The following precautions are recommended to protect the material against damage. Following these precautions will help ensure early acceptance of your products and workmanship.

A. HANDLE CAREFULLY.
   All aluminum materials at job site must be stored in a safe place, well removed from possible damage by other trades. Cardboard wrapped or paper interleaved materials must be kept dry.

B. CHECK ARRIVING MATERIALS.
   Check for quantity counts and keep records of where various materials are stored.

C. KEEP MATERIALS AWAY FROM WATER, MUD, AND SPRAY.
   Prevent cement, plaster or other materials from damaging the finish.

D. PROTECT THE MATERIALS AFTER ERECTION.
   Protect erected frame with polyethylene or canvas splatter screen. Cement, plaster, terrazzo, other alkaline solutions, and acid based materials used to clean masonry are harmful to the finish. If any of these materials come in contact with the aluminum, IMMEDIATELY remove with water and mild soap.

NOTE: Any modifications, other than those specified in this document, could result in this product’s failure to meet UL safety ratings and void the manufacturer's warranties.

The rapidly changing technology within the architectural aluminum products industry demands that C.R. Laurence/U.S. Aluminum reserve the right to revise, discontinue, or change any product line, specification, or electronic media without prior written notice.

NOTE: Dimensions in parentheses ( ) are millimeters unless otherwise noted.
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GENERAL INSTALLATION NOTES

RECOMMENDED GUIDELINES FOR ALL INSTALLATIONS:

1. REVIEW CONTRACT DOCUMENTS. Check shop drawings, installation instructions, architectural drawings, and shipping lists to become thoroughly familiar with the project. The shop drawings take precedence and include specific details for the project. Note any field verified notes on the shop drawings prior to installing. The installation instructions are of a general nature and cover most conditions.

2. INSTALLATION. All materials are to be installed plumb, level, square, and true.

3. BENCH MARKS. All work should start from bench marks and/or column lines as established by the architectural drawings and the general contractor with guaranteed accuracy. Working from these datum points and lines determine:
   a) The plane of the wall in reference to offset lines provided on each floor.
   b) The finish floor lines in reference to bench marks on the outer building columns.
   c) Mullion spacing from both ends of masonry opening to prevent dimensional build-up of daylight opening.

4. FIELD WELDING. All field welding must be adequately shielded to avoid any splatter on glass or aluminum. Results will be unsightly and/or structurally unsound. Advise general contractor and other trades accordingly. All field welds of steel anchors must receive touch up paint (zinc chromate) to avoid rust.

5. SURROUNDING CONDITIONS. Make certain that construction which will receive your materials is in accordance with the contract documents. If not, notify the general contractor in writing and resolve differences before proceeding with work.

6. ISOLATION OF ALUMINUM. Aluminum to be placed in direct contact with uncured masonry or incompatible materials should be isolated with a heavy coat of zinc chromate or bituminous paint.

7. SEALANTS. Sealants must be compatible with all materials with which they have contact, including other sealant surfaces. Consult with sealant manufacturer for recommendations relative to joint size, shelf life, compatibility, cleaning, priming, tooling, adhesion, etc. It is the responsibility of the Glazing Contractor to submit a statement from the sealant manufacturer indicating that glass and glazing materials have been tested for compatibility and adhesion with glazing sealants, and interpreting test results relative to material performance, including recommendations for primers and substrate preparation required to obtain adhesion. The chemical compatibility of all glazing materials and framing sealants with each other and with like materials used in glass fabrication must be established. This is required on every project.

8. FASTENING. Within the body of these instructions “fastening” means any method of securing one part to another or to adjacent materials. Only those fasteners used within the system are specified in these instructions. Due to the varying perimeter conditions and performance requirements, perimeter and anchor fasteners are not specified in these instructions. For perimeter and anchor fasteners refer to the shop drawings or consult the fastener supplier.

9. BUILDING CODES. Due to the diversity in state/provincial, local, and federal laws and codes that govern the design and application of architectural products, it is the responsibility of the individual architect, owner, and installer to assure that products selected for use on projects comply with all the applicable building codes and laws. U.S. Aluminum exercises no control over the use or application of its products, glazing materials, and operating hardware, and assumes no responsibility thereof.

