting ASTM D4869 or non-ASTM #15 felt is not recommended for use behind veneer.

Mortar

The ingredients and directions for the correct mortar mix for all applications are found on page 10. Premixed mortars may be used provided they meet the requirements of ASTM C270 for Type N or Type S mortars and are designed for use with manufactured stone veneers. Polymer modified premixed Type N or Type S mortar meeting ASTM C270 is also acceptable. Not all premixed mortars will provide the minimum required 50 psi shear bond strength when tested in accordance with ASTM C482. Check with the mortar manufacturer to ensure that their product meets or exceeds ASTM C270 requirements and will meet the minimum bond code requirements.

Tools Needed

Masonry Trowel	Gloves
Wheel Barrow and Buckets	Pneumatic Stapler or Screw Gun
Wide Mouth Nippers	Safety Glasses
Masonry Hammer	Finishing Trowel
Dust Mask	Grout Bag
Tuck Pointer	Stapler
Whisk Broom	Metal Shears
Sponge	Utility Knife
Water	Measuring Tape
Chalk Line	Level
Plumb Bob	Concrete Hoe
Circular Saw with Carbide or Diamond Blade	Wet Saw with Carbide or Diamond Tip Blade

Metal Lath

All lath and lath attachments must be made of corrosion resistant material.

Self-furred 2.5 lb. metal lath meeting ASTM C847.

3.4 lb., 0.375" rib lath meeting ASTM C847, for open stud applications (no sheathing).

Self-furred 18 gauge woven wire mesh meeting ASTM C1032.

Use of flat woven wire mesh meeting ASTM C1032 is also acceptable but must be attached using self-furring fasteners.

Fasteners

Corrosion resistant fasteners are used to secure flashing and lath. A variety of fasteners are available such as staples, screws, and nails. For specific fastener selective criteria, refer to ASTM C1063 Sec. 7.10.2.

Wood Framing

Corrosion resistant staples, corrosion resistant roofing nails, or corrosion resistant screws and washers, all to be of sufficient length to penetrate a minimum of one inch into framing members.

Metal Framing or Panels

Corrosion resistant, self-tapping screws with sufficient length to penetrate 3/8" through metal studs or panels, with heads or washers large enough to not pull through lath.

Masonry Walls or Panels

Corrosion resistant concrete screws or powder actuated fasteners (or cap fasteners), with heads or washers large enough to not pull through lath.

Estimating Quantities Needed

Two components, flats and corners, are used for most installations. Flats are applied to the flat wall surface and are ordered in square feet. Corners are applied to outside corners and are ordered in linear feet. Using Corners around window and door openings provides added dimension and depth and enhances the finished design.

1: Determine the Total Project Square Footage

Multiply the length (in feet) times the height (in feet) of each surface area to be covered.

2: Subtract Windows, Doors, or other Openings

Calculate the square footage occupied by windows, doors and other openings. Subtract this amount from the project square footage.

3: Determine the Linear Footage of Corner Pieces Needed

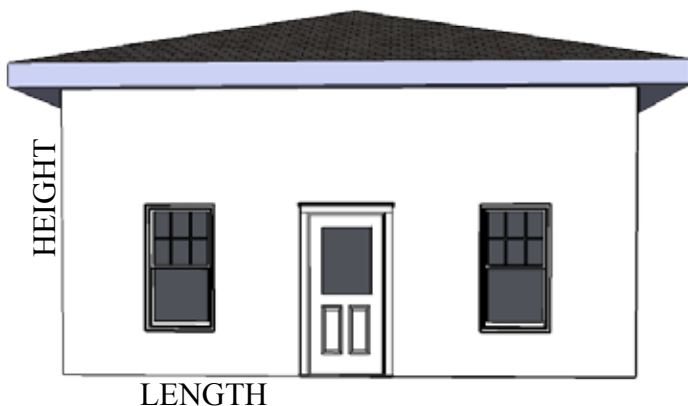
Measure the linear feet of outside corner areas to be covered including any doorways and windows that will have corners.

