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5/16" PETRARCH AND FASSET ARCHITECTURAL WALL PANELS APPLIED OVER A SHEATHED STUDWALL BY MEANS OF A FIELD-APPLIED STRUCTURAL SILICONE SETTING SYSTEM

DESIGN CONCEPT

Structural silicone sealant transfers windloads from the panels to the structure through aluminum bearing plates which are mechanically fastened to a sheathed studwall assembly. In general, only minor modifications to conventional studwall construction are required. Erection tolerance must be minimized to contribute to a flat, aesthetically pleasing finished installation. Stud layout, in addition to normal functions, must accommodate bearing plate fasteners.

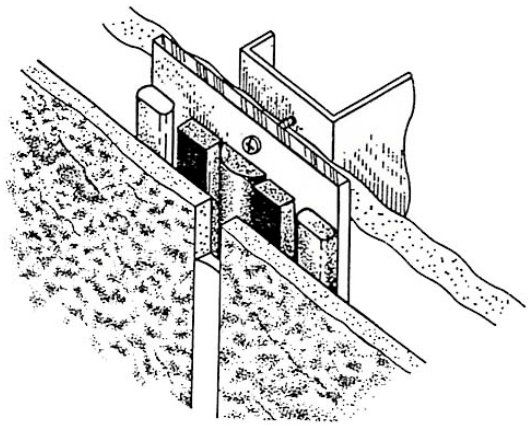
Exterior sheathing, protected by overlapped building wrap, provides a leveling plane for the panel assembly and functions as a secondary barrier to air and water infiltration. Bearing plates are positioned continuously at each panel perimeter and to intermediate studs not more than 24" O.C. These have an 1/8" wall thickness and are alodine treated for optimum sealant adhesion. Bar stock is used for typical vertical joint, head, and stiffener conditions. Shelf angles are used for horizontal base and stack conditions to support the bottom edge of the panel and carry its shear weight. Bearing plates are firmly fastened through the sheathing into the stud framing itself.

Continuous strips of double-faced, cellular foam tape are used as spacers between the plates and the panel and, in all cases, as temporary adhesive to secure the panel until the permanent structural adhesive cures. Beads of structural silicone are applied in a one-panel area, the panel is placed on setting blocks, at the base, pressed into final position on the wall, and blocked in place until the silicone reaches full cure. The primary weatherseal is completed by caulking the joints between panels. Since no exposed fasteners or trim are required, panel surfaces and flush caulk joints are the only visible elements when work is finished.

It is important to note that the system, as designed, does not allow for the prolonged presence of moisture anywhere within the system or behind the panels. If moisture entrapment is anticipated, careful consideration must be given during the architecture design stage to eliminate the source of water infiltration or alternatively to insure that the system thoroughly weeps all moisture on a permanent basis.

SYSTEM LIMITATIONS

This system is applicable to 5/16" Petrarch and Fasset panels, maximum size 47 3/4" x 119 3/4", used on buildings designed for maximum wind loads of 30 pounds per square foot. (For wind loads over 30 pounds, contact CEP Cladding's Technical Department.)



The system is stick built, field assembled, and set from exterior staging. Ambient temperature must be at least 40ºF, at time of actual panel setting.

Additional silicone contact area per panel may be required for projects with design loads higher than 30 pounds per square foot. Engineering calculations must be made for each project to determine actual structural requirements.

Success in setting Petrarch and Fasset panels in a structural silicone system is dependent upon care in the selection of materials for both performance and compatibility; a thoroughly planned installation procedure; plus, of course, careful workmanship and quality control. CEP's technical staff should be consulted in early design or construction stages to review all structural silicone setting applications.

This data is presented as a technical guide to architects, engineers and contractors in preparing specifications and installation. Final requirements should be verified by a qualified engineer or architect.

DESIGN NOTES

1. Subwall Construction

Given design loading conditions, deflection of the wood or light-gauge steel studwall must be limited to L/240. Control and relief joints, as applicable to the structure, must be incorporated to prevent transfer of undue stresses (caused by structural movement, deflection, and hygrometric and thermal expansion and contraction) to the exterior cladding. The wall must be laid out to accommodate structural fasteners for each bearing plate in addition to attachment of exterior sheathing and any required interior-wall surfaces. Depending on panel layout, this may necessitate use of additional stringers, strapping, or other elements in the studwall, particularly to fasten horizontal plates.

The subwall construction should be erected plumb and true with the maximum variation from the true plane not to exceed 1/8" in 10'. As an added barrier to air and water infiltration into the finished wall assembly, the sheathing should be protected by a layer of building wrap, stapled with a 9" overlap.

2. Panel Layout

Cut-to-size panels are taken from standard stock sheets so the net installed cost is directly affected by the gross square footage of stock sheets required for the project. To minimize waste, it is important to plan finished modules which take full advantage of the available standard sizes, 47 3/4" x 95 3/4" or 119 3/4".

A more complete description on size and color can be found in the current CEP Claddings, Inc. brochure (Sweet's file for AEC 07415/Pet) and the general white paper with typical product performance and test data.

3. Aluminum Bearing Plates

Back-up bar stock, angles and extrusions (as appropriate for each joinery condition on the project) are made of mill finish, alodine treated aluminum, having an 1/8" wall thickness. Bearing surfaces are dimensioned to allow generous clearances, including cutting and erection tolerances, plus provide proper contact area, or bite, for the tape and silicone.

The drawings on Pages 7 - 10 detail plates which provide a 1/2" bite for ***both*** structural elements. This is a requirement for the silicone and also for the dimension of the tape. Bearing plates must be alodine treated by the aluminum supplier to remove residual oils and optimize adhesion by the tape and silicone.