10. EXPANSION JOINTS. Expansion joints and perimeter seals shown in these instructions and in the shop drawings are shown at normal size. Actual dimensions may vary due to perimeter conditions and/or difference in metal temperature between the time of fabrication and the time of installation. Gaps between expansion members should be based on temperature at time of installation.

11. WATER HOSE TEST. As soon as a representative amount of the wall has been glazed (500 square feet or 46.5 m²) a water hose test should be conducted in accordance with AAMA 501.2 specifications to check the installation. On all jobs the hose test should be repeated every 500 square feet (46.5 m²) during the glazing operation.

12. COORDINATION WITH OTHER TRADES. Coordinate with the general contractor any sequence with other trades which offset curtain wall installation (i.e. fire proofing, back-up walls, partitions, ceilings, mechanical ducts, converters, etc.).

13. CARE AND MAINTENANCE. Final cleaning of exposed aluminum surfaces should be done in accordance with AAMA 609.1 for anodized aluminum and 610.1 for painted aluminum.
PRODUCT DESCRIPTION

Thank you for purchasing the CRL- U.S. Aluminum Flush Front System. It is designed to install easily and efficiently. This Installation Manual covers the general procedures required for all storefront systems.

IMPORTANT: READ THIS MANUAL THOROUGHLY BEFORE BEGINNING INSTALLATION.

SERIES FF450 PARTS LIST - MAIN ASSEMBLIES

<table>
<thead>
<tr>
<th>CAT. NO.</th>
<th>Description</th>
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<tbody>
<tr>
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<tr>
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SERIES FF451, FT451 PARTS LIST - MAIN ASSEMBLIES

Extrusion part number with a "T" are for THERMALLY BROKEN parts. Series FF451 extrusions have the same profile, but are NOT THERMALLY BROKEN.

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SERIES FF600 PARTS LIST - MAIN ASSEMBLIES

Extrusion profiles shown are for exterior glazing projects. Extrusion profiles for interior glazing projects are available and are listed in our catalog and on our web site.

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SERIES FF601, FT601 PARTS LIST - MAIN ASSEMBLIES

Extrusion part number with a “T” are for THERMALLY BROKEN parts. Series FF601 extrusions have the same profile, but are NOT THERMALLY BROKEN. Extrusion profiles shown are for exterior glazing projects. Extrusion profiles for interior glazing projects are available and are listed in our catalog and on our web site.

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<td>NP218</td>
<td>Glazing Gasket Heavy Exterior</td>
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</table>
Frames may be shop fabricated and shipped to the job site partially or totally assembled.

Systems feature screw race joinery and allow for interior or exterior glazing.

Frames are fabricated in units and snap together. Each unit must have at least one vertical deep pocket to allow for glazing. Plan units accordingly. See DETAIL A.

**Never allow two shallow pockets to face each other.**

![DETAIL A]

Expansion mullions must be used in long run elevations to accommodate thermal expansion. See page 30. Units sit into a continuous subsill. Shimming of subsill is required for leveling.

**NOTE:** Series FF450 for 1/4" (6) is shown in these instructions. Series FF451 and FT451 for 1" (25) glazing are similar.

---

1. Measure ROUGH OPENING to determine FRAME DIMENSION. Allow a minimum clearance of 1/2" (13) at header and 3/8" (10) at wall jambs and subsill. Extra clearances may be necessary to accommodate building tolerances.

2. Cut members to size

   **Subsill:** Overall FRAME WIDTH PLUS 1/8" (3). Subsill must extend 1/8" (3) outside of last wall jamb to allow last panel installation. Subsill runs through.

   If opening exceeds 24' (7.32 m) in width, splice sleeves must be used at splice joints. See DETAIL Q.

   If entrances occur subsill should butt against door jambs. See DETAIL P.