4: Determine the Square Footage of Flat Pieces Required

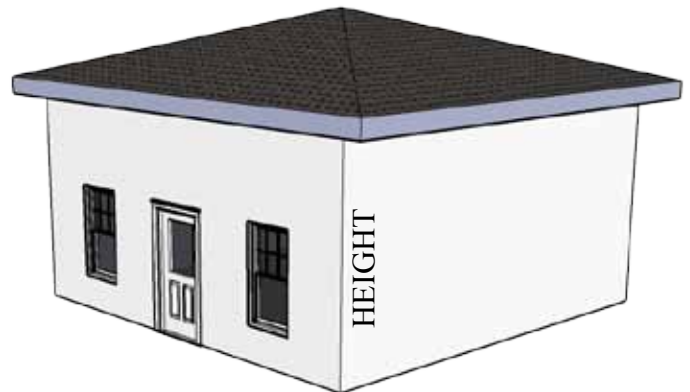
Divide the linear footage of corner pieces needed by 2 (One linear foot of corner veneer equals approximately 0.5 square foot of flat veneer) and subtract this corner square footage from the total project square footage. This will give you the square footage of flat veneer required.

However, some extra quantity of flats is desirable for best fitting, including cutting and trimming.

STEP 1



STEP 3



Over Sheathing (Wood Studs): Plywood, OSB, Cementitious Backer Board, Gypsum Wall Board, Drywall, or other Rigid Wood-Related Sheathing

The WRB shall be applied horizontally in shingle fashion starting from the bottom. Be sure to overlap the upper layers over the bottom layers. Where vertical joints occur the WRB shall be lapped at least 6". Where horizontal joints occur the WRB shall be lapped not less than 2". Refer to WRB manufacturer's installation instructions for fastener spacing recommendations. If none exist, only use enough fasteners to support the WRB before installing lath.

The next step is to install metal lath perpendicular to the framing. Overlap the lath sides a minimum of 1" and lath ends a minimum of 1". Be sure to attach the metal lath with the small cups pointing upwards, rough side up and smooth side down. Verify that the lath is pulled tight before fastening to avoid lath or mortar sag. The ends of adjoining metal lath shall be staggered. Attach the lath using galvanized nails or staples 6" on stud center vertically and 16" on stud center horizontally. Do not use fasteners in between framing and ensure your fasteners penetrate the stud a minimum of 1".

Inside and outside corners must have lath double wrapped or continuously wrapped 16" around each corner. Then apply a nominal 1/2" thick coat of mortar with sufficient pressure to fully embed the lath. The entire lath must be covered with mortar so the lath is not visible. The mortar should be **scored horizontally** with a notched trowel or scarifier to create the scratch coat when the mortar has become thumbprint-dry.

Note: All sheathing should be installed according to the manufacturer's recommendations for fastener requirements including, but not limited to, all woodbased sheathing which should be gapped 1/8". Exposure 1 sheathing is designed for temporary exposure to the weather. It should be covered with an approved WRB as soon as possible after being installed. Not all WRB are resistant to ultraviolet rays, so the wall should be lathed and a scratch coat should be applied as soon as possible after the WRB is installed.

Over Open Stud Framing (No Sheathing)

Apply paper-backed galvanized 3.4 lb., 3/8" rib paper-backed metal lath (meeting ASTM C 847) to the studs using galvanized nails or staples every 6" vertically on stud centers with a minimum 1" penetration into the stud. Overlap lath sides by not less than 1" and lath ends by not less than 1". Apply a 1/2" thick scratch coat and moist cure for at least 48 hours.

Over Open Metal Studs (No Sheathing)

Follow the instructions for Over Open Studs (No Sheathing) except use corrosion-resistant self-tapping screws with a 7/16" head that provides 3/8" minimum penetration beyond the inside metal surface.

