



TT501 Window Wall

installation & glazing manual

NOTE

THE INSTALLATION DETAILS FOUND IN THIS PACKAGE ARE GENERIC AND ARE FOR REPRESENTATION ONLY WITH THE INTENT OF GIVING THE INSTALLATION TEAM A VISUAL REPRESENTATION AS TO HOW THE ASSEMBLIES TYPICALLY INSTALL. THE SHOP SUBMISSION DRAWINGS AND DETAILS ARE THE GOVERNING DOCUMENTS AND AS SUCH THIS PACKAGE IS TO BE USED ONLY AS A RESOURCE.

FOLLOW SEALANT MANUFACTURERS' RECOMMENDATIONS FOR USE AND APPLICATION OF ALL STRUCTURAL SILICONE SEALANT AND WEATHER SEAL SILICONE SEALANT.

CUSTOMER / PROJECT QUALITY ASSURANCE PROCEDURES ARE SEPARATE DOCUMENTS AND ARE TO BE FOLLOWED IN CONJUNCTION WITH THIS MANUAL.

TT501 Window Wall Installation and Glazing Manual

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IMPORTANT NOTICE:

Completely read these instructions prior to beginning work. These recommendations are for general erection/installation procedures only. For actual job conditions, see shop drawings if applicable. For perimeter anchor types and spacing, refer to the approved shop drawings or consult structural engineer/project design professional.

GENERAL NOTES

US Aluminum ® TT501 (2-1/4" x 5") is a high thermal window wall system with options for Captured and SSG installations. Both Inside and Outside Glazed applications can be Pre-Glazed or Field Glazed. TT501 incorporates an innovative thermal strut and an additional screw spline at the face to ensure a tight horizontal to vertical appearance typically not found in strutted or double pour and de-bridged products.

Check all shop drawings and installation instructions to become familiar with the project before work begins. The shop drawings take precedence and include specific details for the project. The installation instructions are of a general nature and only cover the most common conditions.

BUILDING CODES

US Aluminum ® does not control the application nor selection of its product configurations, sealant, or glazing materials, and assumes no responsibility thereof. It is the responsibility of the owner, architect, and installer to make these selections in strict compliance with applicable laws and building codes.

PERIMETER SEALANTS

Due to varying job conditions, all perimeter sealants used should be approved by the sealant manufacturer to ensure the sealant will function for the conditions shown on these instructions and shop drawings. Sealants must be compatible with all surfaces where adhesion is required, including other sealant surfaces. Use primers where directed by sealant manufacturer. Be sure to properly store sealants at recommended temperature and check container for remainder of shelf life before using.

MATERIAL AND WORK ACCEPTANCE

US ALUMINUM ® MATERIALS

Check all material upon arrival for quality and to assure against shipping damage. Any visible damage must be noted on the freight bill at the time of receipt. If a claim is required, then the receiving party must process a claim with the freight company.

OTHER TRADES WORK

Completely check construction that will receive your materials against contract documents. Notify general contractor by letter of any discrepancies before proceeding with work. Failure to do so constitutes acceptance of work by other trades.

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MATERIAL HANDLING

Handle the material carefully. Do not drop from the truck. Stack with adequate separation so that the material will not rub together. Store material off the ground. Protect against the elements and other construction hazards by using a well-ventilated covering away from other trades. Remove material from package if it is wet or located in a damp area.

SHOP

- Cardboard wrapped or paper interleaved material must be kept dry.
- Check arriving materials for quantity and keep record of where various materials are stored

JOB SITE

- Material 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.
- Keep record of where various materials are stored.
- Protect materials after erection. Cement, plaster, and other alkaline solutions are very harmful to the finish.

EXPANSION JOINTS

Expansion joints and perimeter seals shown in these instructions and in the shop drawings are shown at standard size. Actual dimensions may vary due to perimeter conditions and/or differences in metal temperature between the time of fabrication and time of installation. For example, a 12-foot unrestrained length of aluminum extrusion can expand or contract 3/32 of an inch over a 50-degree Fahrenheit change. Any movement potential should be accounted for at time of the installation.

GLASS

Glazing gaskets are designed for a compression fit against glass and can accommodate (+/- 1/32"). Be sure to check overall glass size and thickness.

CLEANING

Final cleaning of exposed aluminum surfaces should be done in accordance with AAMA 609.1 for anodized aluminum and AAMA 610.1 for painted aluminum. Cement, plaster, terrazzo, alkaline and acid-based materials used to clean masonry are very harmful to finishes and should be removed immediately or permanent staining will occur. A spot test is recommended before any cleaning agent is used. Aluminum shall be cleaned with plain water containing a mild detergent. No abrasive agent shall be used.

THERMAL IMPROVEMENT SUGGESTIONS

To maintain or improve wall installation, the following items should be considered:

- Blinds or drapes prevent warm air from washing the window.
- Warm air ventilators too far from window will not adequately wash the window with air to prevent condensation.
- In extreme conditions, the fan of the heating systems should not cycle on and off but run continuously.
- Some heating systems have a water injection feature that can raise humidity levels. The higher the humidity levels the more likely condensation or frost will form. Raising the temperature and reducing humidity will usually solve this problem.
- On rare occasions, an extremely cold storm may cause frost to appear on the glass or framing. A space heater and electric fan blowing along the plane of the window wall can reduce or eliminate this temporary condition.

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GENERAL CONSTRUCTION NOTES

- A. Study these instructions, shop drawings, erection drawings, and architectural drawings before starting any work. Follow installation and glazing instructions.
- B. All materials are to be installed plumb and level.
- C. All work should start from an established benchmark and column centerlines established by the architect and the general contractor.
- D. Do not install wall if there is a walkway with a downslope towards an entrance or a storefront.
- E. Completely check construction which will receive your materials against contract documents. Notify the general contractor by letter of any discrepancies before proceeding with your work since this constitutes acceptance of work by other trades.
- F. Protect all aluminum to be placed directly in contact with uncured masonry or incompatible materials with a heavy coat of zinc chromate or bituminous paint.
- G. Coordinate protection of installed materials with general contractors and other trades.
- H. After sealant is set and a representative amount of the wall has been glazed (500 square feet or more), run a water hose test to check installation. On large jobs, hose test should be repeated during glazing operation. Test should be conducted in accordance with AAMA 501.2 specifications. This test should not be performed at entrances installed in the system.

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GLASS INFORMATION

1.0 Glass Size

1.1 Captured

For Captured installations, reference the formulas below to determine the appropriate glass sizes required. Consult Glass Manufacturer for glass tolerances prior to ordering.

$$\text{Glass Width} = \text{D.L.O.} + 7/8''$$

$$\text{Glass Height} = \text{D.L.O.} + 7/8''$$

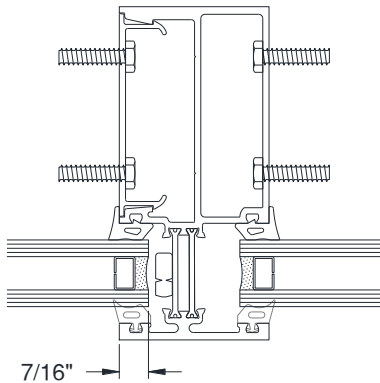


Figure 1: Captured Glass Width Guide

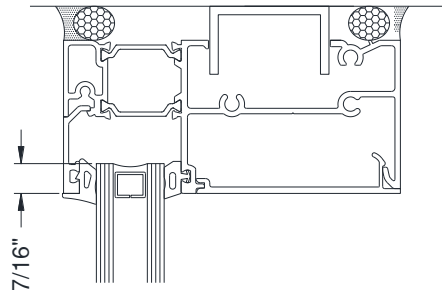


Figure 2: Captured Glass Height Guide

1.2 SSG

For SSG installations, with or without Captured components, reference the formulas and guides below to determine the appropriate glass sizes required. Consult Glass Manufacturer for glass tolerances prior to ordering.

Glass Width =

$$\text{D.L.O plus (+) } 15/16'' \text{ per SSG Mullion plus (+) } 7/16'' \text{ per Captured Mullion}$$

Glass Height =

$$\text{D.L.O plus (+) } 13/16'' \text{ per SSG Jamb Horizontal plus (+) } 7/16'' \text{ per Captured Horizontal}$$

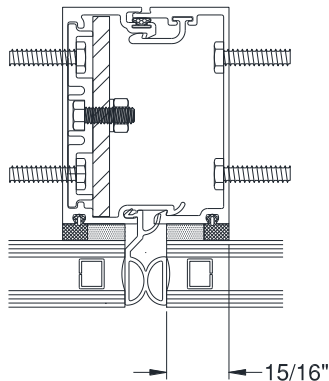


Figure 3: SSG Glass Width Guide

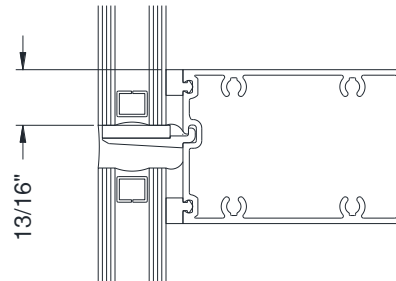


Figure 4: SSG Glass Height Guide

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FRAME FABRICATION

2.0 Establish Frame Size

NOTE: The window wall opening must be square and plumb before installation.

When measuring the rough opening, take multiple measurements and use the smallest dimension. This assures a proper fit of the storefront system.

Measure width of rough opening.

- A. Measure opening at bottom.
- B. Measure opening at center.
- C. Measure opening at top.

Measure height of rough opening.

- A. Measure opening from top to bottom of left side.
- B. Measure opening from top to bottom of middle.
- C. Measure opening from top to bottom of right side.

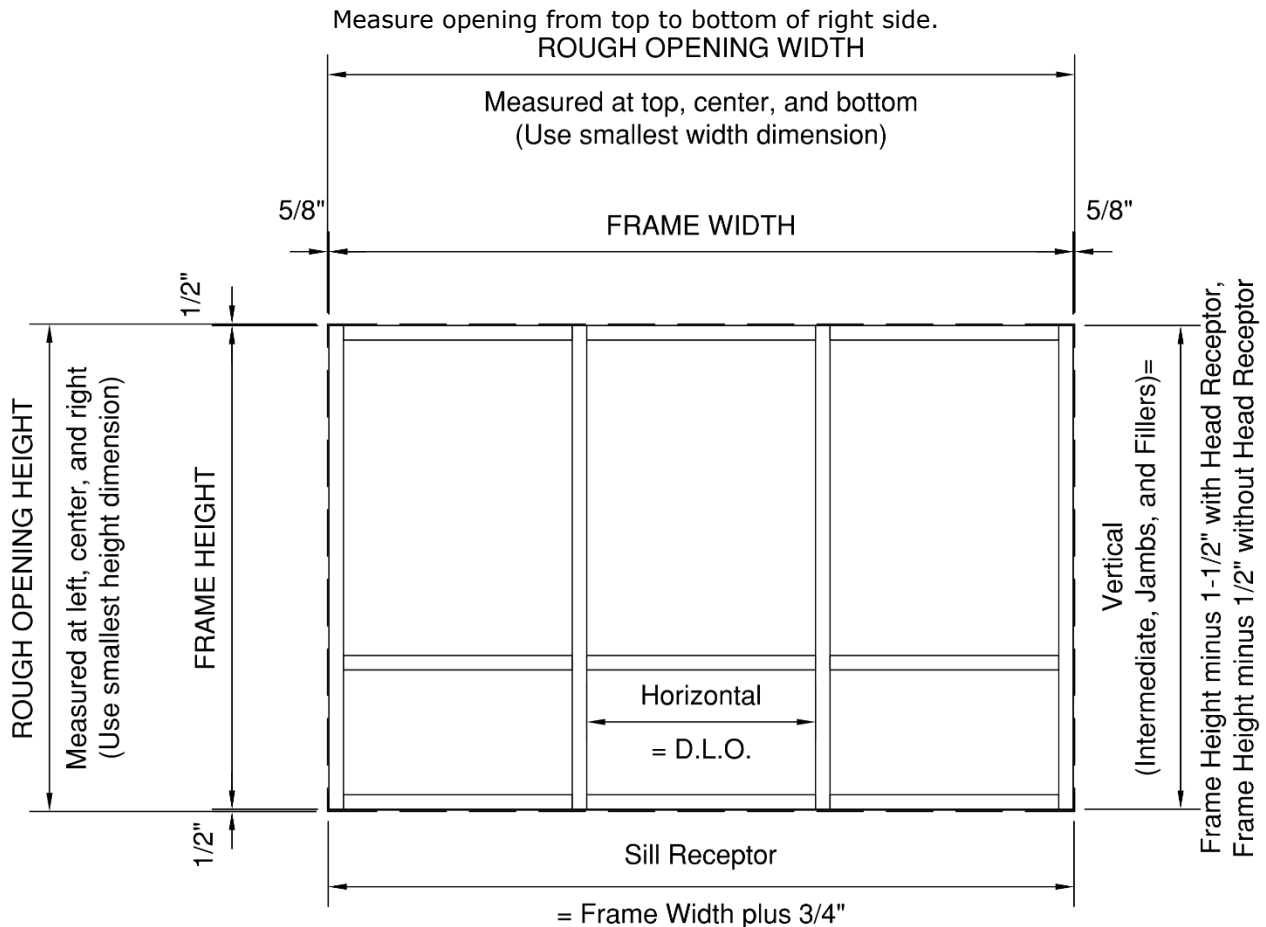


Figure 5: Measuring Rough Opening, Guide without Entrance

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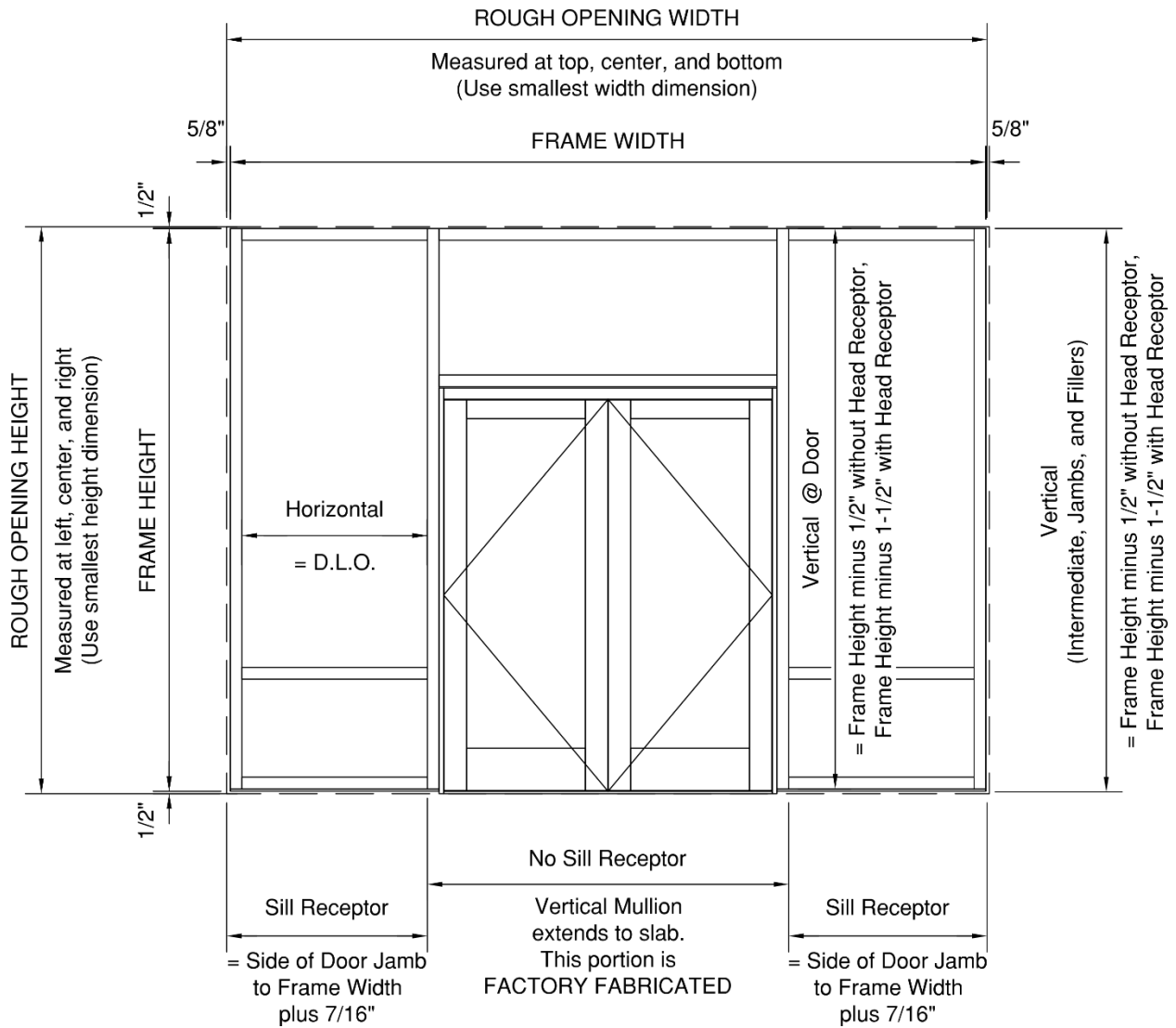