The bottom edge of each panel ***must*** be supported by a shelf angle. Bearing plates with this shelf, like the horizontal base plate and the horizontal stack plate, must be placed ***exactly*** on the wall because the location of the shelf directly influences the position and alignment of the installed panel. Other perimeter parts may be erected with a +/- 1/8" tolerance.

In this system, the main horizontal head and sill plates run continuously. Each length should be dimensioned to abut at a stud location. The erection sequence begins with placement of horizontal parts with a shelf angle, followed by installation of horizontal head plates. Vertical plates, typically shorter by virtue of being interrupted by the main horizontals, are installed next, each positioned directly over a stud.

Bearing plates are required continuously at each panel perimeter and to intermediate studs ***not more than 24" O.C.*** The primary purpose of the stiffener is to help maintain an optically flat appearance for the finished panel installation. Therefore, the stiffener can be oriented horizontally or vertically, whichever is most convenient given stud framing locations and fastener spacing requirements. Stiffeners, essentially full panel width or height, run between the perimeter verticals or horizontals.

Bearing plates are affixed with #8 stainless steel, pan head screws, fastened through the sheathing into the metal studs or other solid framing members. Fasteners are located within 1" of both ends of each length and no more than 16" O.C. in between. Actual spacing depends on design loads, panel size and shape, and stud type or gauge.

Typically, thermal expansion and contraction can be anticipated to be equal at both ends of a length of plate. The plate is staked at mid-length by a fastener set through a hole the same diameter as the fastener shank, while all other fasteners are attached through generously slotted or oversized holes. Plate lengths must be dimensioned, cut, and erected to allow free-floating thermal movement over the temperature gradient to which the installation will be exposed. The aluminum bearing plates have a similar thermal coefficient of expansion to that of Petrarch and Fasset. However, in planning, plate lengths should be dimensioned as if they were independent and unrestrained, using aluminum's 13.0×10^{-6} in/in ºF coefficient of expansion. A 3/8" gap should be allowed between abutting parts both vertical and horizontal. Aluminum bearing plates are available from CEP Claddings, Inc. through an approved local distributor. For more information, contact:

CEP Claddings, Incorporated
22 East Chicago Avenue, Suite 210
Naperville, Illinois 60540

Tel: (800) 450-6099
Tel: (630) 355-4040
Fax: (630) 355-4995
Email: petrarch@enteract.com

4. Structural Silicone
The products recommended for this system are Dow Corning 795 or G.E. Silpruf SCS 2000 structural silicone glazing, one-part sealants. Physical tests have been conducted between Petrarch and Fasset panels and both products and many successful installations have been completed. This system is built around those experiences.

Given a maximum design windload of 30 pounds per square foot and a maximum panel short-span of four feet, based on Dow Corning or General Electric test results and a minimum safety factor of four to one, the structural silicone bite at panel perimeter ***must be*** 1/2". Finished bead thickness, controlled by the thickness of the cellular foam tape after the panel is set, is 3/16". To achieve the required 3/16" X 1/2" silicone dimension, continuous and minimum 3/8" diameter beads are gunned onto the stiffener plates, adjacent to the tape, then the panel is pressed into place. ***Bite cannot be reduced in this system, even for small panels or low wind loads. Experience determines that when smaller beads are gunned, it is impractical to obtain consistent wetting of the panel surface and subsequent, continuous positive bite.***

The procedure for applying structural silicone is to clean the bearing plates, set cellular foam tape, and then working ***only in a one-panel area*** and just before panel setting, gun beads of silicone on the bearing plates.

The approved structural silicones are manufactured by:

Dow Corning Corporation
Midland, Michigan 48686
Tel: 800-662-0661

General Electric Company
Silicone Products Division
Waterford, New York 12188
Tel: 518-237-3330

5. Weatherseal Caulking
Joints between panels are nominally 3/8" wide on the verticals and 7/16" where horizontal stacking occurs (joints may vary depending upon panel sizing). Once the panel is set, outdoor joints must be weathersealed. Open-cell, polyurethane-foam backer rod is placed in vertical joints so only the panel edges remain exposed.

It is recommended that masking tape, approximately 1" wide, is applied to the panel faces of each caulk joint. Caulking is then gunned, tooled and the tape removed. ***The tape should be removed before the caulking skins over - approximately 15 minutes after tooling.***

Good workmanship in caulking is important from both performance and aesthetic viewpoints. Caulking smeared on exposed surfaces ***must be removed immediately***, as it collects dirt, is unsightly and with time is very difficult to remove.

Good quality grade polyurethane sealants may be used for joint weather sealing. Contact sealant manufacturers or CEP Claddings, Inc. for approvals on specific projects.

As noted on page one under "Design Concept", standing water or moisture of any kind must not be permitted to be trapped behind the panels or within the system. The elimination of the ongoing source of moisture and/or a permanent weeping system must be allowed for during the architectural design phase. Prolonged contact with moisture on one side of the panels can cause excessive expansion and/or panel distortion.

6. Cellular Foam Tape
Norton Thermalbond V-2100 series (P2106-Black) is the product recommended for this system. This semi-rigid, open cell, urethane foam tape, 3/16" thick by 1/2" wide, with pressure-sensitive adhesive on two sides, is an integral system component. The tape serves two vital functions:

1. To control the depth of the structural silicone.
2. To hold each panel flat and firm until the structural silicone cures.

The bearing plates have been dimensioned to accommodate a tape bite of 1/2". The tape adheres best at warm temperatures and cannot be satisfactorily used at temperatures below 40ºF.

The installation procedure requires temporary blocking to secure each panel in the event design wind loads are reached before the structural silicone cures.

Temporary blocks, 4" x 4" minimum, are fastened through the panel joint into solid support framing no more than 24" O.C. The blocks may be wood or metal. If metal, they should be padded to prevent surface damage. The blocks are removed after the silicone has cured, usually before or during joint caulking.