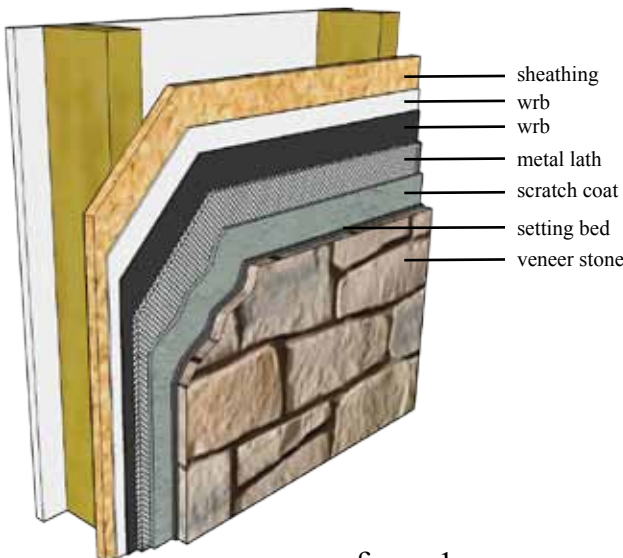


figure 1

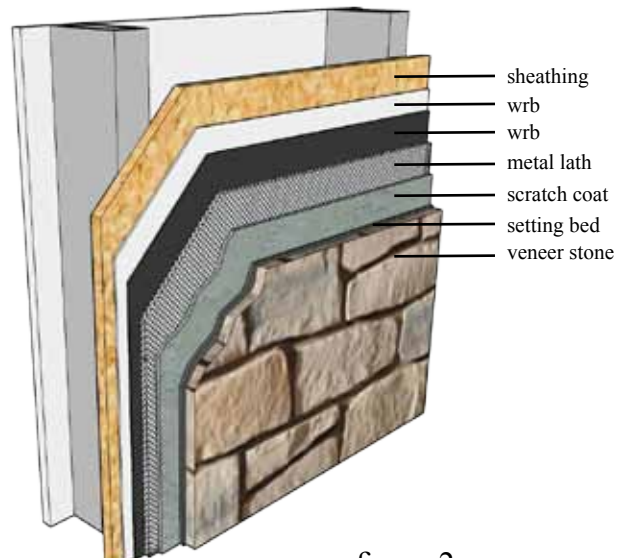


figure 2

Over Metal Studs with Sheathing

Follow the instructions for Over Sheathing (Wood Studs). However, using corrosion-resistant self-tapping screws with a 7/16" head that provides 3/8" minimum penetration beyond the inside metal surface are recommended.

Clean Cementitious (CMU) & Masonry Surfaces Including, but not Limited to Brick, Block, and Stone

Examine the surface to ensure it is solid and shows no sign of deterioration. **The clean surface should not be painted, sealed, or have other coatings that may prevent adequate bond of the scratch coat to the substrate.** To determine if your wall is painted, treated, or sealed, spray water onto the wall. If the water beads follow the instructions for **Painted, Sealed, or Treated Cementitious Surfaces**. If there are random areas of water beading, clean surface again or apply metal lath and scratch coat. If the water does not bead, apply a scratch coat onto the surface using sufficient pressure to ensure the mortar is fully adhered to the surface. Apply the scratch coat using a Type N or Type S mortar onto the surface using sufficient pressure to ensure the mortar is fully adhered to the surface. **Score the surface horizontally** when the mortar has become thumbprint-dry.

Note: If installed on an interior space intended to be inhabited, it may be necessary to waterproof the masonry wall. Bonding agents can be used to enhance the bond of the mortar to the masonry surface and the veneer.

Painted, Sealed, or Treated Cementitious (CMU) Surfaces

Clean the surface by bead blasting or sand blasting. After the surface is clean, spray water onto the wall. If the water beads, continue bead blasting or sand blasting until surface is clean. Apply scratch coat before installing veneer.

If the wall cannot be cleaned, install metal lath using concrete nails or screws. Do not exceed 6" x 16" spacing between fasteners. Fasteners should penetrate the concrete surface by a minimum of 3/4". Apply a scratch coat to the metal lath before installing the veneer.

Over Rigid Insulation Board

Follow the installation instruction for sheathing applications. If the rigid insulation board is thicker than 1/2", consult with a registered engineer to determine if any additional fastener requirements are needed to support the weight of the veneer system.