   **Verticals:** FRAME HEIGHT MINUS 5/16" (8). Verticals run through.

   **Horizontals:** DAYLIGHT OPENING. Horizontals run between verticals. Cut horizontal glazing beads 1/32" (0.8) undersize for easier installation.

![DOOR FRAME]

**NOTE:** Subsill must extend 1/8" (3) outside of frame to allow for last panel installation.

---

**DETAIL B**

<table>
<thead>
<tr>
<th>Insertion method</th>
<th>Panel</th>
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<th>Panel</th>
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<tr>
<td>Erection order</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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</table>

**DIRECTION OF WORK**

Units are inserted into an opening from **LEFT to RIGHT**.
3. Apply End Dams to ends of Subsill. See DETAIL C. Do not apply End Dams to ends that butt against Door Jambs. See DETAIL P, Page 16.

NOTE: Clean all surfaces prior to applying sealants. See sealant manufacturer requirements.

TYPICAL AT ALL CONDITIONS

4. If optional Head Anchors are used, drill 3/4" (19) access holes in head members 2" (51) from ends and at mid-point. See DETAIL D.

HEAD MEMBER FOR SERIES FF450 SHOWN. SERIES FF451, FT451, FF600, FF601, AND FT601 WILL BE SIMILAR.
5. Mark the location of horizontals in vertical members and drill holes for assembly screws. The use of Drill Jigs is recommended. Use Drill Jig DJ452 for Series FF450, Drill Jig DJ552 for FF451 and FT451, Drill Jig DJ652 for FF600, and Drill Jig DJ752 for FF601 and FT601. See DETAIL E. Hook jig into glazing pockets as shown.

HELPFUL HINT:
Clean all surfaces prior to applying Spot drill then remove drill jig to complete hole pattern. This will keep it sharp longer and reduce possibility of drill jig moving during drilling.

Drill .201" (5) Holes using a Cat. No. 80107 #7 Drill as Shown

Top of Vertical
Align Jig with top of Vertical and drill holes 1 and 2

Top of Horizontal
Align Jig with top of Horizontal and drill holes 5, 6, 7, and 8

Align Jig with bottom of Vertical and drill holes 3 and 4

Bottom of Vertical

INTERMEDIATE HORIZONTAL
Align Jig with top of Horizontal and drill Holes 1, 7, 8, and 9

SILL
Interior Glazing

HEADER

Exterior Glazing

DETAL E

(See page 12 for FF451)
5a. Mark the location of horizontals in vertical members and drill holes for assembly screws. The use of drill jigs is recommended. See DETAIL G. Hook jig into glazing pockets as shown. Series FF451 shown, Series FT451 is similar. All Drill Jigs are used in the same fashion with other series.
GENERAL FRAME ASSEMBLY

If transition adaptors for 1/4" (6) spandrel are being used (Series FF451 and FT451) see DETAIL BB on Page 22.

1. Apply RTV408 Silicone to edges of all horizontal members and assemble panels using screws provided. See DETAIL I. Never allow two shallow pockets to face each other. Tool excess silicone.

NOTE:
Frame members for Series FF450 shown. Series FF451, FT451, FF600, FF601, and FT601 will be similar.

Four ST251
#10 x 1" Hex Head Phillips Assembly Screws. (Two Screws per Joint at Head and Sill Members)

Apply RTV408 Silicone to Joint thoroughly from underside. This is a CRITICAL SEAL AREA

DETAIL J

2. After panels are assembled, apply a bead of RTV408 Silicone to joint between verticals and sill members, from the underside, to ensure a watertight installation. See DETAIL J.

NOTE:
Frame members for Series FF450 shown. Series FF451, FT451, FF600, FF601, and FT601 will be similar.
3. Snap jamb filler to back of wall jamb. See DETAIL K.

NOTE:
Frame members for Series FF450 shown. Series FF451, FT451, FF600, FF601, and FT601 will be similar.

4. Apply RTV408 Silicone to top edge of vertical member and insert closure plates. See DETAIL L. Closure plates are required to ensure continuous perimeter sealing. Trim closure plates as required, to fit expansion members.
5. Install closure plates for door jambs following the standard procedure. See DETAIL M.