Norton Tite-R-Bond (2287) Adhesion Promoter is used to prime the tape and silicone contact areas on the back of the panel. The general application procedure is to clean and prime the bearing plates, then apply the tape. A protective polyethylene liner is stripped, exposing the tape's second adhesive face, just before panel setting.

The tape and adhesion promoter are manufactured by:

Norton Company Performance Plastics
Granville, New York
Tel: 800-724-0883

7. Silicone Setting Blocks
Silicone setting blocks, 80-90 Short A durometer hardness, 1/8" x 11/32" x 6", two per panel, are placed on the shelf angle, base only, at panel quarter points. Blocks are made of silicone to assure complete compatibility with the structural components in this system. Silicone blocks are manufactured by several specialty-rubber companies.

8. Durability
Structural silicone is durable. Given proper installation, its cohesive and adhesive values are virtually unaffected by temperature and weather. Designs using Petrarch and Fasset in structural setting systems should provide life expectations of well beyond 20 years.

A 20-year Structural Adhesion Warranty is available from Dow Corning or General Electric. To qualify for the warranty, actual project job site substrate materials, shop drawings and wind load details must be submitted to Dow Corning or General Electric for testing and review. Job site substrate samples must include panels, bearing plates, and spacers that may come in contact with the structural silicone. These materials are tested for adhesion, and compatibility under accelerated performance testing conditions.

Contact CEP Claddings, Inc. for information on how to apply for warranties for individual projects.

9. Inspection, Maintenance and Cleaning
A structural setting system should be inspected on a routine basis after installation to assure that damage which could affect its structural integrity has not occurred. The inspection program should be in accordance with the responsible structural engineer's recommendations. A minimum schedule would be to inspect twice in the first year and once a year thereafter, supplemented by inspections which reasonable judgment would deem prudent following such occurrences as a severe storm, vandalism, civil disorder, or the like. Appropriate protective measures and corrective steps should be promptly implemented anytime structural damage is discovered.

To keep the installation bright and clean, the owner should include panel washing in his annual maintenance schedule, perhaps in conjunction with window washing. The actual schedule will vary depending on factors such as the occupation and use of the building, location relative to atmospheric and environmental conditions, and the relationship of the panels to surrounding materials. Scrubbing with a solution of mild detergent or soap and water, following by a clean water rinse, using standard commercial cleaning techniques, is all that is normally required.

INSTALLATION NOTES
1. Panel Characteristics
All installation crew members should be familiarized with the characteristics of Petrarch and Fasset panels. To a large degree, the responsibility for an aesthetically pleasing, trouble-free installation rests with the installer. The final product is often judged on the basis of the installers skill and workmanship, particularly in the final steps of caulking and touch up.
For instruction on receiving, storage, material handling, and field fabrication, refer to the general CEP product specification white paper.

2. Subwall Inspection
Prior to the installation of the panels, the subwall must be inspected to assure that it is in good condition. The subwall must be plumb and true, with maximum variation from true plane no more than 1/8" in 10'. If it is not, in order to achieve a flat solid installation, defects must be corrected before proceeding.

3. Panel Lay Out
Measure the wall to determine exact panel locations and mark the positions of all bearing plates according to the shop drawings. Horizontal bearing plates run continuously and must abut at a stud location to allow fastening at both ends. Vertical plates are centered over a stud for secure attachment.

Horizontal plates with a shelf angle, like the sill angle and stack plate, must be positioned ***exactly*** because they directly influence the final locations of the panels on the wall. Erection tolerances for other parts can be +/- 1/8".

4. Horizontal Shelf Angle Installation
Begin erection of bearing plates by installing horizontal parts having a shelf angle. Make sure each part is the correct length; position and align. One screw at each length, usually at or near mid-length, is fastened through a hole the same diameter as the screw shank to permanently

stake the plate in position. All other screws are fastened through oversized or slotted holes to accommodate expansion and contraction. As for all plate parts, fasten each length firmly into solid support framing with #8 stainless steel pan head screws located within 1" of the ends and no more than 16" O.C. in between.

5. Remaining Bearing Plate Installation
In a similar fashion, install other horizontal and vertical perimeter plates. Each vertical plate is located directly over a stud to allow solid attachment. Parts can be positioned to a +/- 1/8" tolerance.

If intermediate stiffeners are included in the design, install stiffener plates. These may be located with more generous tolerances.

In all cases, allow for loose abutment and planned-for expansion clearances. Use one screw in each length as a stake and set all other fasteners through generously oversized or slotted holes. Fasten at each end and no more than 16" O.C. in between.

6. Working Temperature Range
Norton does not recommend application of the specified tape or adhesion promoter below 40ºF because lower temperatures reduce the formability of the tape and slow bond development.

The structural silicone may not be stored above 80ºF. A cool or air conditioned space must be available for job site storage of the silicone.

7. Cellular Foam Tape Application
To assure good adhesion, bearing surfaces ***must*** be dry and free from dirt, dust, and other contaminants. Clean both the tape and silicone contact areas with an approved solvent, using a clean, soft, absorbent, lint-free cloth. ***Never*** substitute a paint brush for a cloth as a cleaning tool because it will not absorb and remove the dirt.

Pour the cleaning solvent on the rag. Do not dip the rag in the solvent because that can lead to contamination. Vigorously rub the bearing plates to remove surface contaminants. Continuously rotate the cloth so clean cloth will be used to lift off the solvent loosened dirt. It is best to use another clean cloth to wipe the aluminum dry, rather than allow the solvent to evaporate from the surface. Work ahead only to the extent that cleaned surfaces will not become contaminated prior to application of the tape and sealant.