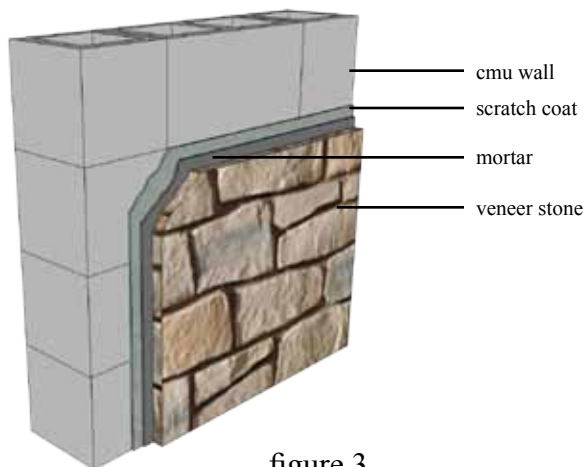


figure 3

Stucco

Dutch Quality Stone veneer can be installed over clean stucco surfaces free of debris, paint, and sealers, provided the following conditions are met:

- Stucco installation meets the requirements of ASTM C 926.
- If sheathing was used, the lath must be 2.5 lb. metal lath, 18 gauge woven wire mesh or heavier.
- If there is no sheathing, the lath size must be 3.4lb., 3/8" rib expanded metal lath.
- If there is rigid insulated foam board and no sheathing, the lath must be 3.4 lb., 3/8" rib expanded metal lath.
- Thickness of the stucco is at least 3/8".

If applying veneer over a stucco color (finish coat) verify with the mortar manufacturer that their product is able to achieve a 50 psi shear bond strength over these surfaces. If the above conditions are not met, the stucco will need to be removed before installing veneer.

TILT WALL AND POURED-IN-PLACE WALLS

Surface preparation is important over these types of surfaces to ensure a successful installation. Surface should be bead blasted or sand blasted until the wall has a sandpaper-like texture and all slick areas have been removed. Next, spray water on the wall. If the water beads, the surface must be bead blasted or sand blasted again. If water continues to bead or the surface cannot be prepared to accept a direct installation of Dutch Quality Stone, install metal lath and scratch coat before you begin the veneer installation. If applying directly to the tilt wall or poured-in-place wall, ensure the wall is damp without excess water (beading) on the surface.

Note: Use of lath after the surface is clean provides the most trouble-free installation on concrete wall. Use of a primer (dash-bond coat) may increase bonding for applications over tilt wall without lath. A dashbond coat consists of a 1:1 mixture of portland cement and sand. The mixture should be a wet slurry (batter) consistency. After mixing, spray or "dash" onto the wall and allow it to cure.

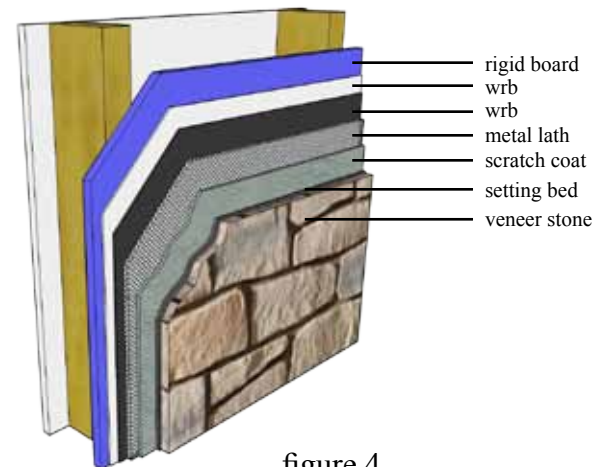


figure 4

Insulated Concrete Form (ICF) Walls

There are variations between ICF manufacturers on the material, spacing, and strength of their support brackets. Consult with the ICF manufacturer to determine how they recommend installing cladding systems over their product. If the support brackets cannot support the weight of the veneer system, Dutch Quality Stone recommends attaching the lath through the ICF panels directly to the concrete. A registered engineer should be consulted to determine the appropriate fastener to use for applications through foam greater than 0.5" thick.

Wall systems outside the scope of this document which may require a specifically-designed installation system for DQS.

- Structural Insulation Panels (SIPs)

Wall systems with these substrates are considered unacceptable for the application of DQS:

- Existing siding in unsound condition.
- Exterior Insulation Finishing System (EIFS).
- Deteriorating or unsound masonry surfaces.

Flashing

Verify that all flashing, including roofing kickout flashing, has 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.

Casing Bead

The perimeter of the scratch should incorporate the use of casing bead (minimum 1/2" depth) control joints, or other approved accessories.