6. If head anchors are used, tape them to the header members at clearance hole locations. See DETAIL N.

**NOTE:**
Frame members for Series FF450 shown. Series FF451, FT451, FF600, FF601, and FT601 will be similar.
NOTE: When entrances occur install Entrance Frame first.

1. Set subsill in place, shimmed as required for leveling and anchor it to structure. Locate fasteners 6” (152) from each side of verticals and 24” (610) on center, or as required. Holes for fasteners should be elongated laterally to allow for thermal movement. **Pin subsill to structure at one point only per cut length.** (This hole is not elongated). Subsill should be shimmed at fasteners location and underneath verticals. Seal around all joints and over heads of fasteners. See DETAIL O.

Subsill butts against door jambs, where they occur.

**NOTE:** End of subsill that butts against door jamb can not be dammed, to allow for sidelite installation. Special care should be taken to control water infiltration at this joint. See DETAIL P.

Infiltrated water from upper lites must be kept out of door jambs. See DETAIL U on page 19.

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**DETIAL O**

**NOT TO SCALE**

**DETIAL P**

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GENERAL SILL INSTALLATION (CONTINUED)

2. If opening exceeds 24' (7.32 m) in width, splice sleeves must be used at splice joints. Splice Subsill as required. Locate splice sleeves near center of Daylight Opening. See DETAIL Q.

   Splice Sleeve
   Seal full length of splice with Cat. No. 95C Silicone

   A minimum 1/2" (13) Expansion Joint is required every 24" (610)

   To avoid a three side adhesion apply CRL 827T1 Bond Breaker Tape to outside of Sleeve before installation

   NOTE: This is a CRITICAL SEAL area

   Apply CRL 827T1 Bond Breaker Tape to Subsill and Splice Sleeve full length of joint and seal over it

3. If there are no entrances, start installation at wall jamb unit. Apply silicone to end dam contact area. See DETAIL R. Set first panel inside subsill and in place.

   NOTE: Use a temporary shim to push end dam tight against wall jamb. See DETAIL R. Remove temporary shim after installation is completed and before sealing around perimeter.

   Panel must be pushed against subsill upturned back wall. See DETAIL W on page 19. Plumb and shim unit and fasten it to structure. Locate header fasteners 6" (152) from each side of verticals and no more than 24" (610) O.C. (See page 18 for optional head anchors). Secure wall jamb through glass pocket if required to limit deflection. Always shim at anchor points.

   Jamb and Sill assembly

   Butter contact area with RTV408 Silicone

   NOTE: Use a Temporary Shim to keep End Dam tight against Wall Jamb. Remove Shim before sealing perimeter with Cat. No. 95C Silicone.
GENERAL FRAME INSTALLATION

1. If optional head anchors are used fasten them to structure through head member access holes.

   **NOTE:** Top of header must align with line mark in head anchors for optimum performance. Anchors may be shimmed if required. See DETAIL S.

2. Install remainder of panels one by one, snapping them together. See DETAIL T.

   **NOTE:** The last two panels may require being installed together as a unit to fit into opening. See Page 09.
3. Apply **RTV408 Silicone** to vertical glazing pocket and gasket reglet at vertical/horizontal intersection. Silicone must be applied to two sides of pocket only. Clearance at outside will allow infiltrated water to run down to subsill. See DETAIL U.

4. Insert water deflector into glazing pocket and slide it down to position. See DETAIL V. Top of deflector must be flush with horizontal glazing pocket.

   **NOTE:** Water Deflectors applied to door jambs must be sealed all around to prevent water from running to floor. (Water will drain at opposite end).

**THERMAL FLUSH FRONT NOTE (Series FT451 and FT601):**

Apply masking tape over slots of **RX210 Vertical Filler** to allow for sealing at Water Deflector locations.