Apply Norton tape from the roll to the bearing plates. Do not handle the exposed adhesive surface or remove the liner from the front side. Place the unlined adhesive surface in the correct position on the bearing plate as detailed in the drawings. The tape in a given one-panel area should be placed to form an unbroken gasket around the panel perimeter. Corners must abut, not overlap. Once the tape is in place, apply firm pressure, preferably with a roller, to ensure complete contact and adhesion.

8. Panel Preparation
Confirm that the panel is in good condition and cut to the proper size.

First, in order to develop structural adhesion, the areas on the back of the panel which will contact the tape and silicone ***must*** be dry and free from processing salts, dirt, dust, or other contaminants. Clean the contact areas with solvent. As with cleaning the bearing plates, pour cleaning solvent onto a clean, soft, absorbent lint-free cloth. Vigorously rub the panel and remove surface contaminants. Continuously rotate the cloth and use clean cloth to wipe the panel dry rather than allowing the solvent to evaporate.

Second, prime the contact areas with Norton Tite-R-Bond (2287) Adhesion Promoter. To apply, pour from the can onto a clean, dry, lint-free cloth. ***Never*** dip into the can because that may contaminate the adhesion promoter. Wipe a thin coat on the contact areas and allow it to dry; usually less than a minute for complete drying.

9. Applying Structural Silicone
Work in a one-panel area only, just before the panel will be set. Make sure the bearing surfaces are ***dry*** and ***clean***. To apply the approved silicone, prepare the nozzle to extrude a 3/8" diameter bead and gun onto bearing surfaces adjacent to the tape, as per details on Pages 8 - 10. One continuous bead should be formed at the panel perimeter and at stiffeners.

Good workmanship at this stage is essential to ensure a sound, weathertight finished installation. Care must be exercised to keep the silicone far enough away from the tape to prevent it from flowing over the tape and interfering with initial tape-to-panel bond. When the panel is pressed into place, the silicone is squeezed into a final 3/16" deep X 1/2" wide configuration. Beads smaller than 3/8" diameter must not be applied and beads must not be stretched out during gunning because that will effectively reduce their diameter.

A uniform sealant bead can best be applied using air pressure equipment. Manual caulking guns may be used but require more skill to control the bead.

10. Set Panel

After the silicone is applied, the panel must be set within 10 minutes - the sooner, the better. Preliminary curing after 10 - 15 minutes may otherwise impair adhesion.

Please note that these times are approximate and depend upon the weather conditions at the time of application. Structural silicone is a moisture cure material, therefore the warmer and more humid the conditions, the faster the silicone will cure or "skin over". ***Silicone that has skinned over is not acceptable to be used.***

First, place two setting blocks, 80 - 90 durometer Shore A hardness silicone, each 1/8" high X 11/32" wide X 6" long, on the shelf angle at panel quarter points (sill only). ***Second***, strip the liner from the Norton tape. ***Third***, move the panel into place, align it, place the bottom edge on the setting blocks, and, once in correct position, pivot the panel and press it into place. ***Finally***, exert firm hand pressure, or use a heavy-duty roller or beating block and hammer, at the perimeter and stiffener locations to ensure proper seating and good adhesion.

From this point on, panels are installed in a similar and routine manner over the entire panel area.

11. Caulking

At panel perimeter, where caulk joints occur, the panel face should be masked just before caulking. Masking tape, 1" wide or so, should be applied. ***Masking tape should remain on the Petrarch no more than two hours; and, after caulking, must be removed before the sealant begins to cure-approximately 10-15 minutes.***

Where appropriate, such as typical vertical joints, open-cell polyurethane foam backer rod is placed in the joints so only the panel edges remain exposed. The rod must be configured so as not to interfere with a full 5/16" sealant depth.

A good grade polyurethane sealant should be applied in accordance with their manufacturer's published instructions. ***Care must be taken not to smear any sealant on the face of the panels. If this occurs, steps should be taken to remove immediately.***

Tooling should be done within 10 minutes using a dry blunt tool. Sealant must be tooled into the joint. Avoid the technique of scraping off excess sealant, which tends to pull the sealant out of the joint.

12. Quality Control

We recommend that the installer take advantage of a no-charge service offered by Dow Corning and General Electric to adhesion-test samples of the actual bearing plates which will be used on the job. This laboratory test, conducted according to ASTM C794, Standard for Peel Adhesion, requires 21 days.

In addition, each silicone shipment must be checked to make sure it cures properly. A simple test can be conducted by extruding a small amount of sealant and checking it the following day to make sure it is rubbery and dry. The installer is best advised to follow steps detailed by the silicone manufacturers and record test results in a log book.

Further, several weeks before the installation crews begin production, the installer should set two or three panels using materials and procedures specified for the project. After the silicone has cured (14 - 21 days), the quality of adhesion to all surfaces should be checked.

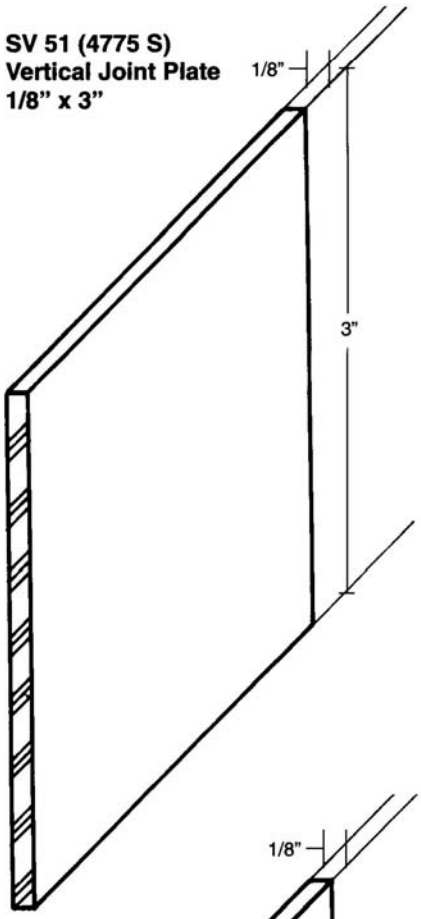
Finally, it is strongly suggested that the project specifications call for a job site meeting of representatives of CEP, the silicone manufacturer, the architect, general contractor and the installing sub-contractor prior to the start of panel installation.