Figure 6: Measuring Rough Opening, Guide with Entrance

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3.0 Cut Material to Length

Sill/Head Receptor Members

RW513 Receptor Stop..... Frame Width plus (+) 7/8"
RW511 Fascia Retainer
RW100 Slab Edge Cover
RT501 and RT502 Sill Receptor
RT510 and RT508 Head Receptor

Verticals

With Head Receptor

RW501 Filler..... Frame Height minus (-) 1-1/2"
RW559 Jamb Filler
RW581 Reinforcement Clip (Continuous)
RW554 and RW555 SSG Split Mullion
RT597 Heavy Mullion
RT591 Mullion
RT590 Jamb
RT582 and RT584 Split Mullion
RT532 and RT536 Expansion Mullion

OUTSIDE CORNERS

RW540 and RW541 Corner Closure
RT544 and RT546 Outside Corner Face

INSIDE CORNERS

RW567 and RW569 Corner Closure
RW568 and RW570 Inside Corner Front

Without Head Receptor

RW501 Filler..... Frame Height minus (-) 1/2"
RW559 Jamb Filler
RW581 Reinforcement Clip (Continuous)
RW554 and RW555 SSG Split Mullion
RT597 Heavy Mullion
RT591 Mullion
RT590 Jamb
RT582 and RT584 Split Mullion
RT532 and RT536 Expansion Mullion

OUTSIDE CORNERS

RW540 and RW541 Corner Closure
RT544 and RT546 Outside Corner Face

INSIDE CORNERS

RW567 and RW569 Corner Closure
RW568 and RW570 Inside Corner Front

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Horizontals

Captured Verticals

RT552 Head	D.L.O.
RT563 Horizontal	
RT564 Sill	
RW557 Glass Stop	D.L.O. minus (-) 1/8"
RW559 Sill Cover	D.L.O. minus (-) 1/32"
RW553 and RW558 Glass Stops	

SSG

RW556 SSG Horizontal	D.L.O.
----------------------------	--------

INTERMEDIATE BAY

RT552 Head	D.L.O. plus (+) 2-1/8"
RT564 Sill	

JAMB BAY

RT552 Head	D.L.O. plus (+) 1-1/16"
RT564 Sill	

Accessories

Verticals

NP525 Fixed Gasket	D.L.O. plus (+) 1" plus (+) 1/8" per foot
NP556 and NP506 Wedge Gasket	
SP451 SSG Spacer Gasket	D.L.O. plus (+) 1"
WH546 Exterior Gasket.....	Mullion Height minus (-) 4-1/2"
WITH HEAD RECEPTOR	
WS998 Bulb Gasket.....	Frame Height minus (-) 1-1/2"
WH544 Bulb Gasket (At Corners)	
WITHOUT HEAD RECEPTOR	
WS998 Bulb Gasket.....	Frame Height minus (-) 1/2"
WH544 Bulb Gasket (At Corners)	

Horizontals

WS998 Bulb Gasket	Frame Width plus (+) 7/8"
WH544 Bulb Gasket	
NP525 Fixed Gasket	D.L.O. plus (+) 1/8" per foot
NP556 and NP506 Wedge Gasket	
SP451 SSG Space Gasket.....	D.L.O.

Abbreviations used within these instructions:

D.L.O. = Day Light Opening

∅ = Diameter

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4.0 Vertical Hole Prep Locations

Drill or punch holes in Verticals for attaching Horizontals. For tubular vertical members, drill access holes as noted.

NOTES:

- US Aluminum ® recommends the use of our EZ Punch tooling for faster and more accurate fabrication of wall systems. If hand fabricating the mullions, drill fixtures are available.
- 0.625" Ø access hole can be used at the top to eliminate sharp cuts.
- Corner Mullion detail will require **ST243** fasteners at 9" O.C. or per approved drawings. Drill Jig is **NOT** compatible for fabrication.
- Additional fabrication may be required when using reinforcements. See approved shop drawings.

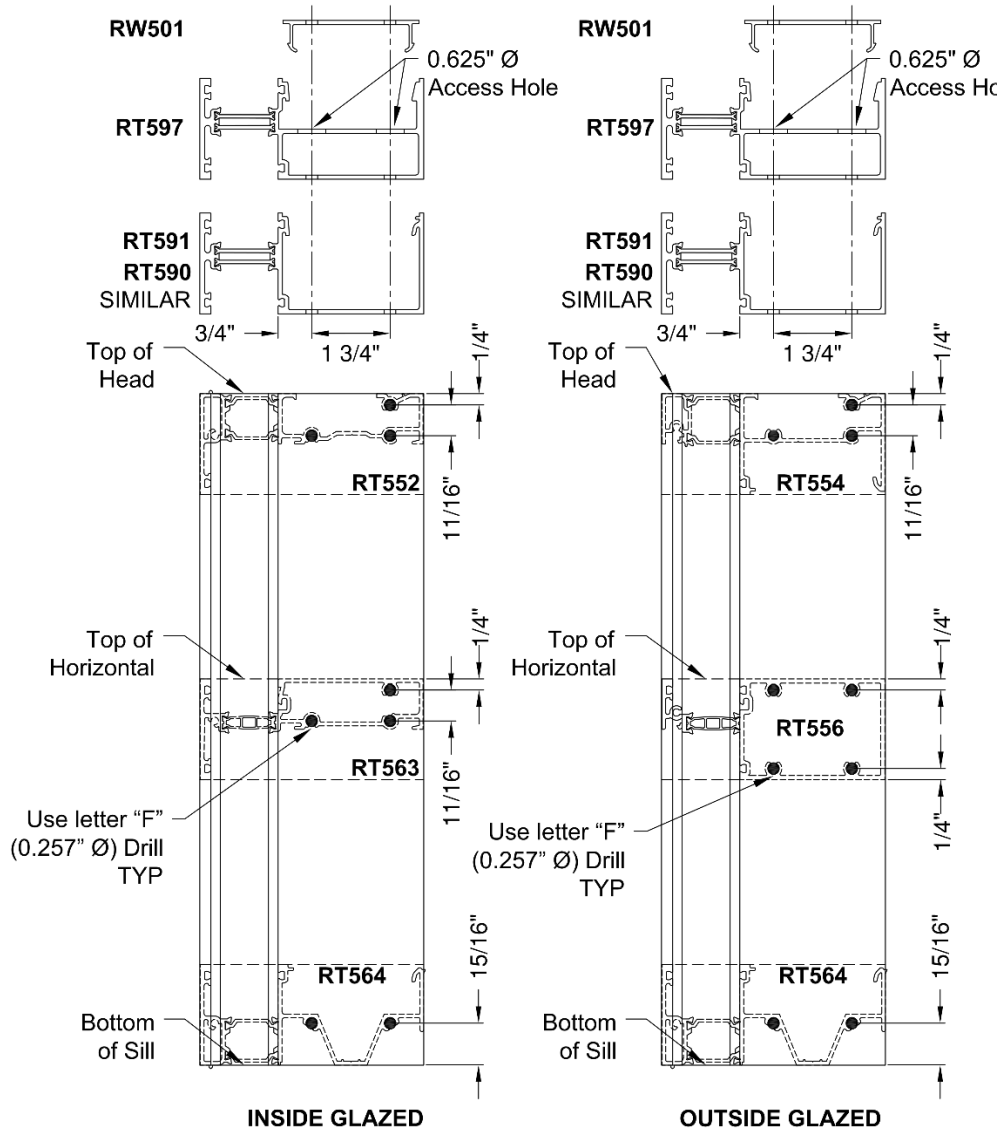


Figure 7: Field Glazed Vertical Mullion Fabrication, Jamb Similar

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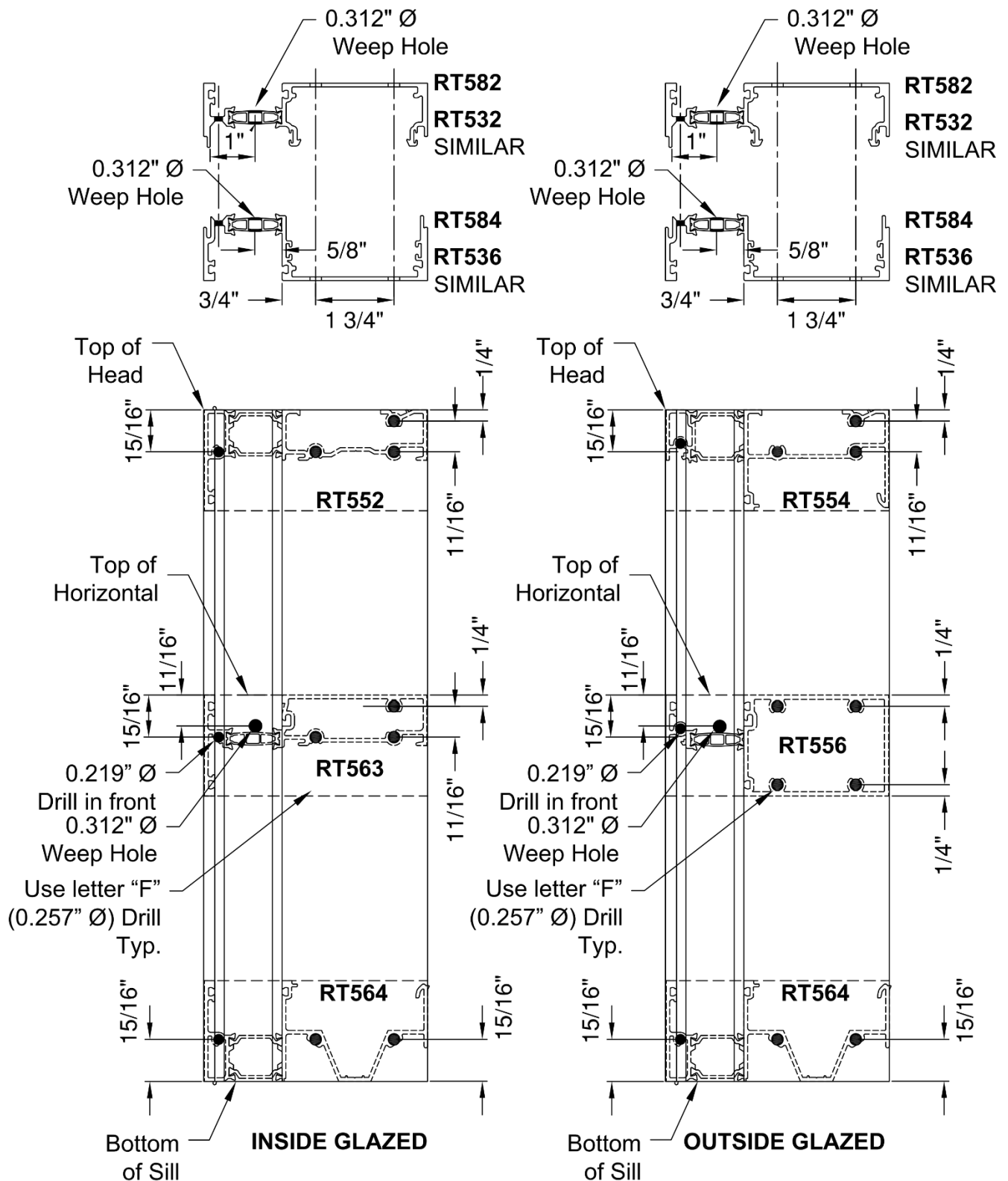


Figure 8: Pre-Glazed and Expansion Split Mullion Fabrication

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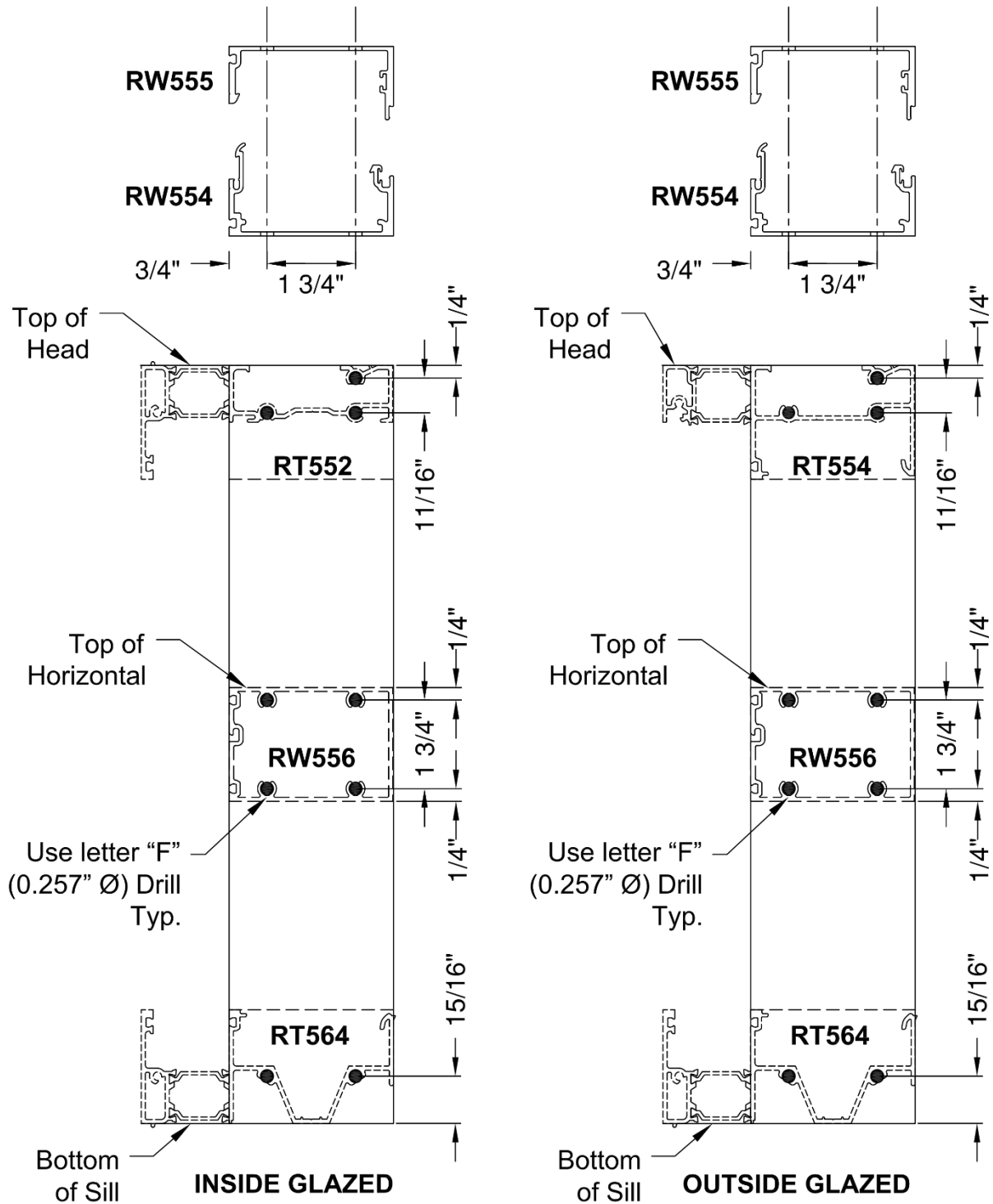
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Figure 9: SSG Vertical Mullion Fabrication