Clearances

On exterior stud walls, weep screeds, and other base flashing 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 DQS 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 of 2" clearance from grade, or 1/2" clearance from a paved surface.

On exterior stud walls where the DQS continues down a CMU foundation wall, with WRB and lath installed down to the weep screed at bottom, maintain minimum 4" clearance from grade, or 2" clearance from a paved surface.

Where DQS 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.

Mortar Consistency

Mortar should be mixed to a firm but workable consistency. Mortar that is too wet or too dry will not provide a good bond to adhere the veneer. **Mortar should stick to the trowel when the trowel is turned sideways.**

Helpful Grout Tips

Only grout as much as you can manage at one time. Joints can be tooled with specific masonry tools or with anything you find easy to use (e.g., stick, striker, joiner, or other blunt masonry instruments).

Don't allow joints to fully harden before tooling. Mortar should be pliable and crumbly, not too wet and not too dry. Overgrout joints can be tooled (somewhat) earlier than standard raked joints.

Using a grout bag is much easier than hand "tucking" joints. Be sure to eliminate any air pockets when applying grout.

Use a trowel for a tempered, more faceted finish.

Creating a mock up board of the grout finish prior to beginning the actual installation is a good idea and can help eliminate unwanted results.

Recommended Mortar Mix Ratios

Dry-Stack Applications:

3 parts Portland Cement
2 parts Thinset Mortar (ANSI A118.4)
7 parts Sand
Water

Alternate:

1 part Type N or type S Masonry Cement
2.25 parts Sand
Bonding Agent
Water

- Integral bonding agent meeting ASTM C 932 or ASTM C 1059 Type II. Refer to manufacturer's instructions for mix ratio.

Grouted & Overgrouted Applications:

1 part Portland Cement
1 part Lime
4.5 parts Sand
Water

Alternate:

1 part Type N or type S Masonry Cement
2.25 parts Sand
Water

- The use of antifreeze or liquid dish soap in the mortar mixture is not recommended.
- Accelerating admixtures shall comply with C1384; accelerating admixtures containing calcium chloride are not recommended.

Installation of Dutch Quality Stone

Prior to commencing installation of DQS, ensure that the WRB and flashing are properly installed and integrated with each other. For windows, doors, through-wall penetrations, and DQS terminations, refer to the Wall System Drawings document in the download section of our website for more information.

Laying out the Veneer

Before you begin, lay out a minimum 25 s.f. of veneer. Select and mix pieces from different boxes throughout the installation. During installation, try to achieve a balanced pattern of shapes, sizes, colors, thickness, and textures by selecting and mixing veneer.

Starting

For grouted installations, apply veneer from the top-down to help keep the surface clean. For a dry-stack installation, veneer is applied from the bottom up. Install the corners first for easiest fitting. Corner pieces have a long and a short return and these should be alternated in opposite directions on the wall corner.

Fitting

Veneer should be installed with uniform size grout joints. A consistent 0.5" or less space around the veneer is desirable. Long, straight, unbroken joint lines should be avoided. When installing coursed and horizontal styles of Dutch Quality Stone, special attention should be given to keeping the work level. Chalk lines should be snapped horizontally every 1' to 2' as a guide for keeping the installation straight. You can also use a level during the installation of individual pieces. Vertical and horizontal joints should be staggered.

Trimming Veneer

For the best fit, veneer can be cut or shaped using a hatchet, wide-mouth nippers or masonry trowel. Straight cuts can be made with a diamond or carbide saw blade. Rinse surface of the veneer after cutting to avoid staining from the dust. To help conceal cut or broken edges, cover them with mortar when grouting the veneer.

Always use proper protection when cutting veneer. Repeated or prolonged exposure to silica dust can be hazardous to one's health. A respirator dust mask is recommended when cutting veneer with dry diamond or carbide saw blade. The use of a wet saw will lower the exposure to silica dust. OSHA approved safety lenses are recommended when exposed to flying debris from hatchets, wide-mouth nippers, masonry trowel, wet or dry mason saw, or any other veneer cutting devise.

Wetting the Veneer

For all applications, the scratch coat and veneer must be moistened to reduce the initial rate of absorption. This can be done by spraying water onto the wall surface and back of veneer. Veneer can also be dipped into a container of water. The back of the veneer and the scratch coat surface should appear wet but should not have excess water on the surface.