NOTE:

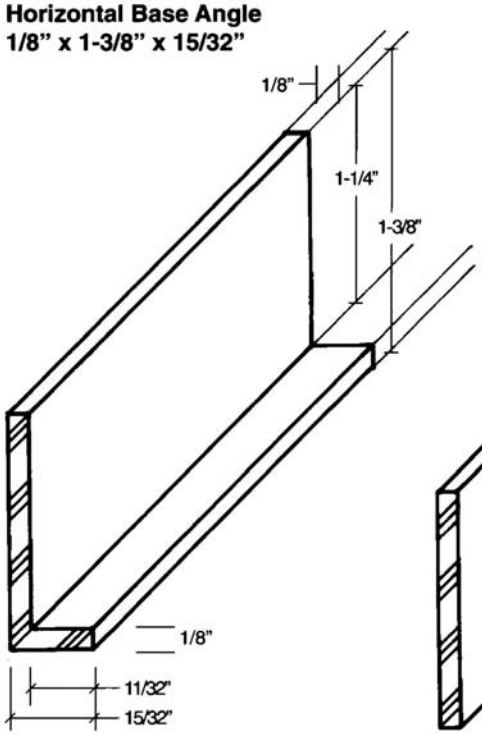
The installation of Petrarch and Fasset panels using the structural silicone setting system must conform to this design and installation data paper, dated March, 2002, or all warranties are void.

This CEP design and installation data paper supersedes all installation instructions. Check for later additions.

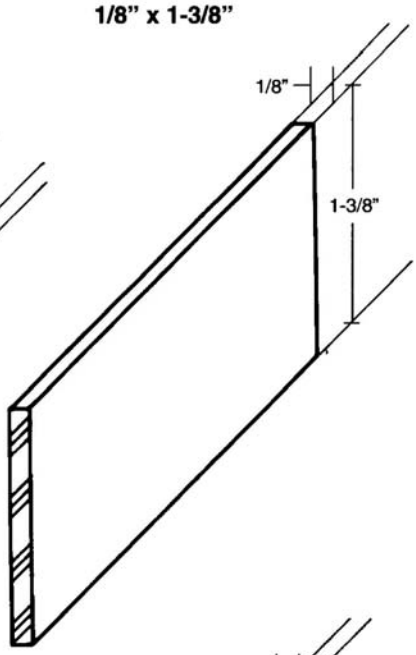
SV 51 (4775 S)
Vertical Joint Plate
1/8" x 3"



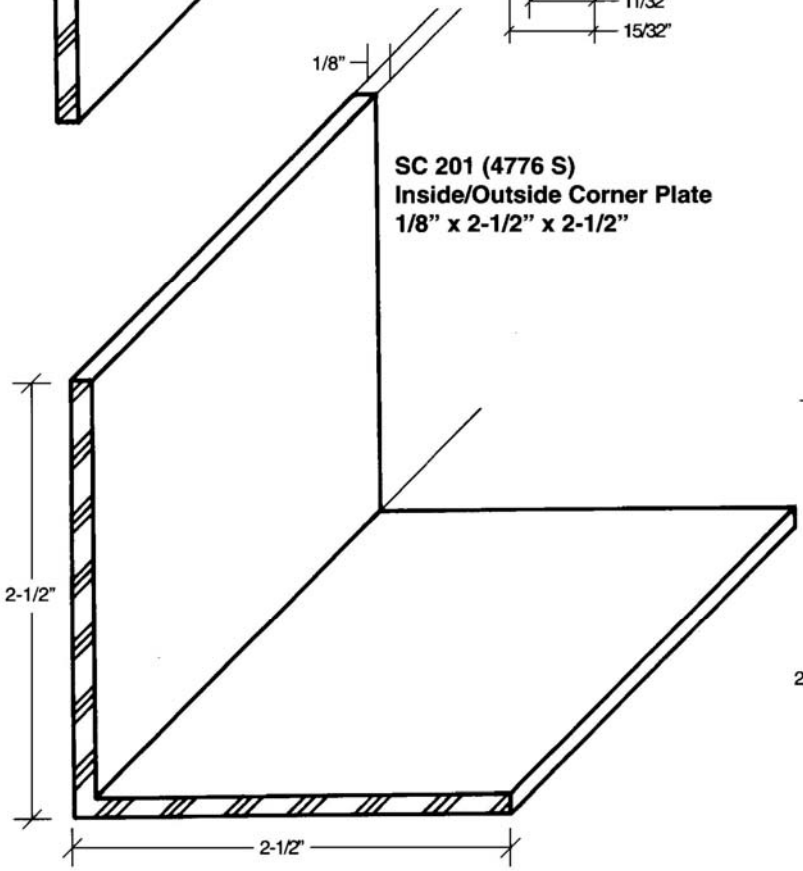
SH 21 (4778 S)
Horizontal Base Angle
1/8" x 1-3/8" x 15/32"