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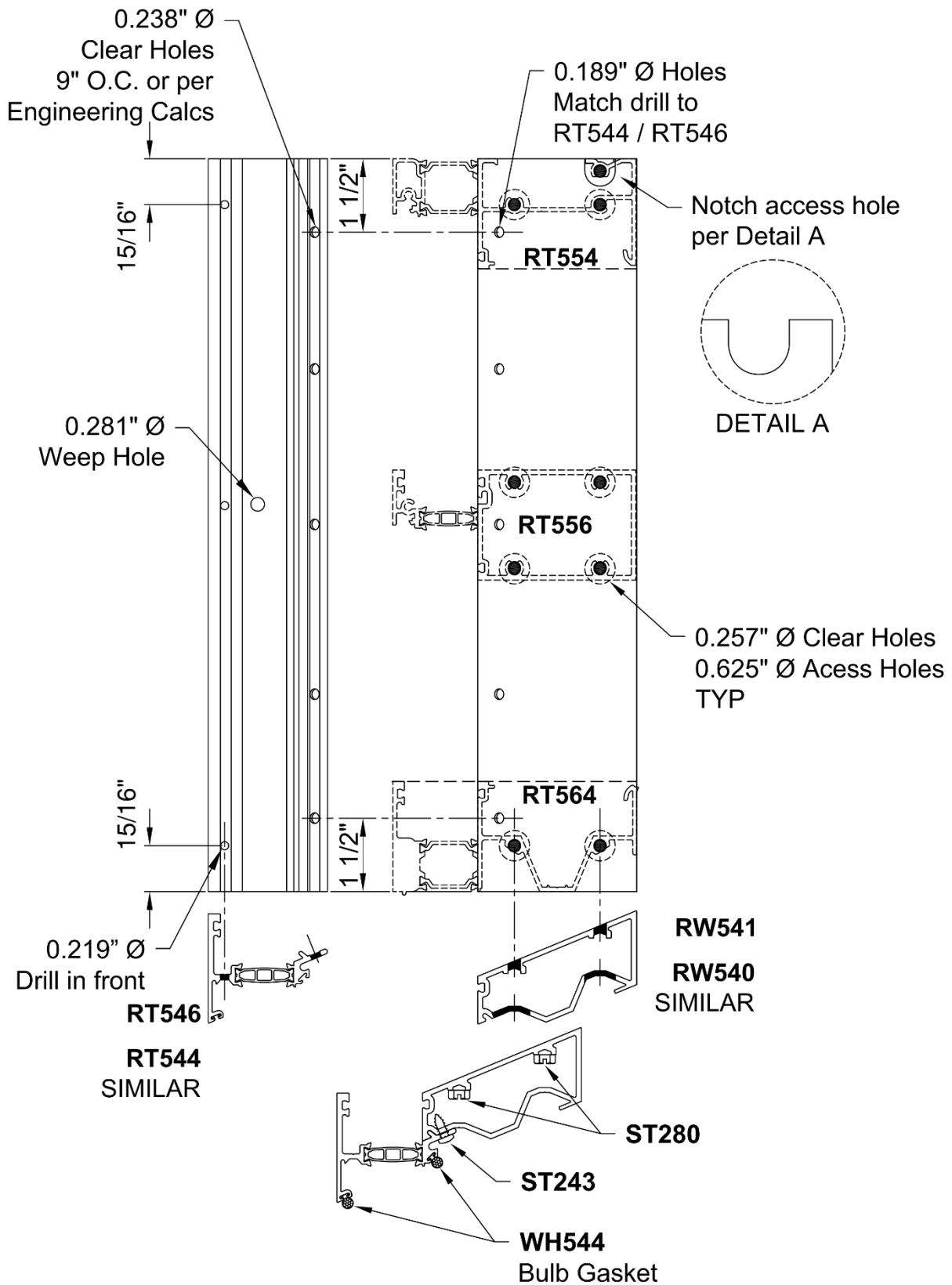


Figure 10: Outside Corner Mullion Reference Guide

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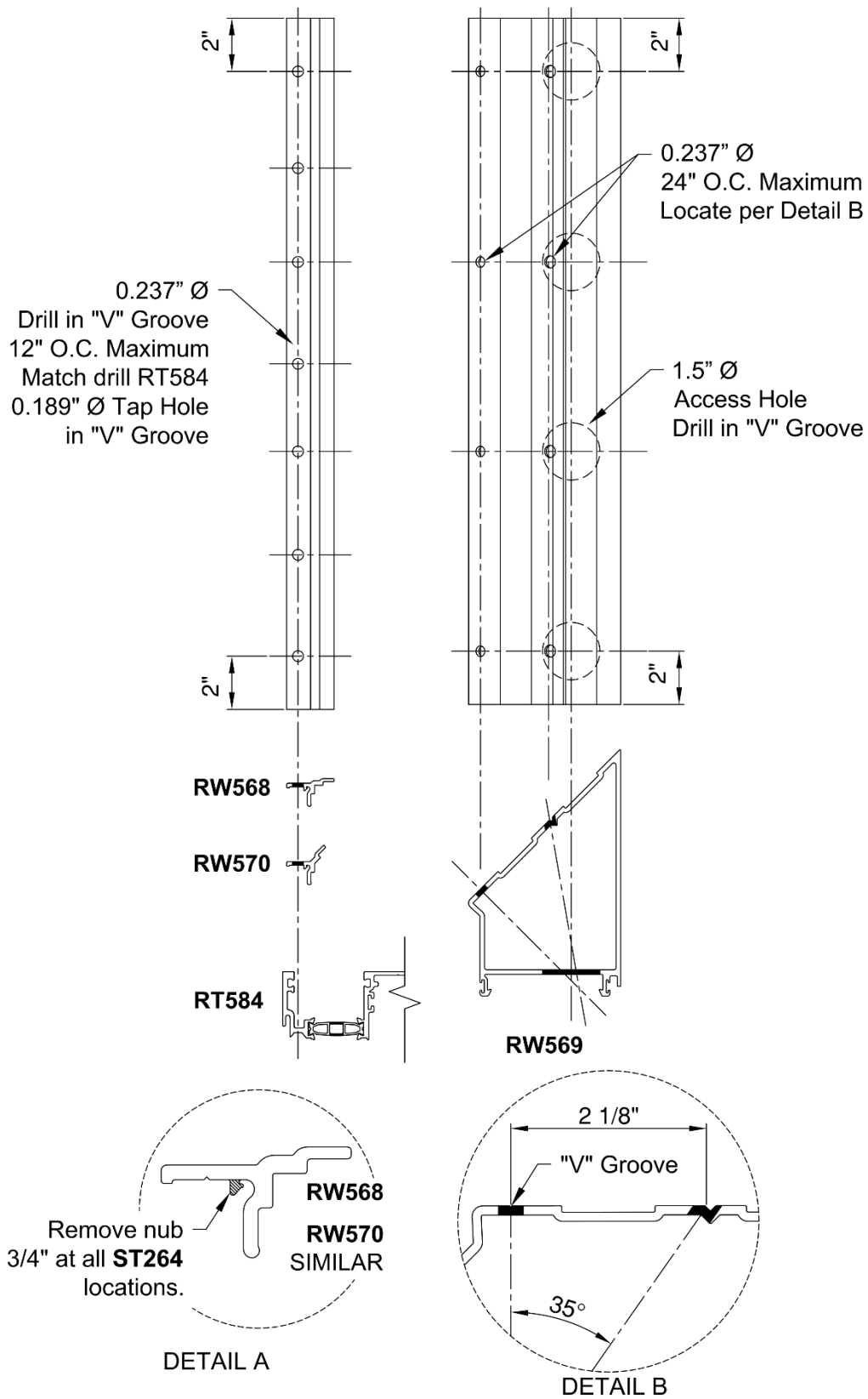


Figure 11: Inside Corner Mullion Reference Guide

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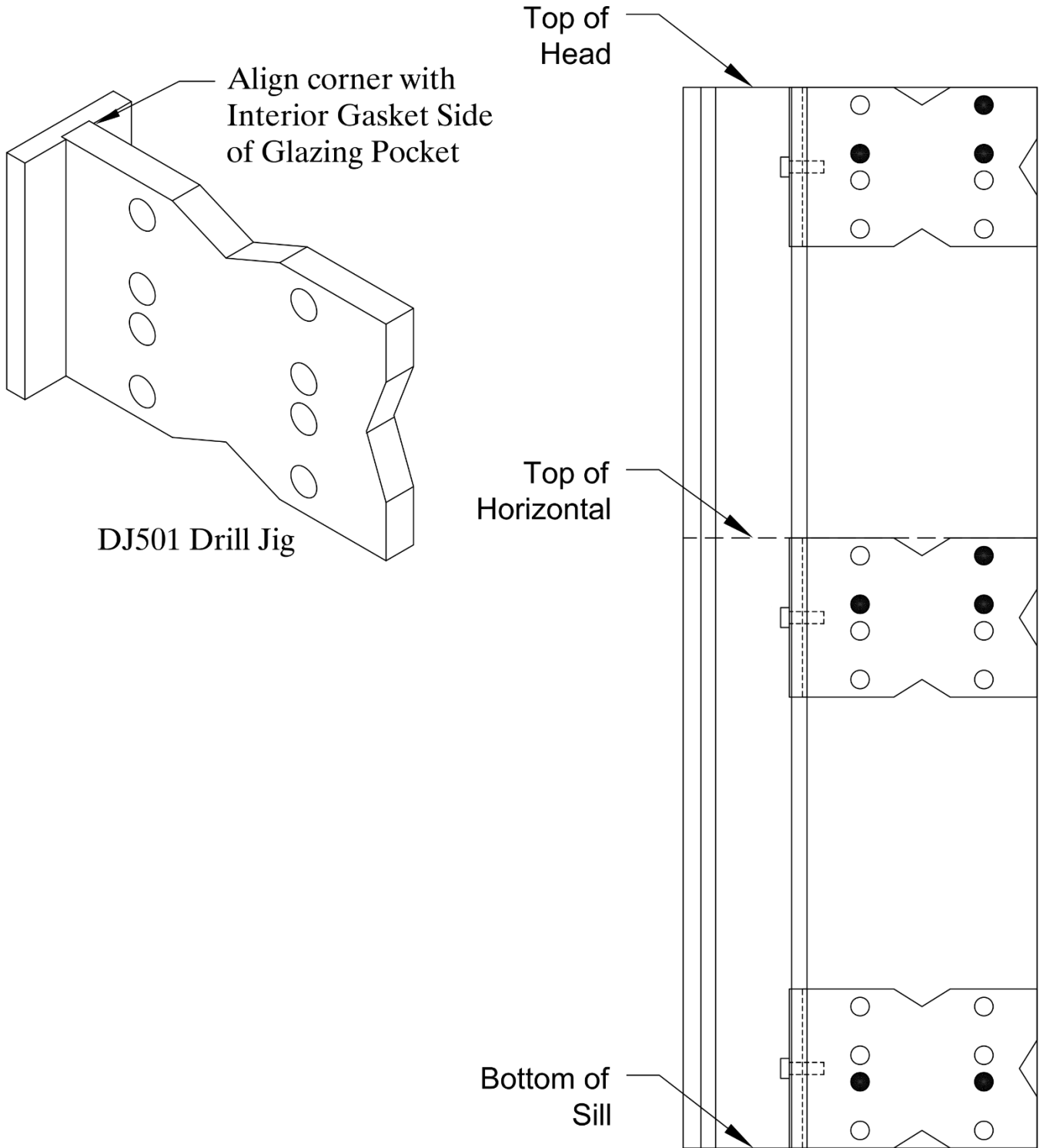


Figure 12: Drill Jig Reference Guide

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5.0 Reinforcement

NOTES:

- Instructions for reinforcement are generic. Please see approved engineering review and shop drawings for appropriate use, location, and fastening requirements.
- Standard Reinforcement connection is shown with **MS19042** fasteners. For Reinforcement thicker than 1/4", attach Horizontals to Verticals with **ST280** fasteners.

5.1 Reinforcement Only

- 5.1.1 Cut Reinforcement option 1/4" shorter than the Vertical or to the length specified in approved shop drawings or per engineered documents.
- 5.1.2 Slide the Reinforcement into Vertical following the location shown in *Figure 14*.
- 5.1.3 Match drill all anchor holes using an "F" (0.257 Ø) drill.
- 5.1.4 Anchor Horizontal members per *Section 12.0* panel assembly.

5.2 Reinforcement with RW581 Continuous

- 5.2.1 Cut **RW581** per cut length in *Section 3.0*.
- 5.2.2 Slide the **RW581** reinforcement into Vertical, making sure both ends of the Vertical and reinforcement are flush with each other.
- 5.2.3 Match drill all anchor holes using an "F" (0.257 Ø) drill.
- 5.2.4 Anchor Horizontal members through **RW581** per *Section 12.0* panel assembly. See *Figure 13* and *Figure 14* for section visuals.

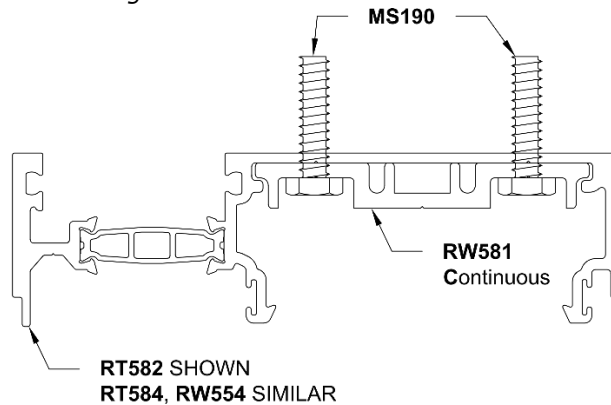


Figure 13: RW581 Continuous Reinforcement Attachment

5.3 Reinforcement with RW58100 Reinforcement Clips

- 5.3.1 Cut reinforcement 1/4" less than the length of the Vertical.
- 5.3.2 Prepare reinforcement by drilling 5/16" clear holes centered on the "V" groove at 1-3/8" from each end and at the center.
NOTE: the center **RW58100** Reinforcement Clip may be moved up or down the Vertical up to 6" to avoid horizontal attachment interference. Move the clear hole in the reinforcement bar accordingly.
- 5.3.3 Apply a small amount of sealant to **MF26642** and apply to **RW58100** to keep the nut from moving, keeping the sealant out of the threads.
- 5.3.4 Slide **RW58100** clips into Vertical and apply a small amount of sealant to keep clips from moving during panel assembly.
- 5.3.5 Assemble panel per *Section 12.0*.
- 5.3.6 Slide reinforcement bar into place and secure into place using **MF142** fasteners for 1/4" thick reinforcement or **MF20642** and **MF25200** for 3/8" thick reinforcement. See *Figure 14*.