5. Seal joints between panels and subsill at both inside and outside. See DETAIL W.

   **NOTE:** Panels must be pushed tight against subsill inside upturned leg before fastening head and caulking sill

6. When interior glazing a multistory building, exterior perimeter sealing must be done before glazing, unless caulking is to be done from the exterior as a secondary operation.
GLAZING

GLASS SIZES*

SERIES FF450 and FF600 for 1/4" (6) glazing: Daylight Opening + 5/8" (16) (Except door transom, see page 25 - 26)
SERIES FF451, FT451, FF601, and FT601 for 1" (25) glazing: Daylight Opening + 7/8" (22) (Except door transom, see page 25 - 26)

*These formulas do not take into account glass tolerances. Consult glass manufacturer before ordering glass.

INTERIOR GLAZING

1. Cut glazing gaskets to size. Gaskets should be cut 1/8" (3) longer per foot of aluminum member to allow for shrinkage. Same gaskets are used for interior and exterior.

2. Install setting blocks, two per glass lite, into horizontal and sill members. Check deadload charts and shop drawings for correct setting block locations.

3. Install exterior gaskets. Vertical gaskets run through. Start at corners and work towards center. Tight butt joined corners are critical to avoid leakage.

   NOTE: All glazing pockets must be clean of debris before glazing to prevent blockage of weeps or drains.

4. Set glass in place following the four step procedure. See DETAIL X. Be careful not to disturb exterior gasket while installing glass. Center glass into opening and rest on setting blocks pressed against exterior gaskets.

   GLAZING SEQUENCE
   1. Into Deep Pocket
   2. Swing to Plane
   3. Slide to Shallow Pocket
   4. Down onto Setting Blocks

   DETAIL X

   NOTE:
   Frame members for Series FF450 shown. Series FF451, FT451, FF600, FF601, and FT601 will be similar.

5. Install interior gaskets. Horizontal gasket runs through. Start at corners and work towards center. Tight butt joined corners are critical to avoid leakage. Seal gasket corners.
GLAZING (CONTINUED)

EXTERIOR GLAZING

1. Set glass in place following the four step procedure. See DETAIL Y. Be careful not to disturb interior gasket while installing glass. Center glass in the opening.

NOTE: All glazing pockets must be clean of debris before glazing to prevent blockage of weeps or drains.

GLAZING SEQUENCE
1. Into Deep Pocket
2. Swing to Plane
3. Slide to Shallow Pocket
4. Raise into Top Horizontal

2. Install setting blocks, two per glass lite, in horizontal/sill members. Check deadload charts and shop drawings for correct setting block locations. Rest glass on setting blocks pressed tight against interior gaskets.

3. Snap-in glazing beads. See DETAIL Z.

4. To prevent glass from shifting in the opening, one WB452 "W" Edge Block should be installed into vertical’s deep glass pocket at center point or as recommended by glass manufacturer. See DETAIL AA on Page 22.
GLAZING (CONTINUED)

EXTERIOR GLAZING

5. Install remaining gaskets. Horizontal gaskets run through. Start at corners and work towards center. Tight butt joined corners are critical to avoid leakage.

TRANSITION GLAZING

Roll-in transition adaptors and glazing beads for 1/4" (6) spandrel are supplied as required. Glazing adaptor cutting length is D.L.O. minus 1/32". Roll-in adaptors need to be installed when setting glass and held in place temporarily with a piece of gasket. Glazing beads for 1/4" (6) glazing are used for interior glazing applications only.

**NOTE:** Always install Water Deflectors before rolling in vertical adaptors. Use deflectors for 1" (25) glazing.

6. Apply **RTV408 Silicone** full length of reglet and install glazing adaptor centering in opening. See DETAIL BB.
GLAZING (CONTINUED)
FLUSH IN (F.I.) - Exterior Glazing

With Flush-In glazing, the glass is flush to inside. Use interior glazing members in reverse.

Follow standard procedure for FRAME FABRICATION and ASSEMBLY except the following steps:

1. Silicone closure plates to vertical members on outside. See DETAIL CC.

2. Set subsill in place as shown on Page 16, Step 1, DETAIL O. Do not reverse subsill. Weep slots must always be outside. See DETAIL EE.