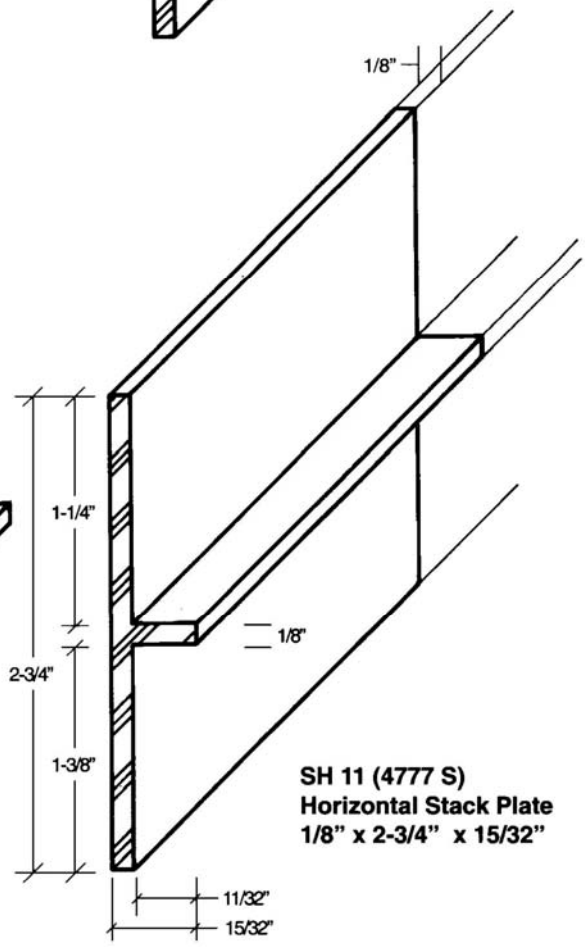


SH 01 (4774 S)
Horizontal Head Plate
1/8" x 1-3/8"



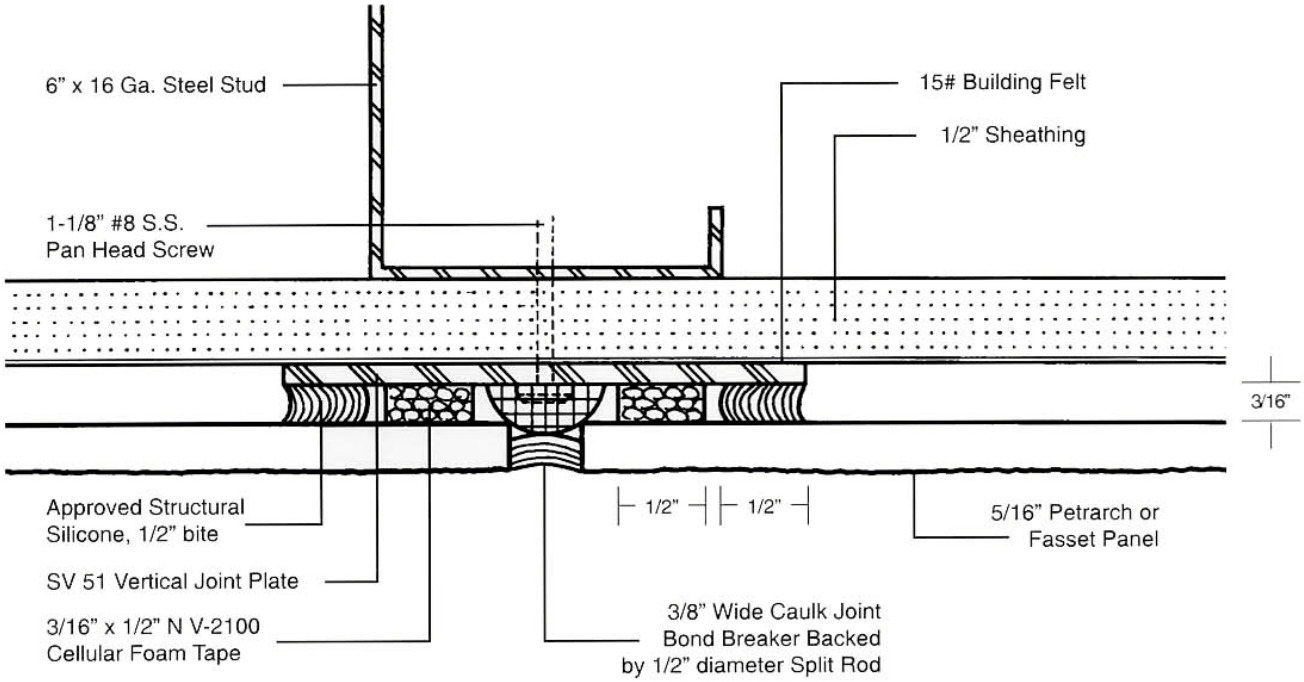
SC 201 (4776 S)
Inside/Outside Corner Plate
1/8" x 2-1/2" x 2-1/2"



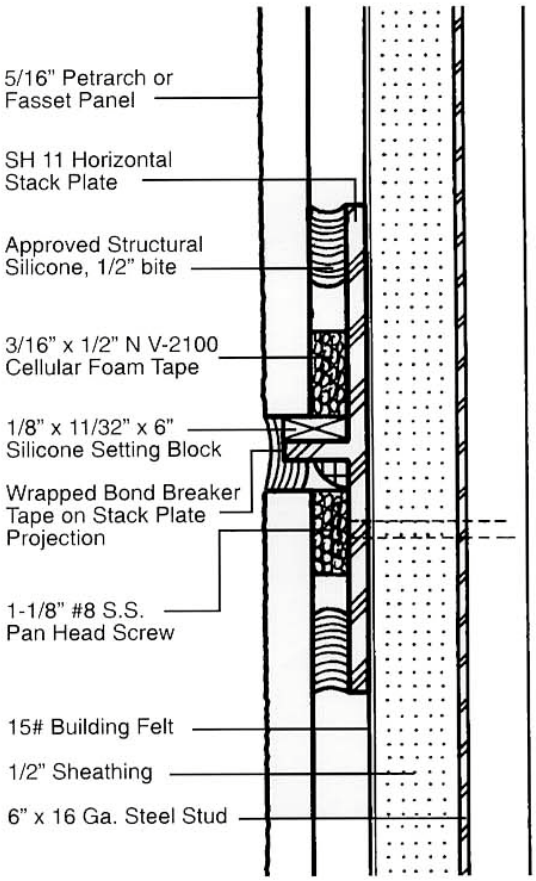


SH 11 (4777 S)
Horizontal Stack Plate
1/8" x 2-3/4" x 15/32"