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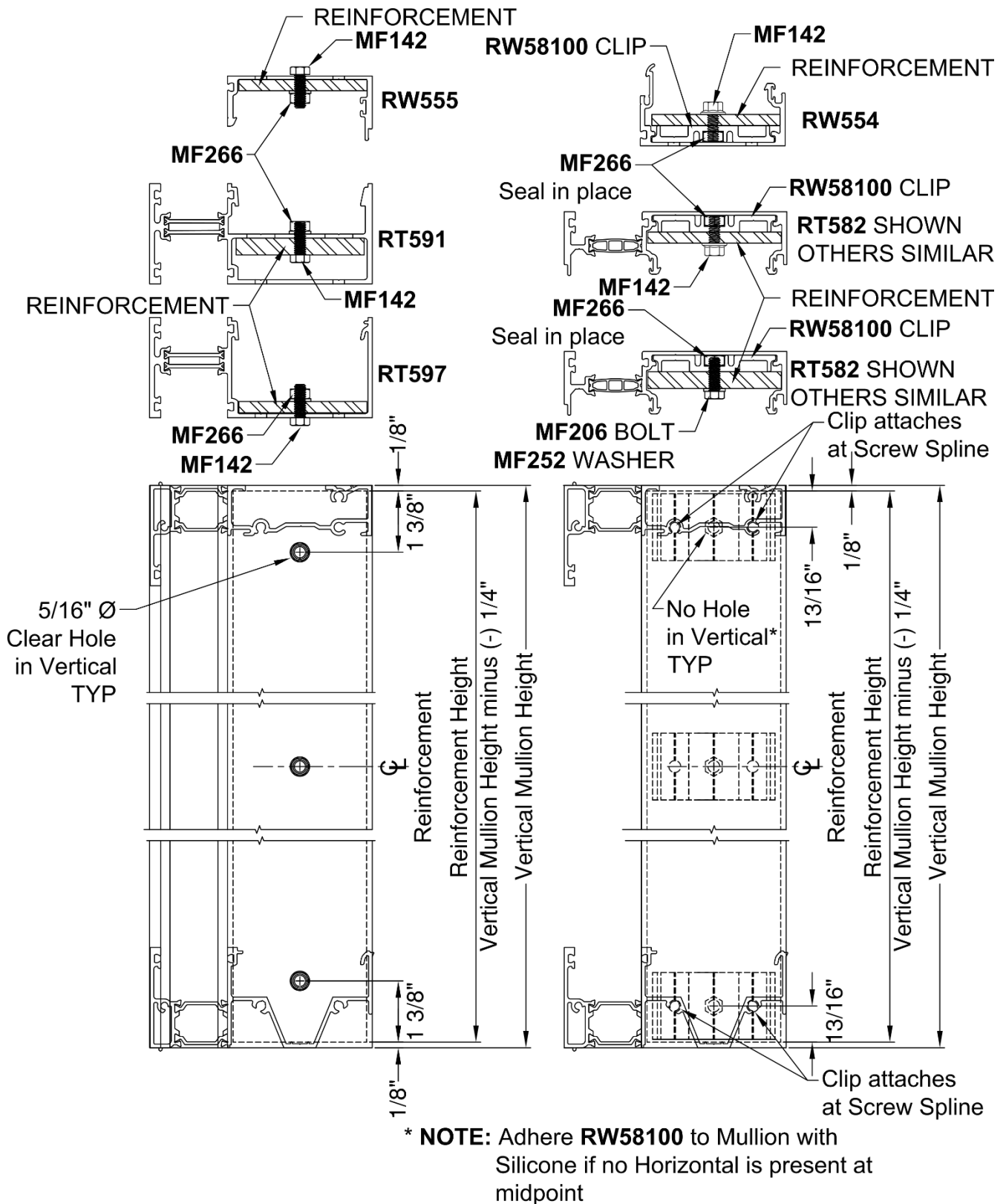


Figure 14: Reinforcement Bar Guide

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6.0 Sill Receptor Fabrication

NOTES:

- The maximum length of the Sill Receptor without a splice is 20'. Every 20' of Frame Width must include Expansion Verticals to accommodate thermal expansion.
- For additional slab edge cover conditions, it is recommended to provide additional space between the end of the Sill Receptor and the Jamb substrate.
- For frame openings longer than 24'-0", allow for a 3/8" splice joint between the Sill Receptor members every 12 to 15 feet at the center of the D.L.O.
- Corner Fabrication:
 - When measuring for an outside corner, do not include the miter in the width. When measuring for an inside corner, include the miter in the width.
 - For 90° corners, subtract an additional 3/16" from the width. For 135° corners, subtract an additional 1/8" from the width.

6.1 Verify the Sill Receptor is cut to the correct width per *3.0 Cut Material to Length*, taking care to include Expansion Verticals and corners as required.

6.2 Drill 5/16" Ø weep holes in the "V" groove on the front face of the Sill Receptor at the center of each Vertical and the midpoint of each D.L.O. between Verticals. See *Figure 15*.

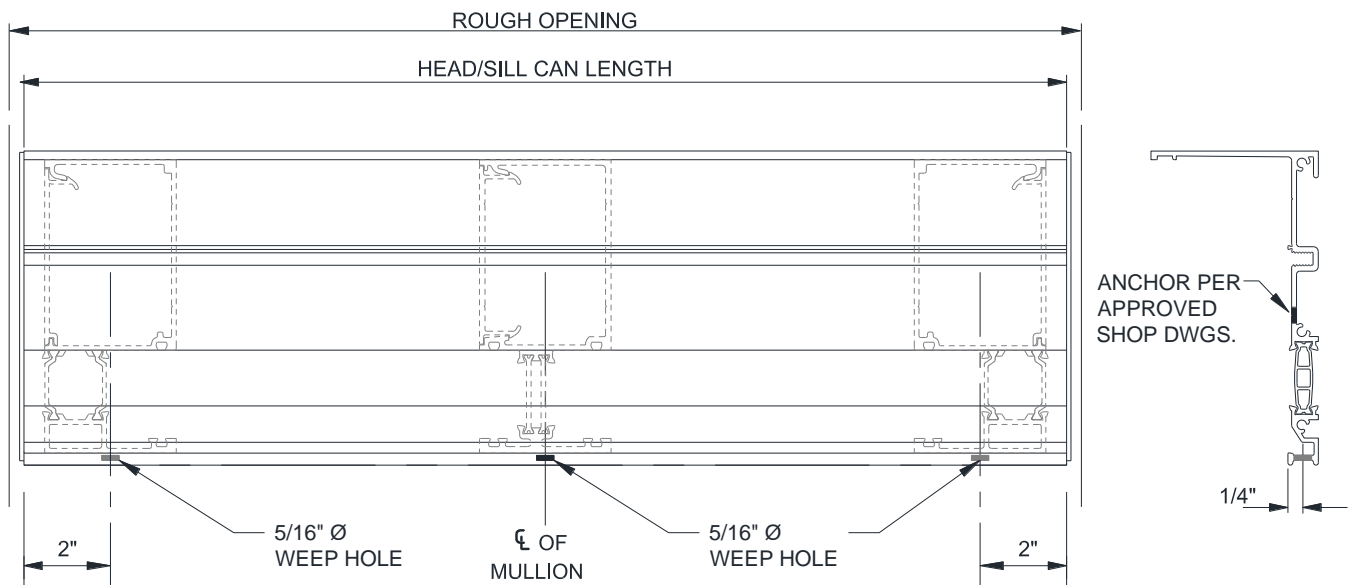


Figure 15: RT501 Sill Receptor, RT502 Similar

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7.0 Head Receptor Fabrication

NOTES:

- The maximum length of the Head Receptor without a splice is 20'. Every 20' of Frame Width must include Expansion Verticals to accommodate thermal expansion.
- For additional slab edge cover conditions, it is recommended to provide additional space between the end of the Head Receptor and the Jamb substrate.
- For frame openings longer than 24'-0", allow for a 3/8" splice joint between the Head Receptor members every 12 to 15 feet at the center of the D.L.O.
- Corner Fabrication:
 - When measuring for an outside corner, do not include the miter in the width. When measuring for an inside corner, include the miter in the width.
 - For 90° corners, subtract an additional 3/16" from the width. For 135° corners, subtract an additional 1/8" from the width.

7.1 Verify the Head Receptor is cut to the correct width per formula in *3.0 Cut Material to Length*, taking care to include Expansion Verticals and corners as required.

7.2 If using the **RT510** Head Receptor, drill 5/16" Ø weep holes in the "V" groove at the front of the Head Receptor at the center of each Vertical and the midpoint of each D.L.O. between Verticals. See *Figure 16*.

NOTE: The **RT508** Head Receptor does not require weep holes.

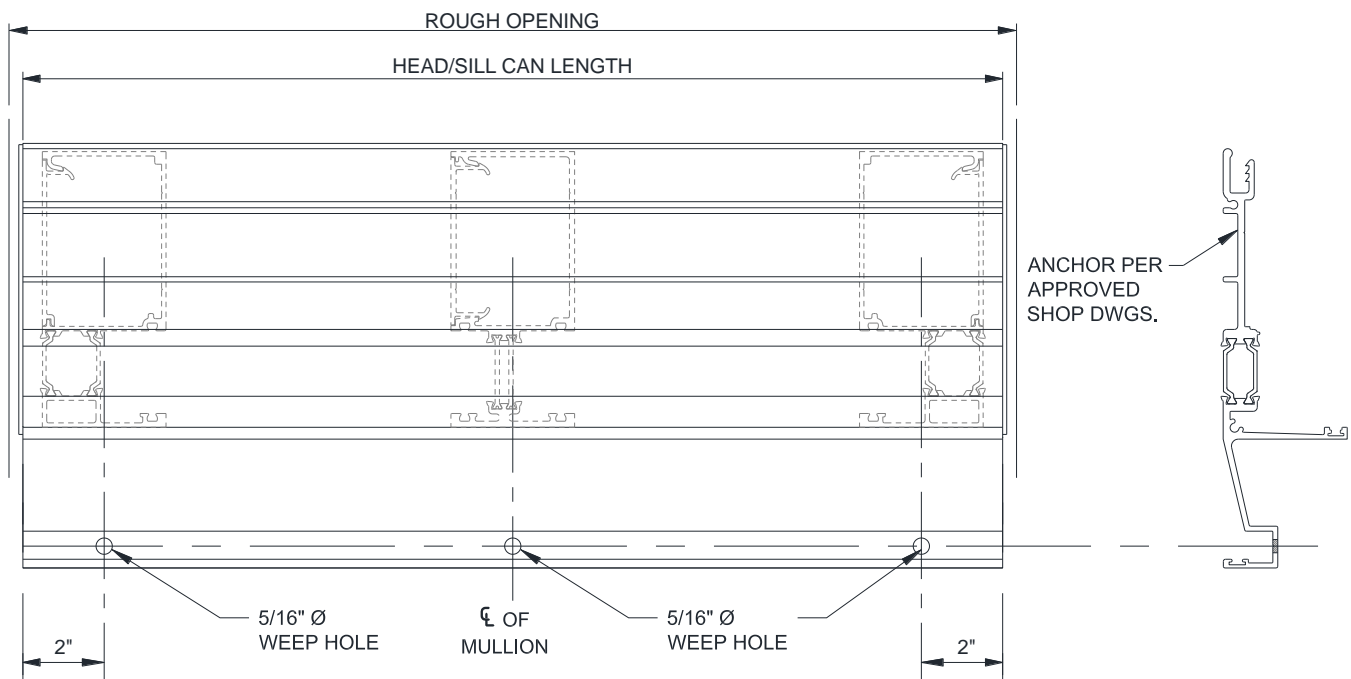


Figure 16: RT510 Head Receptor

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8.0 Head / Sill Fabrication

8.1 Systems with Captured Verticals

Prepare Head and Sill by first verifying it is cut to the D.L.O. Head requires a minimum of 4 access holes placed 3-1/16" from the exterior face. Sill requires a minimum of 2 anchor holes placed along the "V" groove. Reference *Figure 17* and *Figure 18* for generic hole locations. Always verify quantity and locations of holes with approved Shop Drawings.

NOTE: When end reactions are equal to or greater than 500 lbs per mullion, Sill will require an additional anchor hole at 2.5" from ends, centered at the "V" groove, as shown in *Figure 18*.

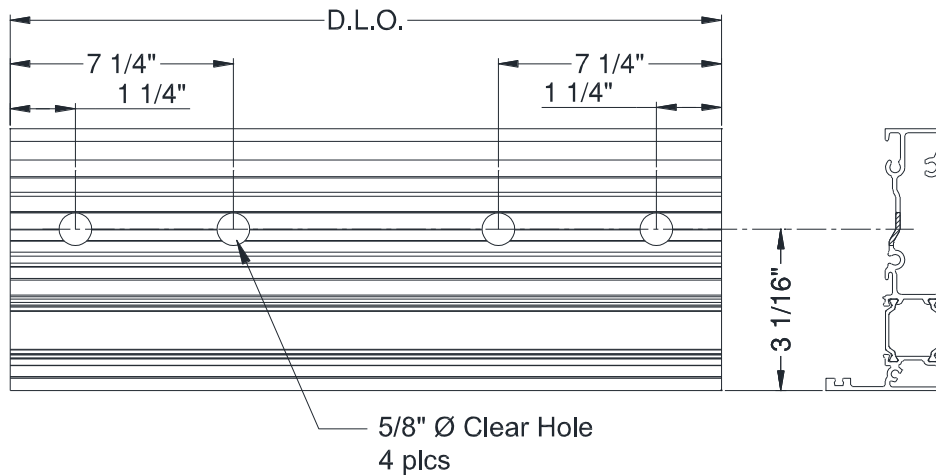


Figure 17: RT552 Head Fabrication

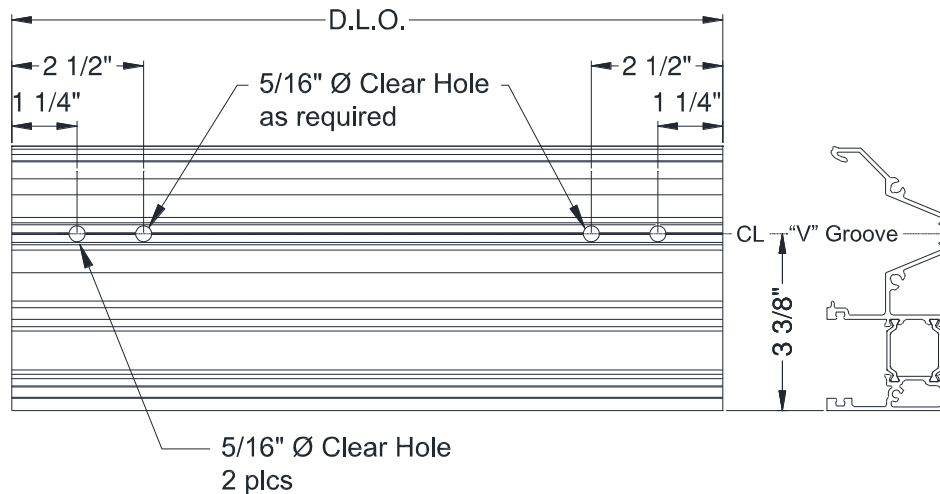


Figure 18: RT564 Sill Fabrication

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8.2 Systems with SSG Verticals

Prepare Head and Sill by first verifying it is cut to the D.L.O. Head requires a minimum of 4 access holes placed 3-1/16" from the exterior face. Sill requires a minimum of 2 anchor holes placed along the "V" groove. Reference *Figure 19* and *Figure 20* for generic hole locations. Always verify quantity and locations of holes with approved Shop Drawings.

NOTE: When end reactions are equal to or greater than 500 lbs per mullion, Sill will require an additional anchor hole at 2.5" from ends, centered at the "V" groove, as shown in *Figure 20*.

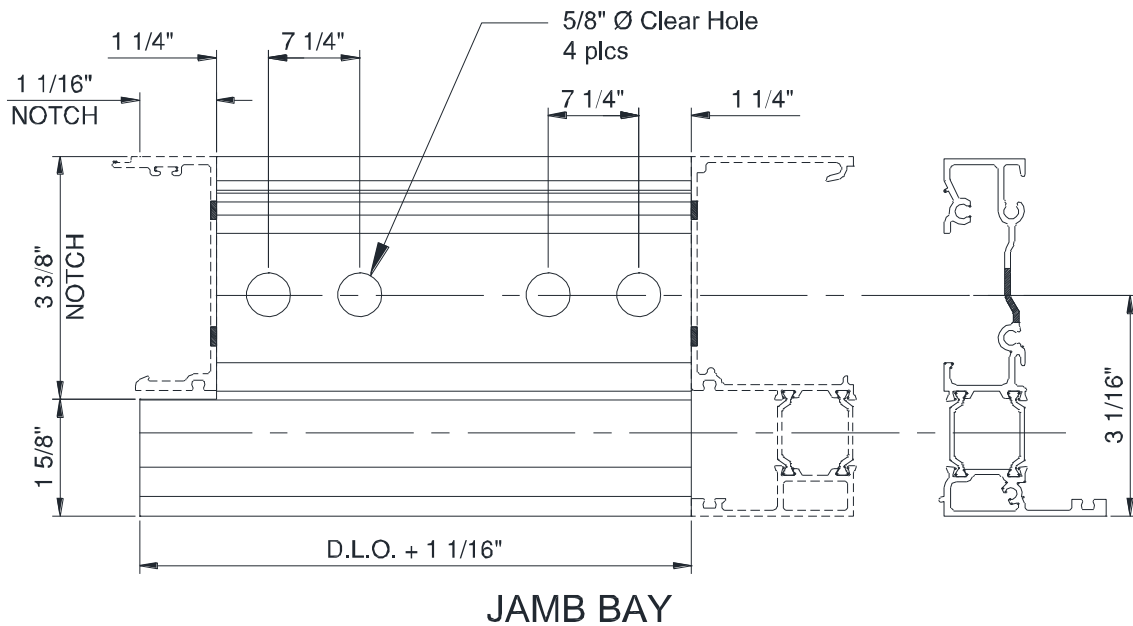
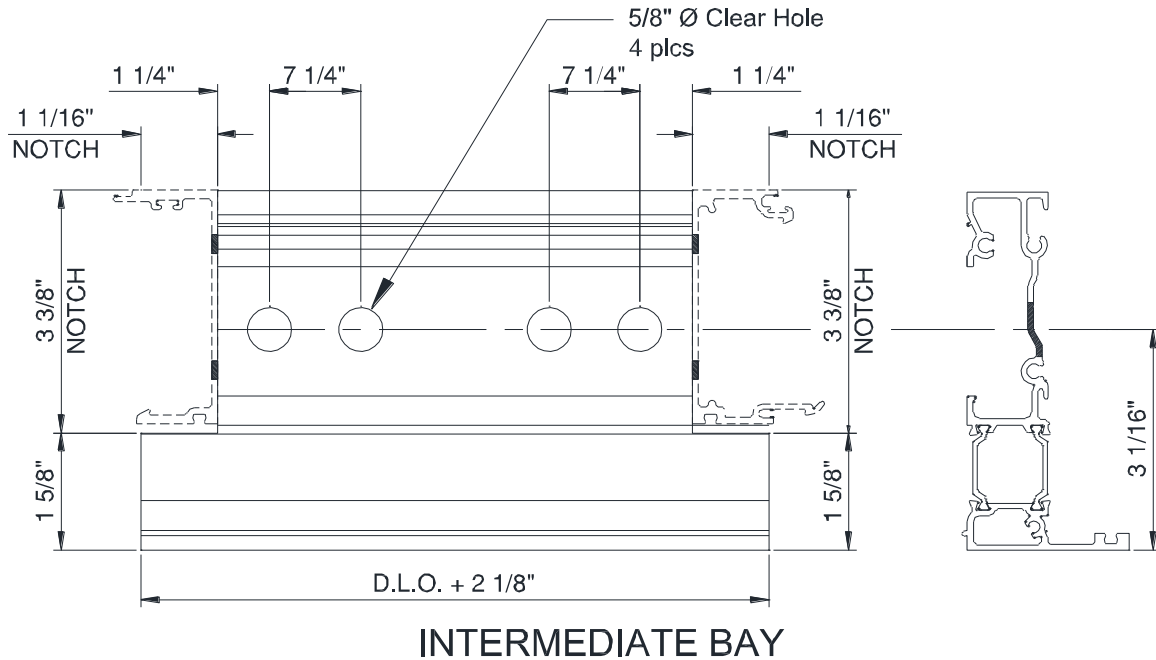