Installing Veneer with a Standard Joint Technique

The standard joint is achieved by laying each piece of veneer roughly 1/2" apart (one finger width). Corner and flat pieces

should be installed from the top-down. Using a masonry trowel, apply a 1/2" thick, even layer of mortar to the **entire back** of the veneer. Then press the veneer firmly into place on the prepared wall surface **squeezing the mortar out around all edges**. Use a gentle wiggling action while pressing the veneer to ensure a good bond. Use a grout bag to fill joints with mortar and force grout into any voids. Joint grouting can be done as you lay the veneer or after it has been installed.

Installing Veneer with a Full Joint Technique

A full joint is similar to a standard joint however the grout level is flush with the face of the veneer. Full joint differs from overgrout whereas the grout does not actually overlap the face of the veneer.

Installing Veneer with an Overgrout Technique

Overgrout applications are an increasingly popular way to achieve an old-world appearance. It is a technique that tends to make the masonry-work appear rustic and aged. The grout overlaps the face of the veneer, widening the joints and making them very irregular. Corner and flat pieces should be installed from the top-down. It is important to fill the mortar joints fully to avoid creating air pockets. If you are tooling the grout joints use a wooden striking tool instead of a metal striking tool.

Installing Veneer with a Dry-Stack Technique

The dry-stack joint look is accomplished by tightly fitting each veneer piece prior to installation to ensure a tight fit. Corner and flat pieces are installed from the bottom up to allow for a tighter dry-stack pattern. For ease of installation with panelized systems, install one course of veneer (one row of flats and corners) at a time.

It is important, when setting the veneer, **that the perimeter of the veneer piece is properly sealed with mortar to ensure satisfactory bond and future durability.**

This can be achieved by following these steps:

1. Apply workable mortar generously to the entire back of each piece to allow ample mortar to squeeze out around all edges as it is pressed onto the wall surface.
2. When applying mortar, **completely cover the back of each piece** and use a trowel to work the mortar into all depressions on the back.
3. Immediately after setting each piece, use a masonry trowel to remove any excess mortar and fill any voids along the exposed edges. You can also use a metal striking tool to smooth the mortar around the perimeter.
4. Just prior to setting each piece, apply a thin bead of mortar (with a grout bag) to the edges of all previously installed adjacent veneer pieces.

For the best finished appearance, the dry-stack mortar color should blend with the veneer base color to help conceal the joint lines. Ask your distributor for information regarding available mortar colors.

- Not for Bric-Stone

Grouting the Joints

After the veneer has been applied to the wall surface, use a grout bag to fill the joints with mortar forcing grout into any voids. Be careful not to smear grout onto the face of the veneer. Any mortar that accidentally gets on the veneer should be allowed to set until dry and crumbly, then brushed off with a dry whisk broom.

It is not necessary to joint grout a dry-stack installation because the veneer edges should have already been properly sealed with mortar when the veneer was applied to the wall. However, if the scratch coat is visible, or if the perimeter of the veneer pieces are not sealed with mortar, grout as needed.

Finishing the Joints

When the mortar joints become thumbprint-dry, use a wooden or metal striking tool to rake out the excess mortar to the desired depth. Be sure to force the mortar into the joints to seal the mortar against the veneer. Be careful not to work the joints too soon or the mortar will smear. A concave joint will have fewer tendencies to develop hairline cracks at the interface between the veneer and the mortar.

After working the joints, use a whisk broom to smooth the joints and clean away any loose mortar from the joints and veneer face. If any mortar accidentally gets on the veneer face, do not try to wipe it off since it may smear and stain the veneer. The mortar should be allowed to set until dry and crumbly and then brushed off with a dry whisk broom. Loose mortar and mortar spots, which have set for only a few hours, should never be allowed to set up overnight.

Cleaning

To remove dried mortar off the face of the veneer use a dry whisk broom and lightly scrub the surface. The veneer can also be cleaned with water and a soft bristle brush.

Caution:

- Do not use wet brushes or sponges to wipe the joints or clean mortar off the face of the veneer since the veneer may smear and stain.
- Do not use high pressure washers to clean the veneer.
- Do not use wire brushes or acid on the veneer surface.
- Always protect adjacent surfaces when cleaning veneer.