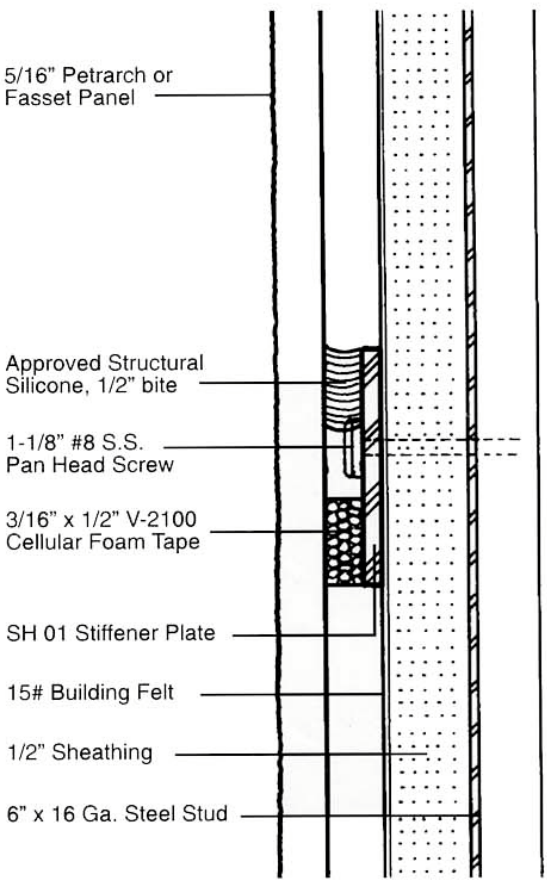
Section Through Typical Vertical Joint



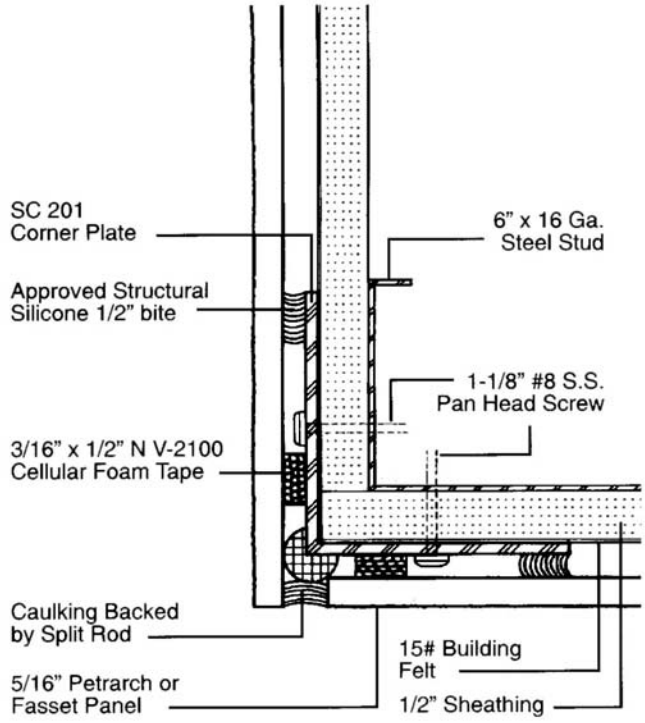
Section Through Horizontal Stack Joint



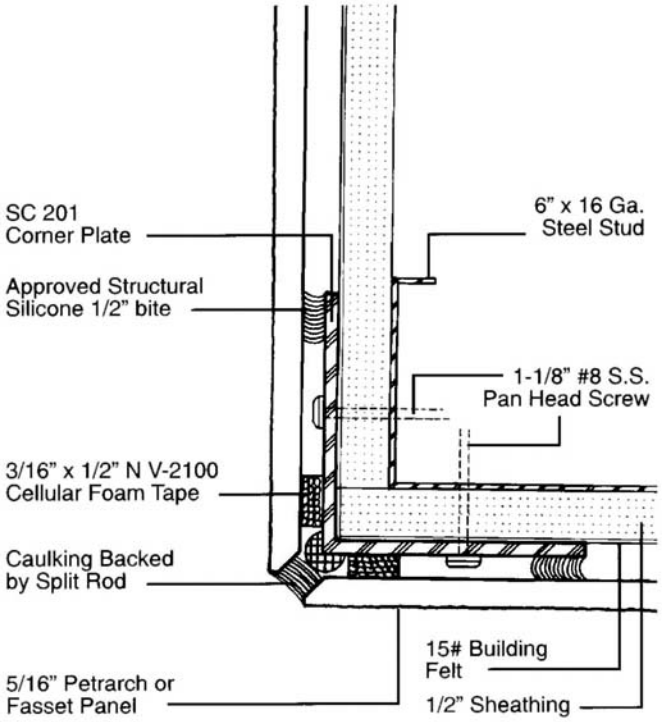
Section Through Intermediate Stiffener



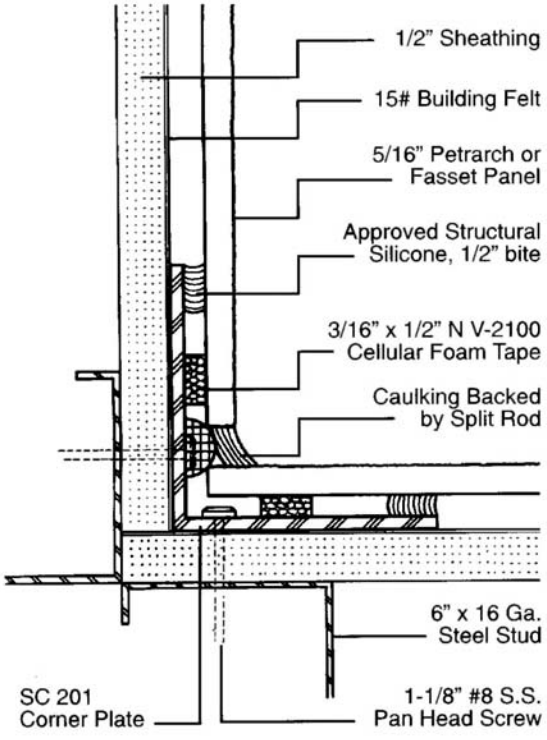
Section Through Standard Outside Corner