Figure 19: RT552 Head Fabrication

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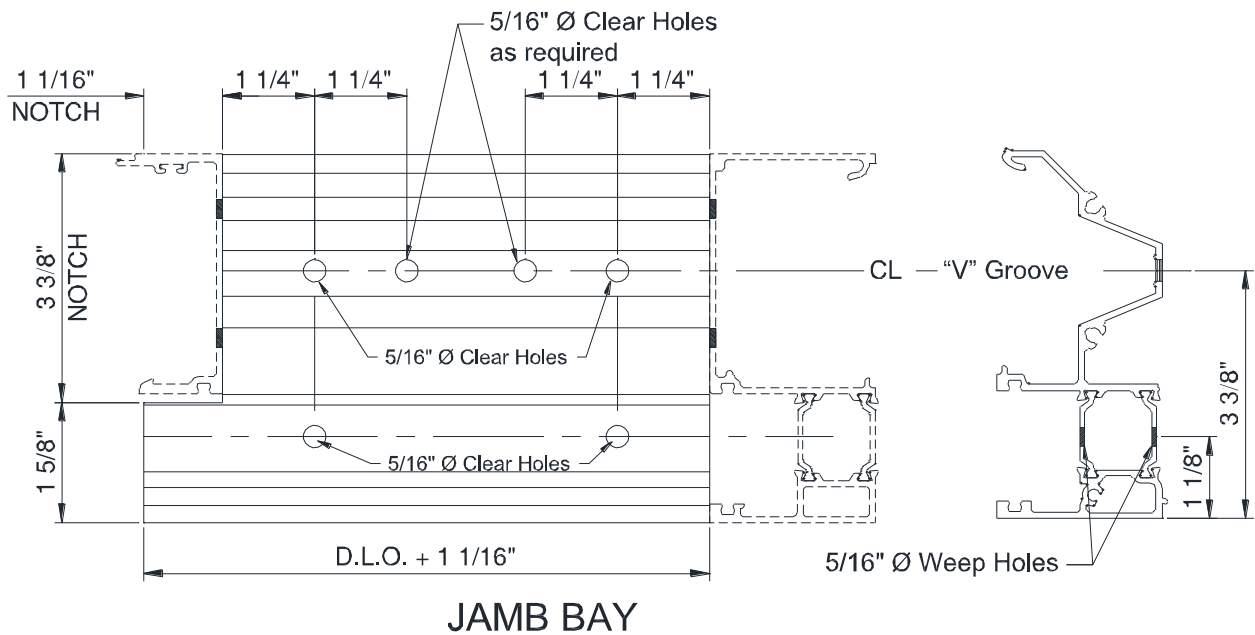
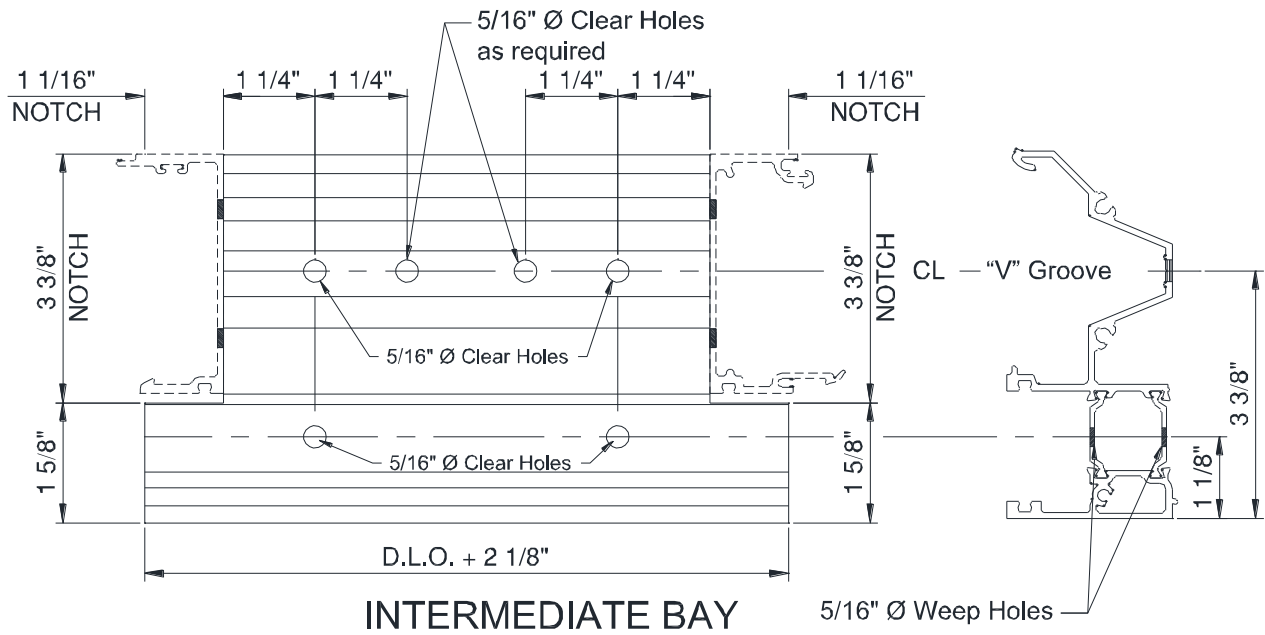


Figure 20: RT564 Sill Fabrication

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8.3 Corner Fabrication

Prepare Horizontals by first verifying each required piece is cut per *Section 3.0*.

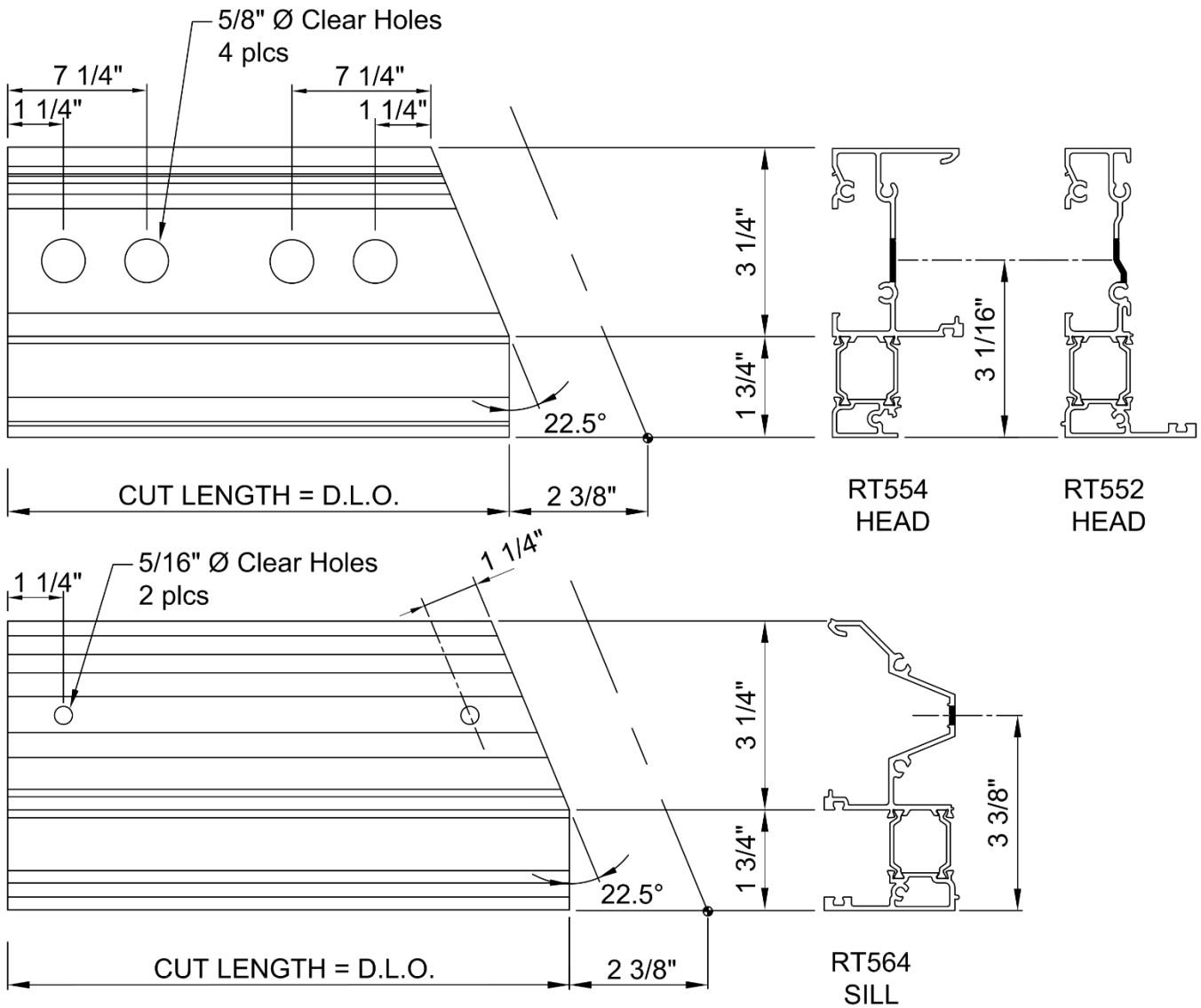


Figure 21: Head and Sill at 135-Degree Corner

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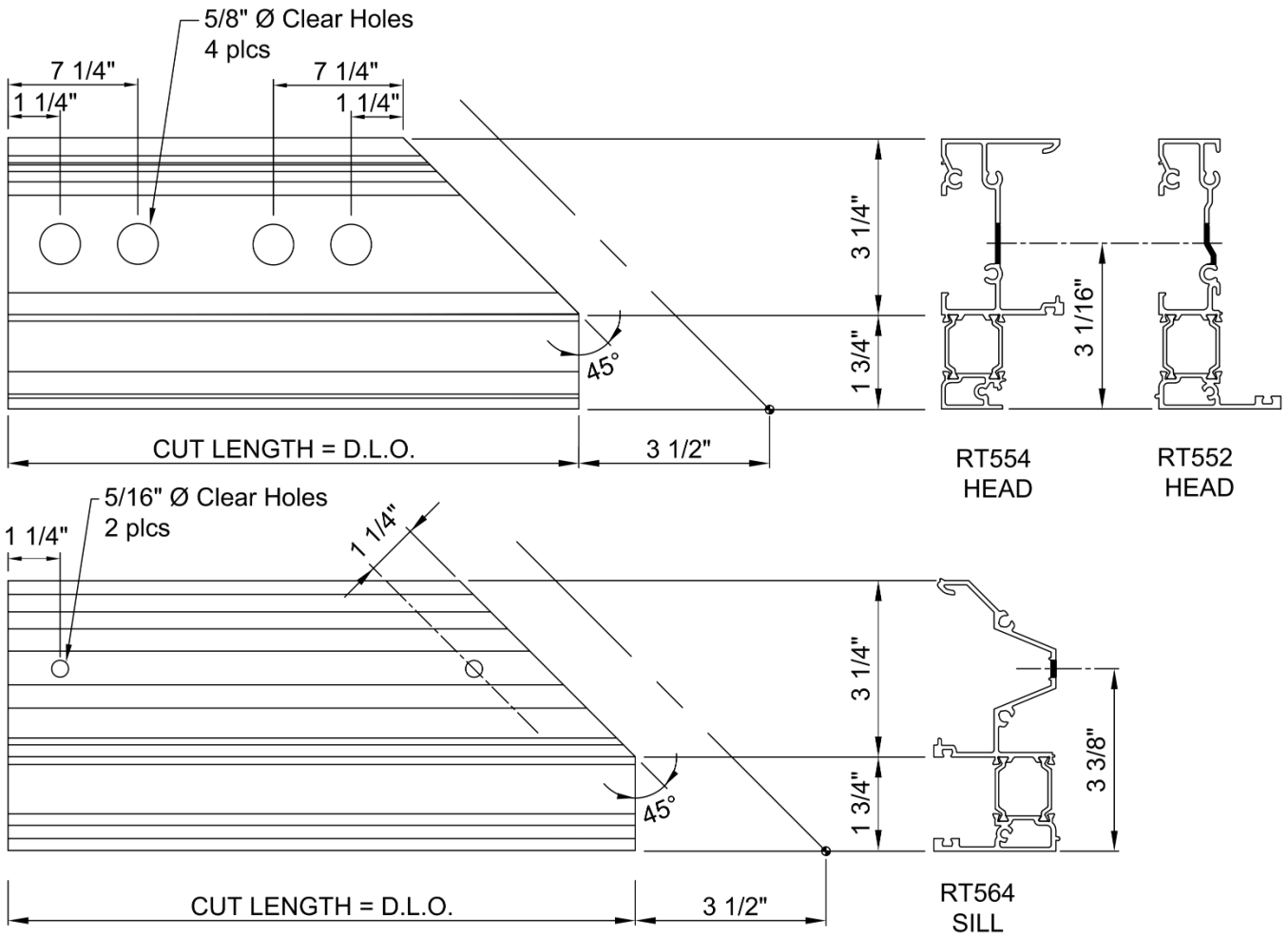