3. Install panels reversed (glazing pocket to inside). See DETAIL DD.

NOTE: Panels must be pushed tight against Subsill inside upturned leg before fastened

NOTE: Do not seal this area
Gap on outside will allow water to run down to Subsill

HELPFUL HINT:
Use a small piece of tape to bridge gap to back-up RTV408 Silicone.

NOTE: Seal Subsill at exterior and interior

Tremco “SPECTREM 1” a Low Modulus High Performance One Part Silicone (or similar) is recommended
GLAZING (CONTINUED)
FLUSH IN FLUSH OUT (F.I.F.O.) - Exterior or Interior Glazing

Carefully check shop drawings to select the correct members before assembling units.

If Exterior glazing is required FLUSH IN and FLUSH OUT panels should be built with different components.

If FLUSH IN and FLUSH OUT panels are built using the same components a combination of Interior/Exterior glazing will be required. See DETAIL FF.

Follow standard procedure for FABRICATION and ASSEMBLY except the following steps.

4. Use RTV408 Silicone to seal closure plates to vertical members on outside. See DETAIL GG.

5. Set Subsill in place as shown on Page 16, Step 1. Do not reverse Subsill. Weep slots must always be outside. See DETAIL DD and EE on Page 23 for FLUSH IN panels installation.
GLAZING (CONTINUED)

CENTER GLAZED ENTRANCE FRAMES

ENTRANCE FRAME HEIGHT equals FLUSH FRONT HEIGHT plus bottom clearance. (Door jambs run to floor).

NOTE: Glass above door is centered in frame.

<table>
<thead>
<tr>
<th>Glass Sizes</th>
<th>SERIES FF450</th>
<th>SERIES FF451/FT451</th>
<th>SERIES FF600</th>
<th>SERIES FF601/FT601</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass Height</td>
<td>D.L.O. - 1/8&quot; (3)</td>
<td>D.L.O. - 1/8&quot; (3)</td>
<td>D.L.O. - 1/8&quot; (3)</td>
<td>D.L.O. - 1/8&quot; (3)</td>
</tr>
</tbody>
</table>

SERIES FF450 for 1/4" (6) and 3/8" (9.5) glazing; SERIES FF600 is similar.

SERIES FF451/FT451 for 1" (25) glazing; SERIES FF601/FT601 is similar.
GLAZING (CONTINUED)
OFFSET GLAZED ENTRANCE FRAMES

ENTRANCE FRAME HEIGHT equals FLUSH FRONT HEIGHT plus bottom clearance. (Door jambs run to floor).

NOTE: Glass above door is offset in frame.

### TRANSOM GLAZING

<table>
<thead>
<tr>
<th>Glass Sizes</th>
<th>SERIES FF450</th>
<th>SERIES FF451/FT451</th>
<th>SERIES FF600</th>
<th>SERIES FF601/FT601</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass Height</td>
<td>D.L.O. - 1/8&quot; (3)</td>
<td>D.L.O. - 1/8&quot; (3)</td>
<td>D.L.O. - 1/8&quot; (3)</td>
<td>D.L.O. - 1/8&quot; (3)</td>
</tr>
</tbody>
</table>

SERIES FF450 for 1/4" (6) and 3/8" (9.5) glazing;
SERIES FF600 is similar.

SERIES FF451/FT451 for 1" (25) glazing;
SERIES FF601/FT601 is similar.

**DETAIL JJ**

**DETAIL KK**

NOT TO SCALE

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OPTIONAL CORNER SYSTEM

CORNER CONDITIONS

Subsill should be mitered as required.

Corner members should be cut the same length as verticals.

Subsill must be pinned to structure on both sides of corner to prevent movement at mitered joint.

Elevations with corners at both ends may require a splice to accommodate thermal movement. See DETAIL LL.

FLOOR PLAN

1. Install mitered Subsill on one side of corner only. Secure it to structure and seal over head of fasteners with Cat. No. 33S Silicone.

2. Set corner panel ending with FF480 (FF580/FT580) first. See DETAIL MM. Attach panel to structure at one point for safety.