Water Run-off

It is important to divert water run-off away from veneer surfaces. Run-off or splashing may stain the veneer. Water run-off combined with severe freeze/thaw conditions can result in surface damage. Dutch Quality Stone veneer should never be used below water level or in applications that subject the veneer to chlorine, deicers, or chemicals that may discolor or adversely affect the veneer. Corner or flat veneer pieces should not be used on exterior horizontal surfaces or to cap walls. Use Dutch Quality Stone caps and extend them beyond wall surfaces by (approximately) 2".

Movement Joints

Expansion joints normally pass completely through a wall. Control joints normally are on the surface of the wall and relieve strain on the skin of the wall. Terminate the veneer installation where control and expansion joints occur in the substrate. Do not span these joints with veneer because this will lead to cracking. Expansion joints in a building must be specified by the architect or engineer.

The architect or engineer should consider the ASTM C 1063 control joint requirements when determining the location of control joints on any structure. Normally the weakest point on a wall is immediately above and below penetrations.

Efflorescence

Efflorescence is usually a white residue that occasionally appears on concrete or masonry surfaces. Efflorescence results from moisture moving through concrete or mortar to the exterior surface. Migrating moisture can carry soluble salts from within the concrete or mortar and deposit them on the face of the product after the moisture evaporates.

To clean efflorescence, lightly scrub affected areas with a soft bristle brush and water. If that does not clean the surface use a mixture of 5 parts water to 1 part white household vinegar. Acids, other cleaning agents or power washing techniques are not considered acceptable methods of removing efflorescence.

Cold Weather Application

For cold weather installations, ambient temperature should be 40°F or higher at the time Dutch Quality Stone veneer is applied. If the temperature is below 40°F, mortar should be heated between 40°F – 120°F (not to exceed 140°F). Any mortar that freezes should be discarded. Wall surfaces may need to be covered and heated after installation of veneer to avoid freezing the mortar. See section 2104.3 of the International Building Code (IBC) for additional cold weather requirements.

Hot Weather Application

If the environmental conditions during installation exceed 90 degrees F (32 degrees C) additional water may be needed on the scratch coated surface and the backs of the DQS being applied. Providing shade and/or frequent misting of the wall may be required. Consult with mortar manufacturer to determine if mortar mix hot weather mix options are available. Local building code hot weather methods should be followed.

Sealers

Sealing the veneer is not required. If you choose to apply a sealer use only a penetrating and breathable silane or siloxane-based masonry sealer. The sealer should be tested on a few veneer pieces first to determine if there will be any undesirable effects. Some sealers may alter the color of the veneer by making the surface darker or changing the sheen. Refer to the sealer manufacturer for recommended application, coverage and maintenance.

Retaining Walls

Retaining walls in direct contact with soil must be waterproofed and incorporate a drainage system prior to installing veneer. For installations utilizing hollow block construction, precautions should be taken to prevent water from entering, or stagnating in, wall cavities before veneer is applied.

Overhead Horizontal Applications

Please verify your installation with your building official and consult with an engineer for specific design issues on your project. There are grout and mortar manufacturers that will support their product's use in these installations. Dutch Quality Stone's 50 Year Limited Warranty will still cover our veneer products for manufacturing defects.

Applications in Seismic Zones

Consult with the building official to determine proper selection of mortar type and any installation height requirements. Dutch Quality Stone recommends using only Type S mortar in seismic zones.

Cautions:

The following precautions should be taken to ensure a successful and durable DQS installation.

- Do not subject DQS to direct or frequent water contact. For example, avoid allowing sprinklers to directly spray onto the surface. Also, downspouts or drainage pipes should be placed so that water is not frequently moistening the DQS units.
- Do not subject DQS to contact with de-icing materials, salt, or other harsh chemicals. Prolonged exposure to these conditions may discolor the DQS or result in surface damage.

Warranty

Manufacturer warrants Dutch Quality Stone veneer against manufacturing defects for a period of 50 years. For the full warranty description, or more information on Dutch Quality Stone, refer to the downloads section on our website www.dutchqualitystone.com or contact Customer Service at 877.359.7866.