Figure 22: Head and Sill at 90-Degree Corner

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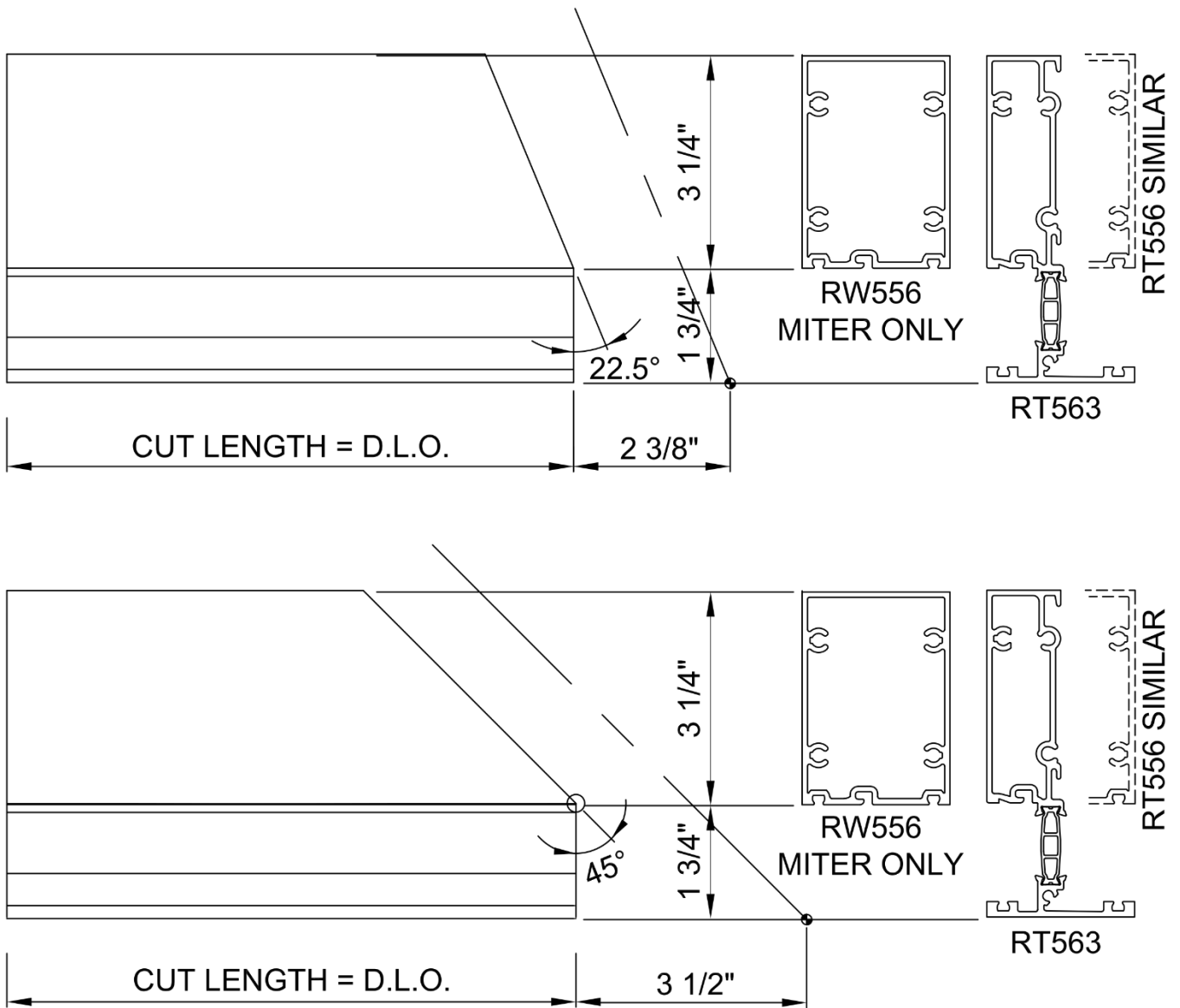


Figure 23: RT563 Horizontal Corner Fabrication

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9.0 Glass Stop Fabrication

Glass Stop **RW557** requires additional preparation, as shown in *Figure 24*. Verify quantity and locations of holes with approved Shop Drawings.

NOTE: RT563 Horizontal **cannot** be used with **RW554** and **RW555** SSG Vertical Mullions

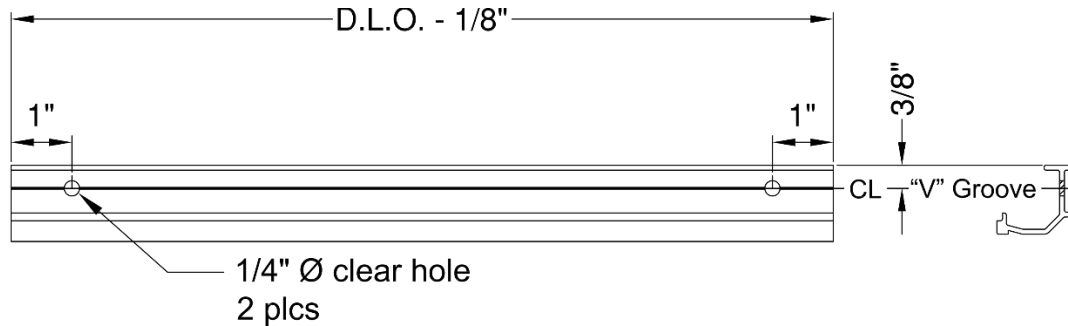


Figure 24: RW557 Glass Stop Fabrication

FRAME ASSEMBLY

10.0 Sill Receptor End Dam Assembly

- 10.1 Clean the surface of the End Dam and the end of the Sill Receptor using cleaner approved by sealant manufacturer.
- 10.2 Attach **EC550** End Dam with (4) **MF230** fasteners, as shown in *Figure 25*, stopping 1/4" short of attaching completely.
- 10.3 Gently pull the End Dam back from the end of the Sill Receptor and apply silicone sealant in the gap. Push the End Dam back into place and gently drive the fasteners tight.
- 10.4 Tool sealant smooth.
- 10.5 Cap-seal fasteners.

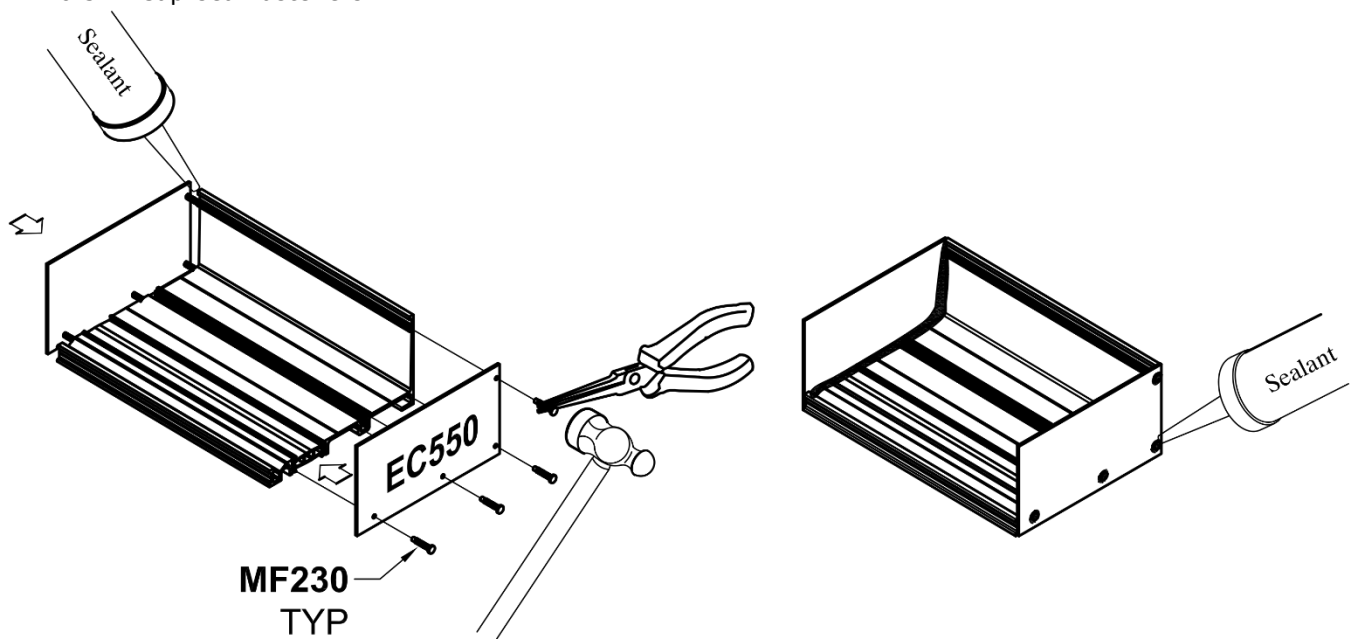


Figure 25: Sill Receptor End Dam Attachment

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11.0 Head Receptor End Dam Assembly

- 11.1 Clean the surface of the End Dam and the end of the Head Receptor using cleaner approved by sealant manufacturer.
- 11.2 Attach **EC552** End Dam with (2) **MF232** fasteners, as shown in *Figure 26*, stopping 1/4" short of attaching completely.
- 11.3 Gently pull the End Dam back from the end of the Head Receptor and apply silicone sealant in the gap. Push the End Dam back into place and gently drive the fasteners tight.
- 11.4 Tool sealant smooth.
- 11.5 Cap-seal fasteners.

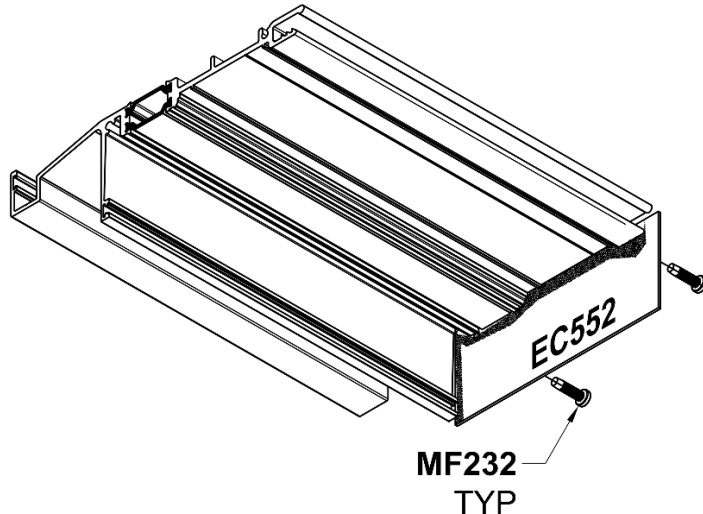


Figure 26: Head Receptor End Dam Attachment

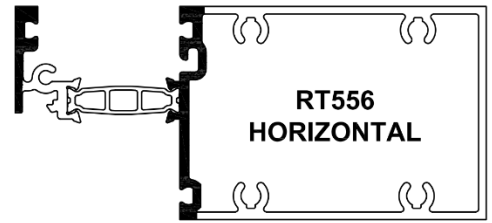
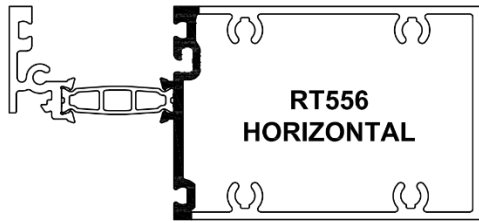
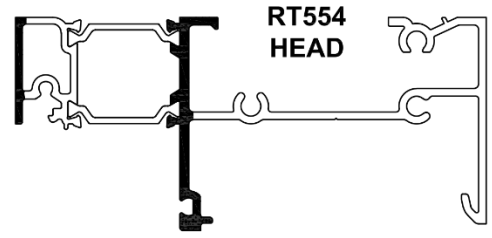
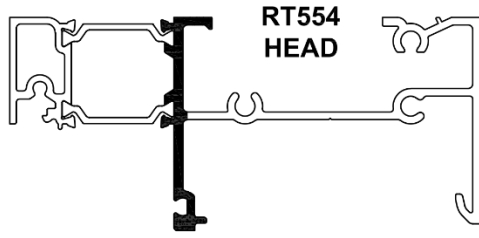
12.0 Frame Panel Assembly

12.1 Field Glazed Panels

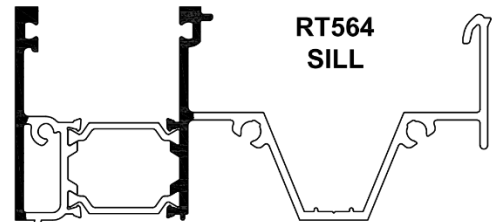
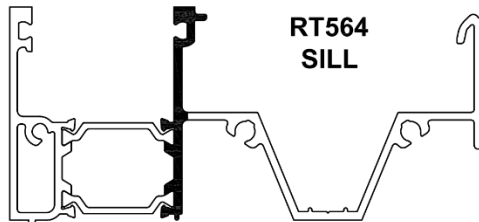
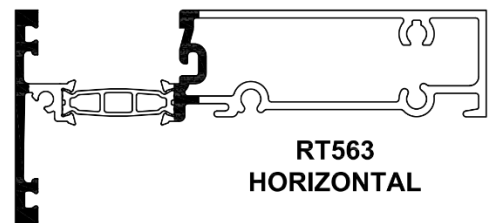
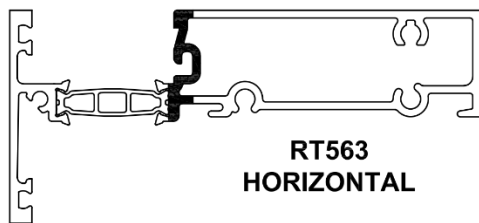
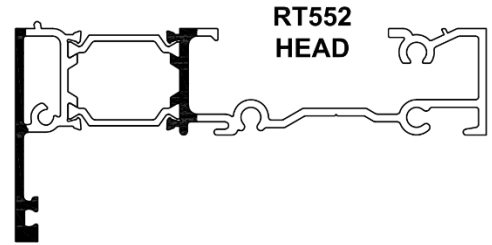
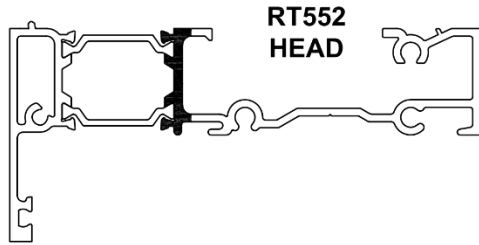
- 12.1.1 Clean framing members at locations where Silicone Sealant is noted to be applied.
- 12.1.2 Apply Sealant to the end of the Head, Horizontal, and Sill that will attach to the Mullion or Jamb. See *Figure 27* and *Figure 30*.
NOTE: *It is not necessary to apply Sealant to the front edge of the mating Horizontal members at the Filler portion of the Mullion.*
- 12.1.3 Insert **WS998** Bulb Gasket into male half of split mullion and stake in place at each end as shown in *Figure 28*.
- 12.1.4 Insert **RW582-01** Anti-buckling Clips, locating as required by approved shop drawings or engineering review, into female half of split mullion and stake in place on both ends of each clip as shown in *Figure 29*. Verify clips are parallel with front and rear faces of mullion.
- 12.1.5 To ensure a proper fit into the Sill Receptor, align Sill to Vertical at the interior edge and the bottom, as shown in *Figure 30, Detail B*.
- 12.1.6 Attach Horizontals to Verticals using **MS19042** fasteners, referencing *Figure 30*,
NOTE: *Captured Split Mullion requires **ST26442** fasteners at exterior half, as shown in Figure 30, Detail A. Corner Mullions require **ST280**, per Figure 10.*
- 12.1.7 Wipe off excess sealant before it cures.