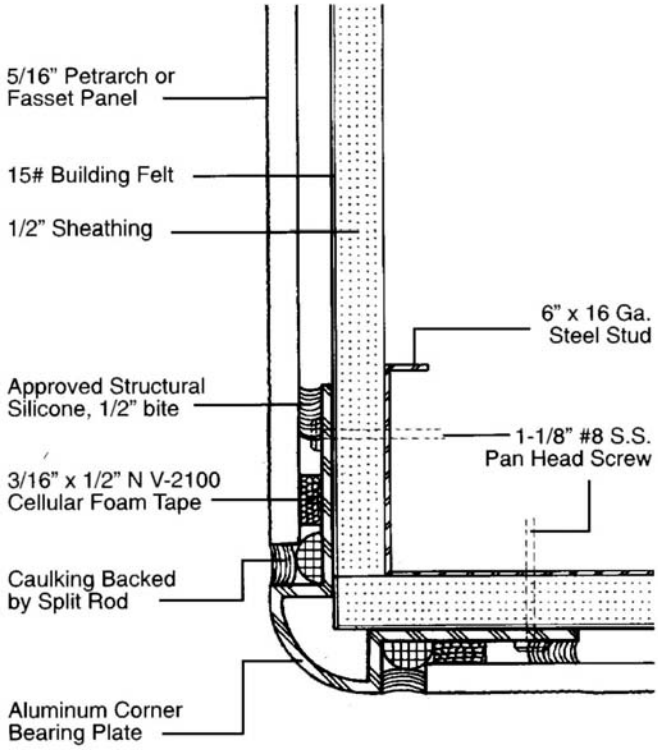
Section Through Mitered Outside Corner



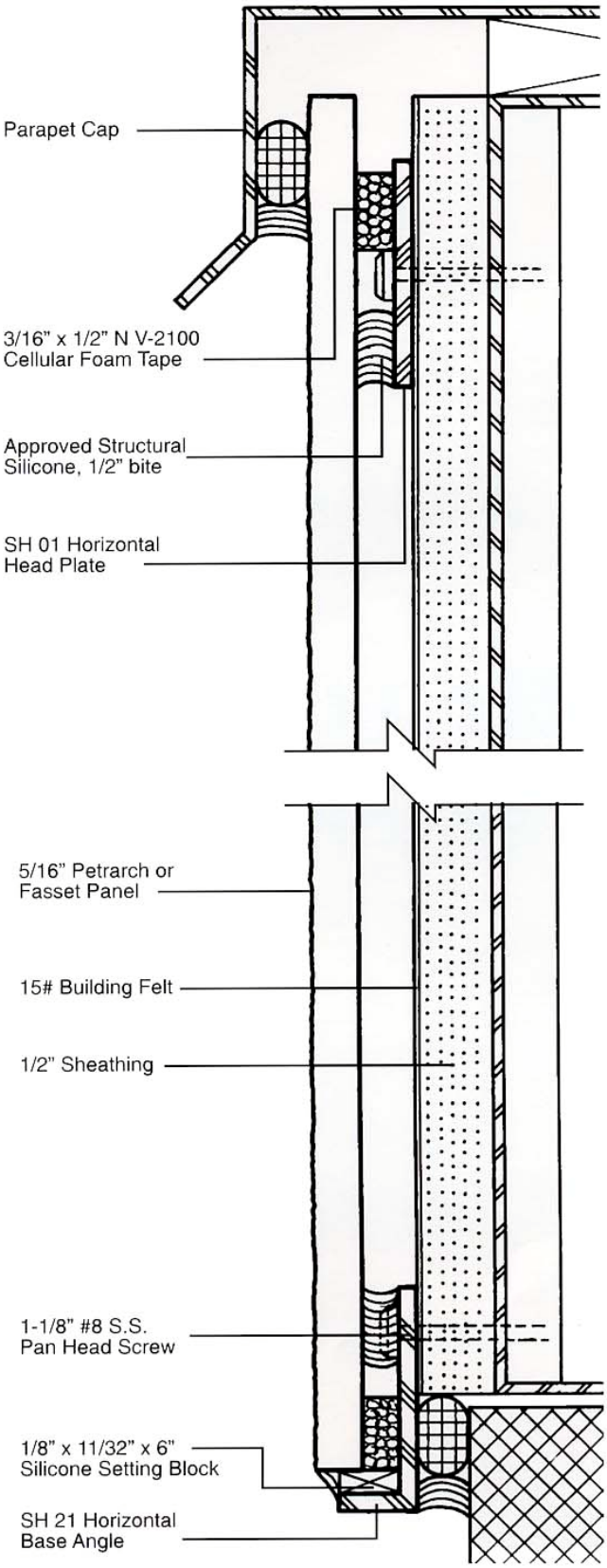
Section Through Inside Corner



Section Through Trimmed Outside Corner



Section Through Horizontal Head Plate and Base Angle



Section Through Head and Base Between Windows