DETAIL LL

It is recommended that elevations with corners at both ends have at least one expansion member to allow for minor adjustments.

90° OUTSIDE CORNER

1. Install mitered Subsill on one side of corner only. Secure it to structure and seal over head of fasteners with Cat. No. 33S Silicone.

2. Set corner panel ending with FF480 (FF580/FT580) first. See DETAIL MM. Attach panel to structure at one point for safety.

A clearing notch in Vertical may be required to clear the fastener’s head.

Pin Subsill to structure at both sides of corner. Seal over head of screws Cat. No 33S Silicone.
(Do not elongate these holes)

FF480 shown

DETAIL MM

NOTE:
Frame members for Series FF450 shown. Series FF451, FT451, FF600, FF601, and FT601 will be similar.
OPTIONAL CORNER SYSTEM (CONTINUED)

3. Install Subsill on the other side of the corner. Secure it to structure. Completely seal joint and over head of fasteners with Cat. No. 33S Silicone. See DETAIL OO.

4. Set corner panel on the other side and snap panels together. See DETAIL OO.

5. Secure panels at head as indicated on Step 3, Page 17.

NOTE:
Frame members for Series FF450 shown. Series FF451, FT451, FF600, FF601, and FT601 will be similar.

90° INSIDE CORNER

1. Install mitered Subsill on one side of corner only. Secure it to structure and seal over head of fasteners with Cat. No. 33S Silicone.

2. Set corner panel ending with FF475 (FF575/FT575) first. Secure it to structure at one point for safety. SEE DETAIL PP.

NOTE:
Frame members for Series FF450 shown. Series FF451, FT451, FF600, FF601, and FT601 will be similar.
OPTIONAL CORNER SYSTEM (CONTINUED)

3. Install subsill on the other side of the corner and secure it to structure. Completely seal mitered joint and over head of fasteners with Cat. No. 95C Silicone. See DETAIL QQ.

4. Set corner panel on the other side and snap panels together. Inside corner has only one snap point. Tie components together at pocket side with #10 screws, 24" (610) O.C. See DETAIL QQ.

135° CORNERS

1. Install mitered Subsill on one side of corner only. Secure it to structure and seal over head of fasteners with Cat. No. 33S Silicone. See DETAIL RR.

2. Apply RTV408 Silicone to mitered edge.

3. Set corner member in place.

4. Butter mitered edge of Subsill for the other side and install tight against previously installed half. Secure to structure with and seal over head of fasteners with Cat. No. 33S Silicone.

5. Snap-in panels at both sides of corner.
**EXPANSION MULLIONS**

Expansion Mullions must be used to accommodate thermal movement in long run elevations. They should be spaced as required by job conditions and project specifications. Two piece Mullions allow for a 3/8" (9.5) maximum movement. Gap between half members should be based on the temperature at the time of installation. Maximum distance between Expansion Mullions should be:

\[
\text{In Feet} = \frac{2422.5}{\text{Temperature difference } ^\circ \text{F}} \\
\text{In Meters} = \frac{410.21}{\text{Temperature difference } ^\circ \text{C}}
\]

**EXAMPLE**

<table>
<thead>
<tr>
<th>Temperature Difference</th>
<th>Unit</th>
<th>120&quot; (from 30° to 150°)</th>
<th>Unit</th>
<th>66.7° (from -1.1° to 65.6°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate Vertical Spacing</td>
<td>feet</td>
<td>4'</td>
<td>meters</td>
<td>1.22 m</td>
</tr>
<tr>
<td>Maximum Distance Between Expansion Mullions</td>
<td>feet</td>
<td>( \frac{2422.5}{120} = 20.18' )</td>
<td>meters</td>
<td>( \frac{410.21}{66.7} = 6.15 \text{ m} )</td>
</tr>
</tbody>
</table>

**USE ONE EXPANSION MULLION EVERY FIVE BAYS**

**GAP AT THE TIME OF INSTALLATION SHOULD BE BASED ON THE FOLLOWING RATIO:**

\[
\frac{\text{Maximum temperature - Actual temperature}}{\text{Maximum temperature - Minimum temperature}}
\]