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OUTSIDE GLAZED



INSIDE GLAZED



**FILLER-CONNECTION
CAPTURED, FIELD GLAZED**

**MULLION-CONNECTION
CAPTURED, FIELD GLAZED**

Figure 27: Sealing

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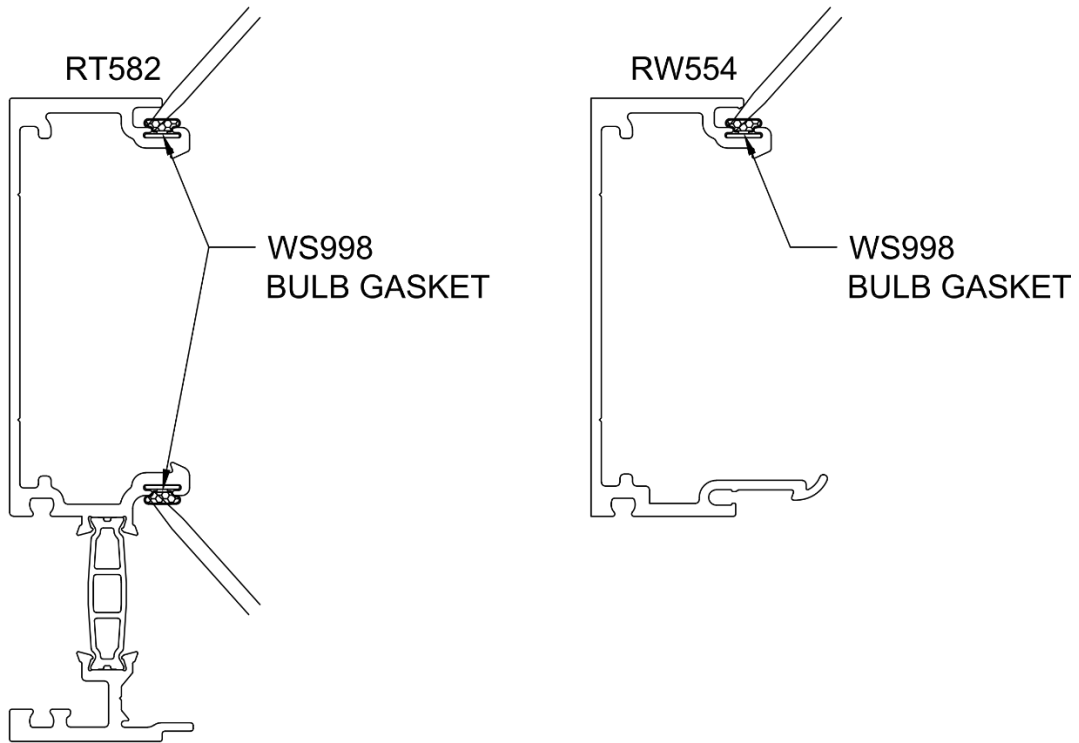


Figure 28: Gasket Installation into Male-Half of Split Mullions

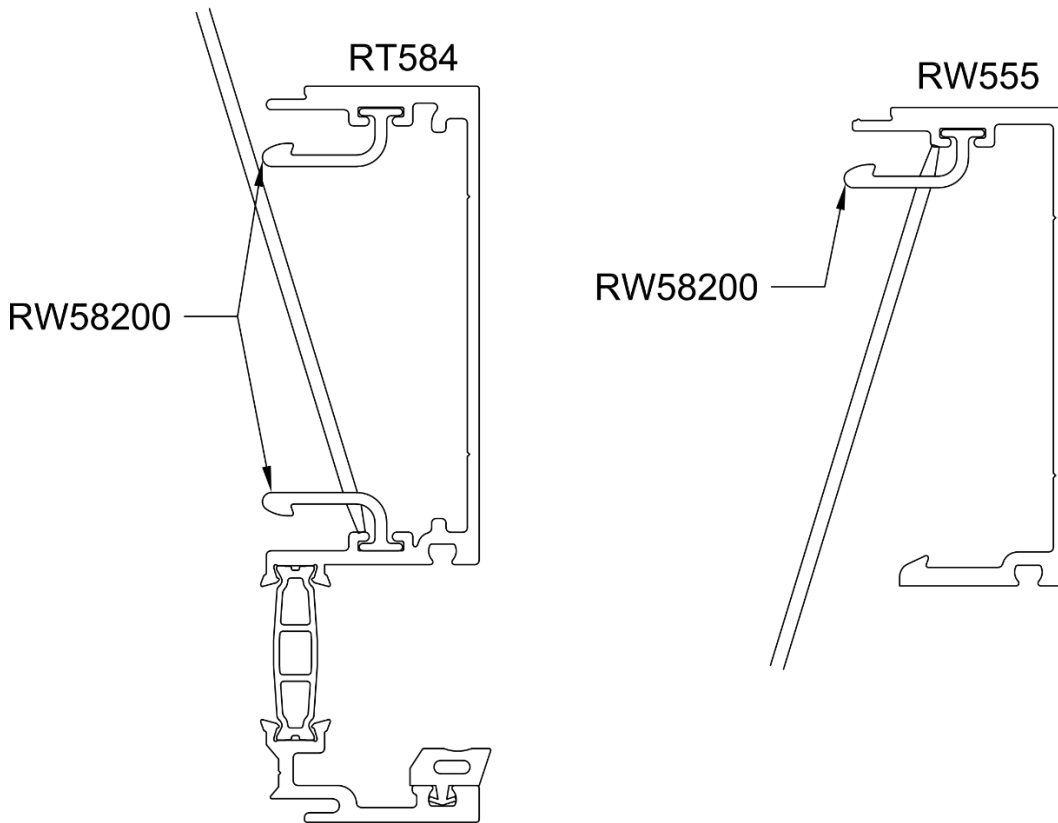


Figure 29: Anti-Buckling Clip Installation into Female-Half of Split Mullions

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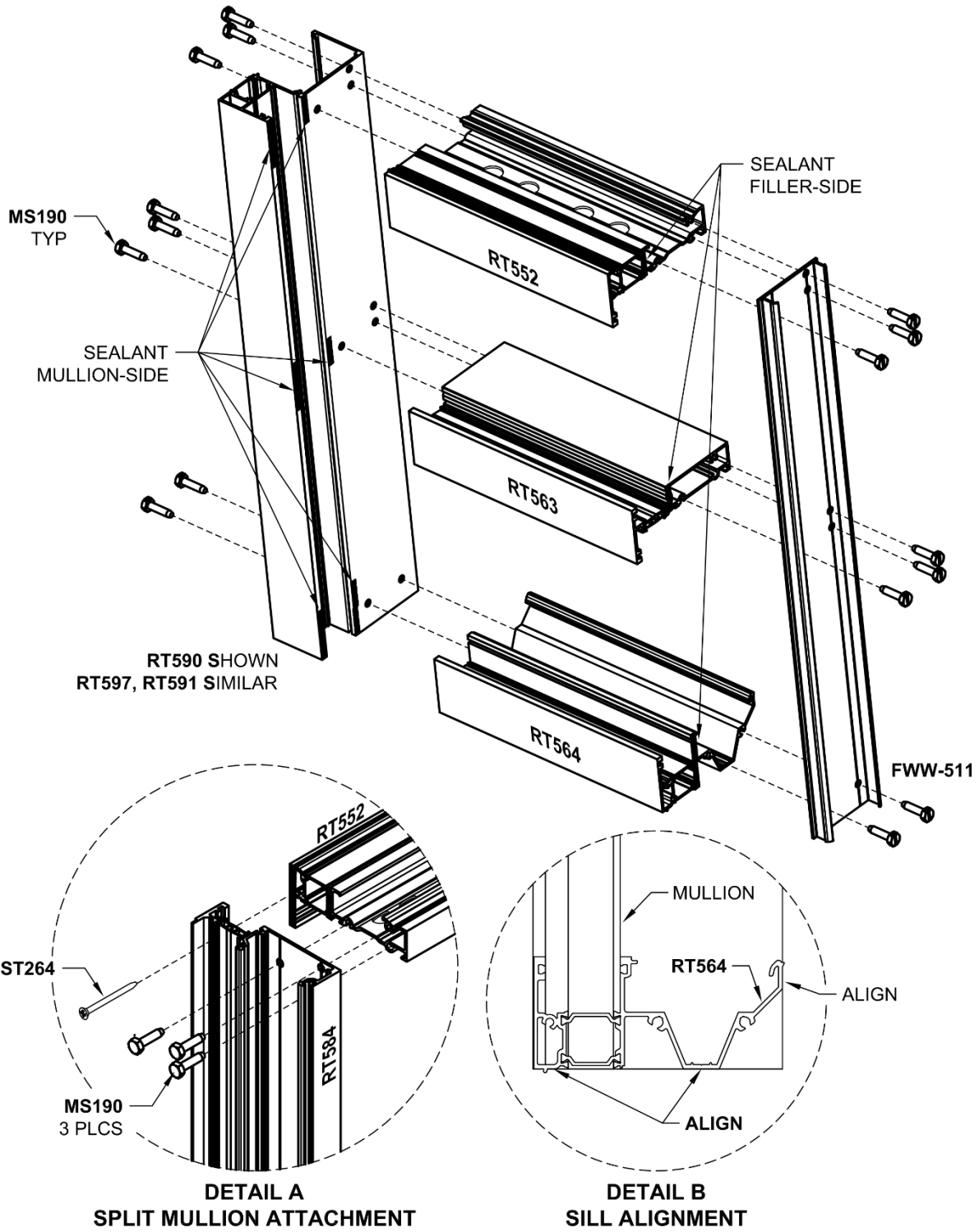


Figure 30: Panel Assembly

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12.2 Pre-Glazed Panels, Captured

NOTES:

- If panels will be glazed in an up-right position, the Flat Surface Assembly Prep is optional. If panels will be glazed in a horizontal orientation, Flat Surface Assembly Prep is required.
- Check the unit often to make sure that it is square.

Flat Surface Assembly Prep

NOTES:

- When assembling on a flat surface, ensure that the mullions are fully supported, free from bow and twist.
- When complete with the *Flat Surface Assembly Prep*, continue to *Full Assembly* with *Step 12.2.6*.

12.2.1 Reference approved shop drawings for required Setting Block locations; depending on the glass size, Setting Blocks will be located at either 1/4 points or 1/8 points. Clean Sill and Horizontal members where Setting Blocks and Setting Chairs will be installed.

12.2.2 Using a small amount of Sealant, install the Setting Chairs in the Horizontals. Use just enough Sealant to hold the Setting Chair in place. Immediately clean up any excess Sealant. Reference

12.2.3 *Figure 31, Detail A*, for a visual guide.

12.2.4 Using a small amount of Sealant, install the Setting Blocks in the Sill and on the Setting Chair in the Horizontal. Use just enough Sealant to hold the Setting Blocks in place. Immediately clean up any excess Sealant. Reference

12.2.5 *Figure 31, Detail B*, for a visual guide.

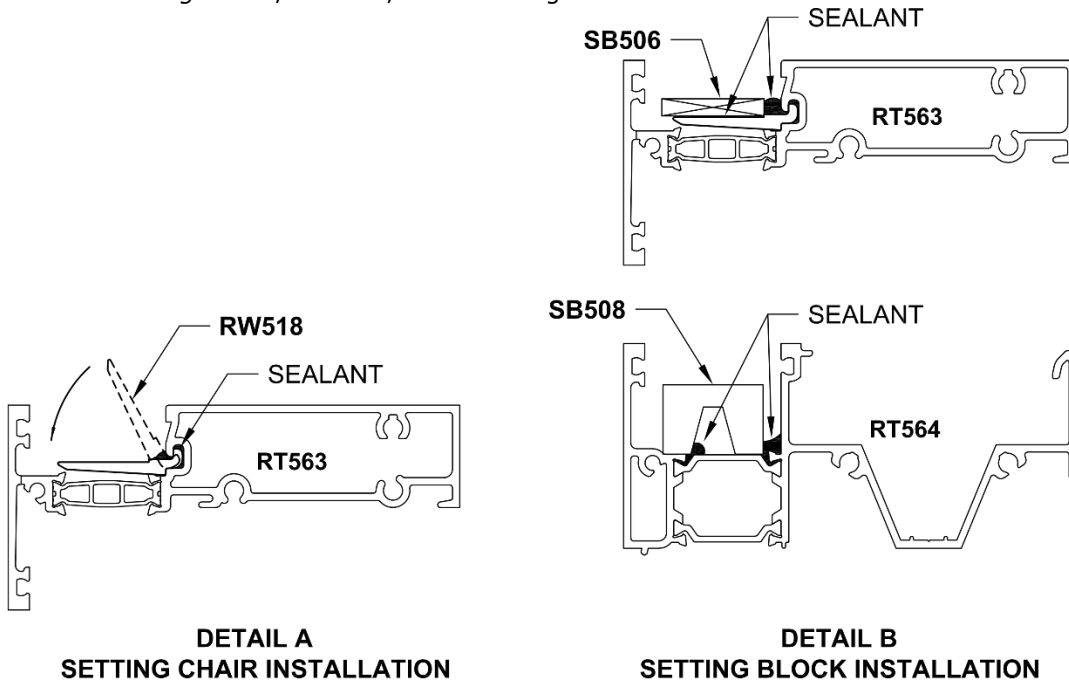
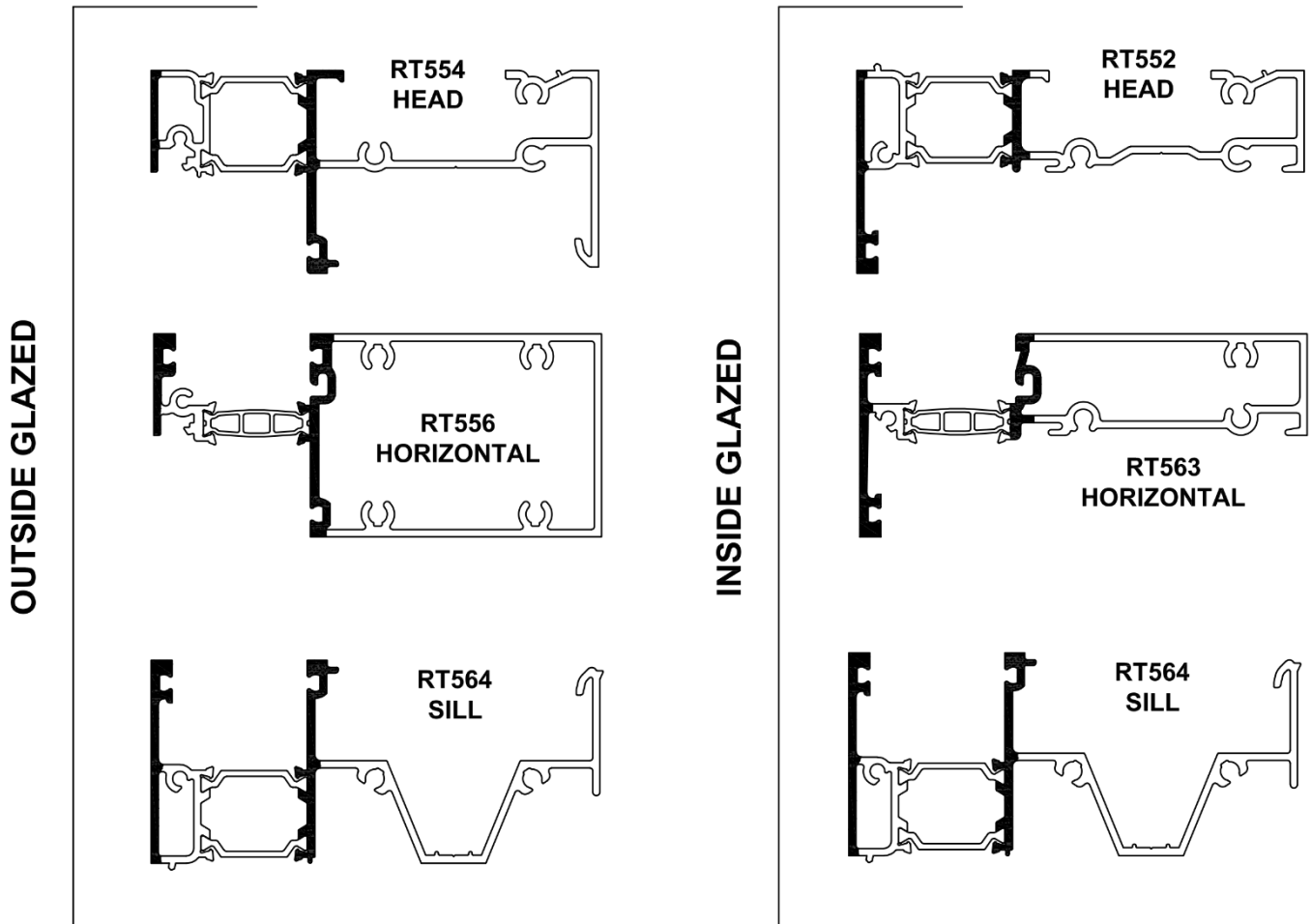


Figure 31: Setting Chair and Setting Block Installation, Flat Surface Assembly

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Full Assembly

- 12.2.6 Clean framing members at locations where Silicone Sealant is noted to be applied.
- 12.2.7 Apply Sealant to the end of the Head, Horizontal, and Sill that will attach to the Mullion or Jamb, as detailed in *Figure 32*.
- 12.2.8 To ensure a proper fit into the Sill Receptor, align Sill to Vertical at the interior edge and the bottom, as shown in *Figure 33, Detail A*.
- 12.2.9 Attach Horizontals to Verticals using **MS19042** fasteners and **ST26442** fasteners, referencing *Figure 33*.
NOTE: Corner Mullions require **ST280**, per *Figure 10*.
- 12.2.10 Wipe off excess sealant before it cures.