<table>
<thead>
<tr>
<th>If Installed at</th>
<th>°F</th>
<th>70°</th>
<th>°C</th>
<th>21.11°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gap at Time of Installation</td>
<td>inches ( \frac{(150° - 70°)}{150° - 30°} \times .375° )</td>
<td>.25°</td>
<td>mm ( \frac{(65.6° - 21.11°)}{65.6° + 1.1°} \times 9.52 \text{ mm} )</td>
<td>6.4 mm</td>
</tr>
</tbody>
</table>

**NOTE:** Expansion mullion for 1" (25) glazing features a .200" (5) visible gap at the closed position therefore the calculated gap, .25" (6.4) will result in a visible gap of .25" + .200" = .450" (6.4 + 5 = 11.4)
DOOR GLAZING INSTRUCTIONS

Door may be glazed either Installed or Laid horizontal.  
NOTE: Doors are more easily glazed in horizontal position. If glazing horizontally, leveling screw adjustments occur after hanging door.

Raise adjustable leveling screw to maximum retracted position.  
See DETAIL A.

Install glass stops, with glazing gaskets on one side of door only.  
If using square stops, install vertical stops first.  
If using beveled stops, install horizontal stops first.

Center glass in opening resting on setting blocks.

Snap-in remaining glass stops.

Turn leveling screw as required to maintain a uniform clearance between door top rail and header.

On pair of doors with astragal adjust screws to keep proper meeting stiles clearance. See DETAIL B.

On all weather stripped door stiles pull the string to release weatherstrip pile after doors are installed. See DETAIL C.
This Concludes the Installation Manual for your product. We hope that this guide has been helpful. Should you need further assistance, our knowledgeable Technical Sales Department is available at no charge during regular business hours. Please have your Order Number ready before calling.

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GUIDE TO SEALANTS

NOTE: All sealants must be tooled to ensure proper adhesion.

WATERPROOFING

- **33S ACETIC CURE SILICONE**
  Sill to Subsill, End Dams, Screw Heads, and Threshold to Door Frame Sealing.

  Seal Over Screw Heads with CAT. NO. 33S Silicone

  Fill with CAT. NO. 33S Silicone to Create a Water Shed.

  NOTE: Not for use near insulating glass units with butyl sealant.

JOINT ADHESIVE

- **RTV408 NEUTRAL CURE SILICONE**
  Small Joints, End Joints and Buttered Surfaces, Water Diverters, End Dams, and Reglet Fills.

  Fill screw riglet ends with CAT. NO. RTV408

  Butter Ends Before Assembly CAT. NO. RTV408

  Seal Vertical Gasket Reglet with CAT. NO. RTV408 Silicone

  Seal Screw Heads with CAT. NO. RTV408 Silicone

  Seal Water Diverter with CAT. NO. RTV408 Silicone

  NOTE: I.G. butyl contact OK.

EXPANSION

- **95C NEUTRAL CURE SILICONE**
  Expansion Joints.

  Bond Breaker Tape CAT. NO. 827T

  Seal Tape Edges with CAT. NO. 95C Silicone

  Seal Gap with CAT. NO. 95C Silicone

  Seal Screw Heads in Slotted (Expansion) Holes with CAT. NO. 95C Silicone

PERIMETER

- **95C NEUTRAL CURE SILICONE (Preferred)**
- **M64 (SMOOTH) MODIFIED POLYURETHANE**
- **M66 (TEXTURED) MODIFIED POLYURETHANE**
  Perimeter Seals, Expansion Joints, Sill and Threshold Beds; Concrete, Wood, and Steel Openings.

  Exterior Perimeter Caulking CAT. NO. 95C/M64/M66

  Waterproofing Silicone Sealant CAT. NO. 33S/RTV408 Do Not Block Weep Holes

  Do Not Block Weep Holes

STRUCTURAL

- **ALL STRUCTURAL SEALANTS REQUIRE TESTING AND APPROVAL.**

  Glass-to-Glass or Glass-to-Metal