**CAPTURED
PRE-GLAZED**
Figure 32: Sealing

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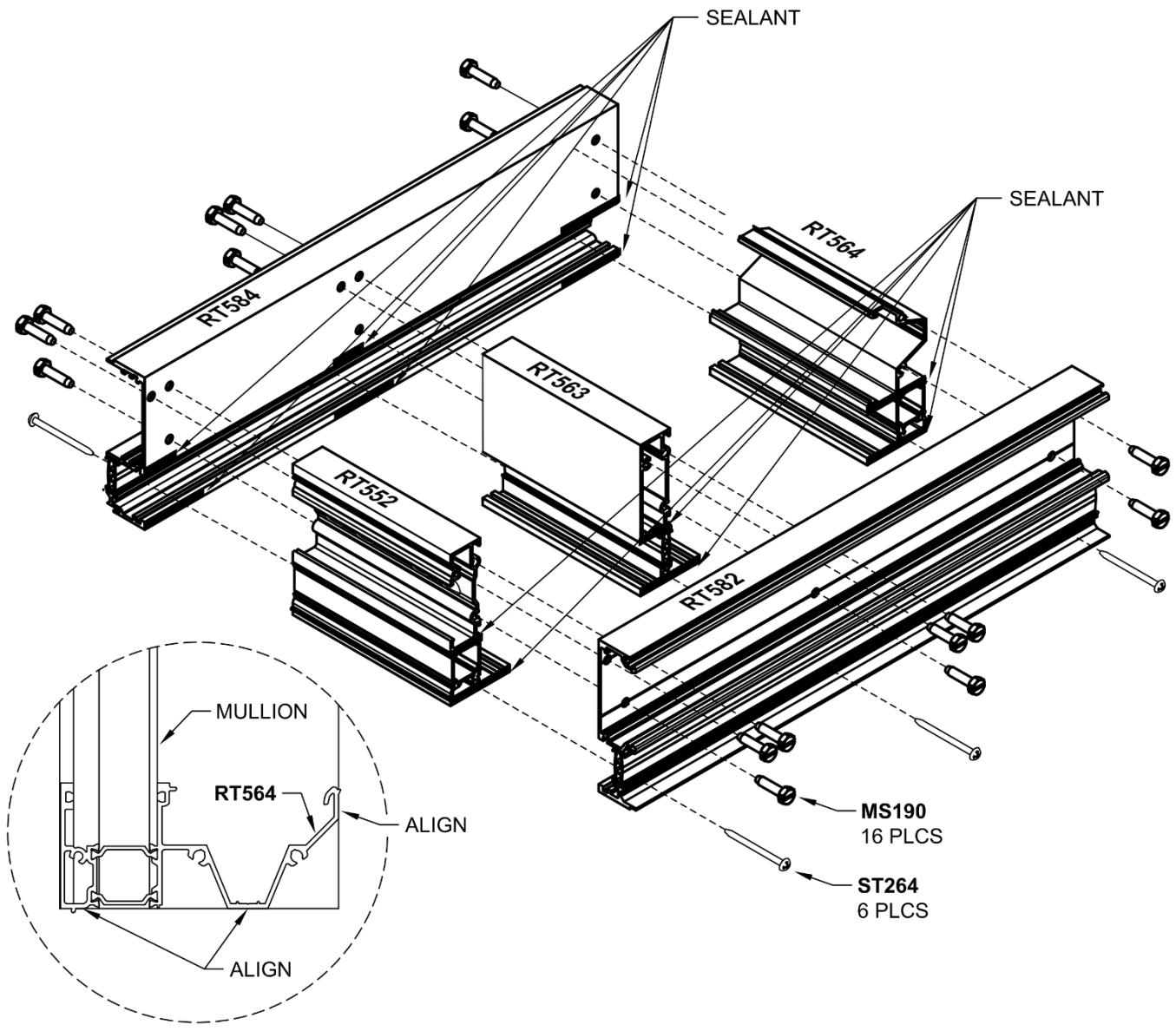


Figure 33: Pre-Glazed Captured Assembly

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12.3 Pre-Glazed Panels, SSG

NOTES:

- If panels will be glazed in an up-right position, the *Flat Surface Assembly Prep* is optional. If panels will be glazed in a horizontal orientation, *Flat Surface Assembly Prep* is required.
- Check the unit often to make sure that it is square.

Flat Surface Assembly Prep

NOTES:

- When assembling on a flat surface, ensure that the mullions are fully supported, free from bow and twist.
- When complete with the *Flat Surface Assembly Prep*, continue on to *Full Assembly* with *Step 12.3.6*.

12.3.1 Reference approved shop drawings for required Setting Block locations; depending on the glass size, Setting Blocks will be located at either 1/4 points or 1/8 points. Clean Sill members where Setting Blocks will be installed.

12.3.2 Using a small amount of Sealant, adhere the Setting Blocks to the Setting Chairs. Use just enough Sealant to hold the Setting Chair in place. Immediately clean up any excess Sealant. Reference

12.3.3 *Figure 34* for a visual guide.

12.3.4 Using a small amount of Sealant, install the Setting Blocks in the Sill. Use just enough Sealant to hold the Setting Blocks in place. Immediately clean up any excess Sealant. Reference

12.3.5 *Figure 34* for a visual guide.

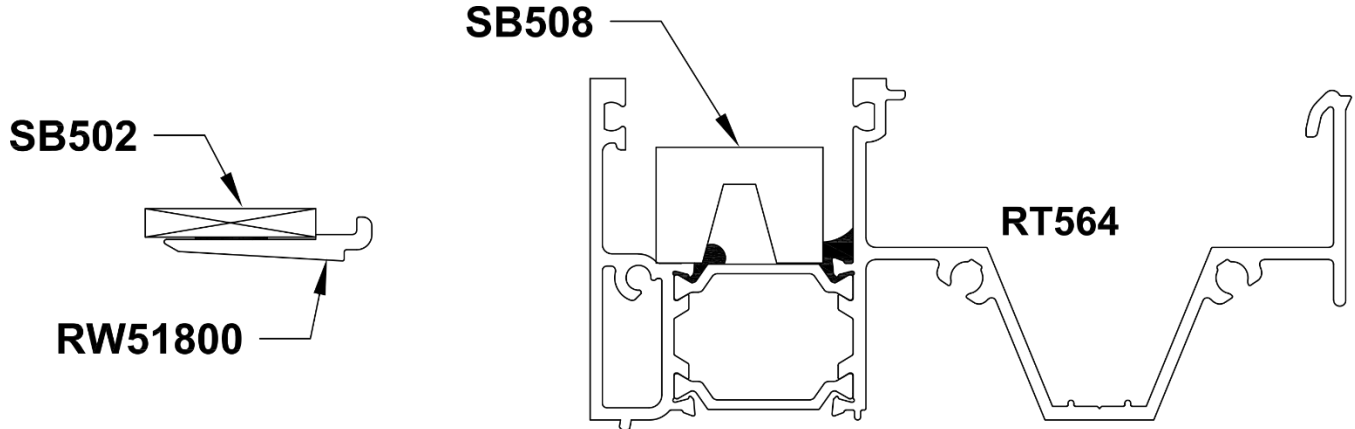
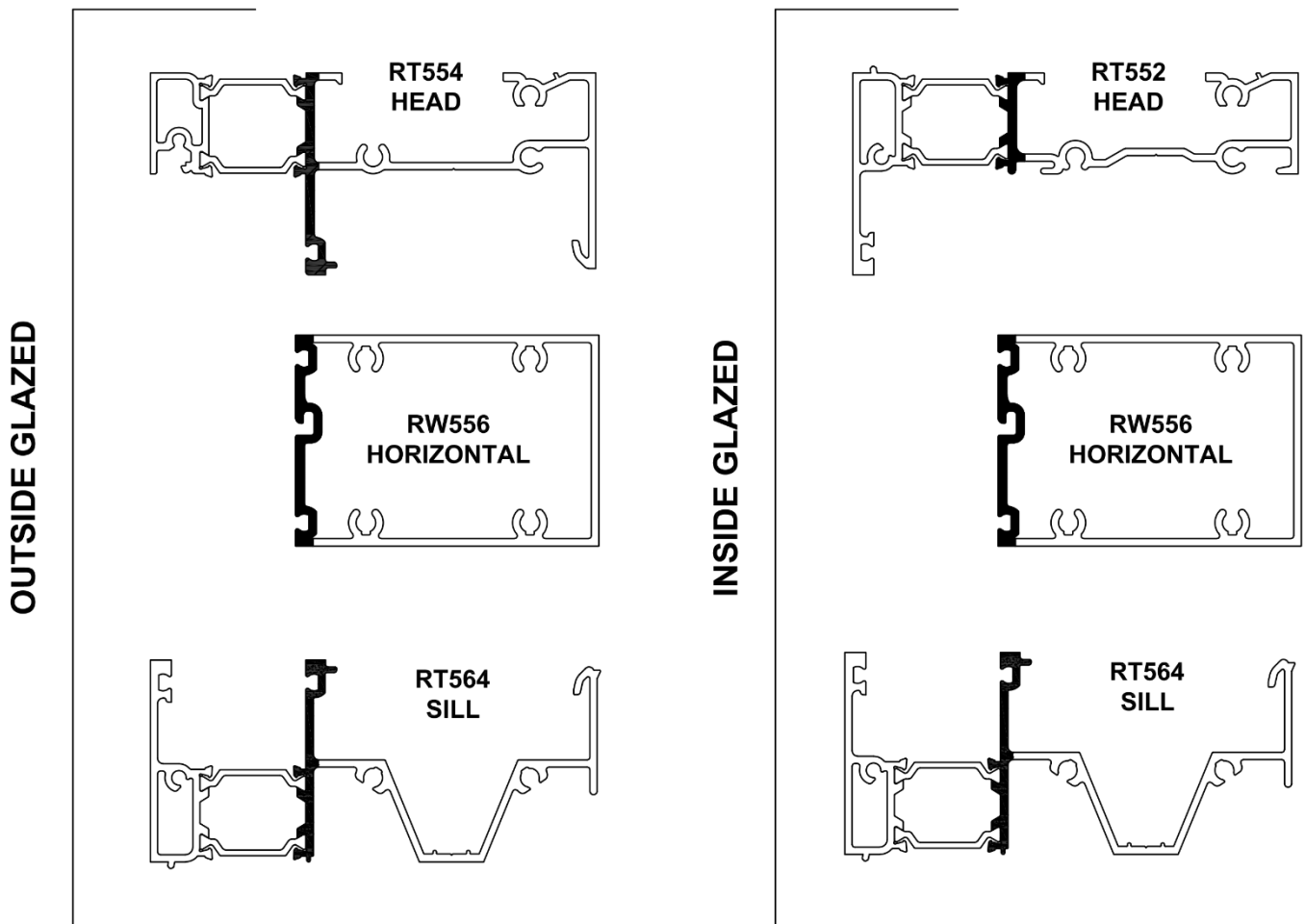


Figure 34: Setting Block Prep, Flat Surface Assembly

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Full Assembly

- 12.3.6 Clean framing members at locations where Silicone Sealant is noted to be applied in *Figure 35*.
- 12.3.7 Apply Sealant to the end of the Head, Horizontal, and Sill that will attach to the Mullion or Jamb, as detailed in *Figure 35*.
- 12.3.8 To ensure a proper fit into the Sill Receptor, align Sill to Vertical at the interior edge and the bottom, as shown in
- 12.3.9 *Figure 36, Detail A*.
- 12.3.10 Attach Horizontals to Verticals using **MS19042** fasteners, referencing
- 12.3.11 *Figure 36*.
- NOTE:** Corner Mullions require **ST280**, per *Figure 10*.
- 12.3.12 Wipe off excess sealant before it cures.
- 12.3.13 Store unit on a vertical rack. Unit may be glazed on this rack or glazed lying flat. Orient accordingly for inside or outside glazing.
- 12.3.14 *Figure 37* shows a panel on a vertical rack.



**SSG
PRE-GLAZED**

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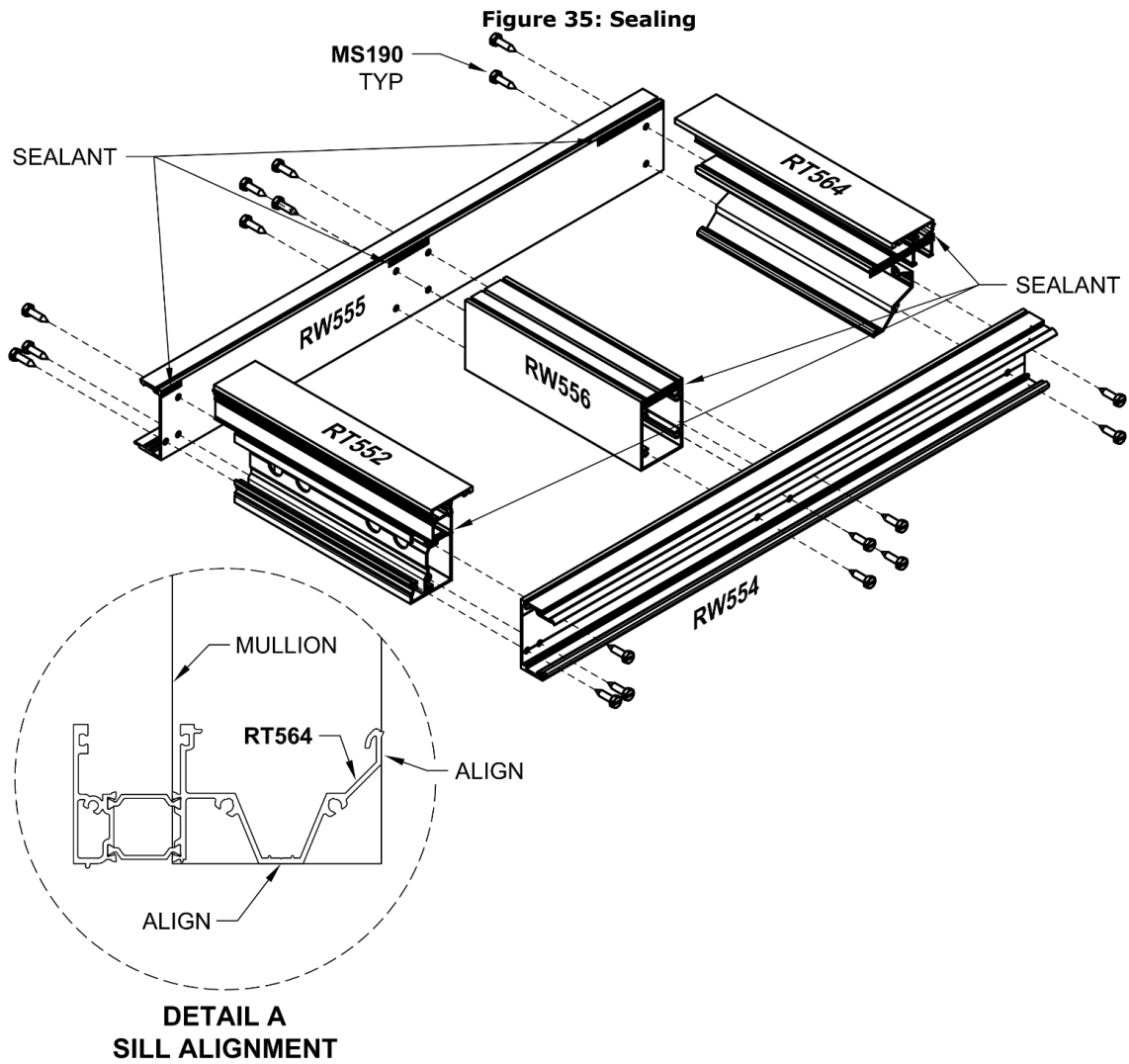


Figure 36: Pre-glazed SSG Assembly

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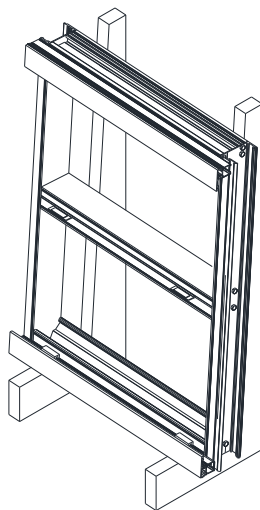


Figure 37: SSG Vertical Rack

PRE-GLAZING

13.0 Preparation of Frame Opening for Glass

NOTE: When glazing on a flat surface, ensure that the mullions are fully supported, free from bow and twist. Check the unit often to make sure that it is square.

- 13.1 Prepare the frame opening by removing all dirt and debris from the glazing pockets and gasket reglets.

14.0 Install Setting Blocks

NOTE:

- For Pre-Glazed Captured units, if the Setting Blocks and Setting Chairs were installed during *Flat Surface Assembly Prep*, continue to *15.0 Pre-Glazed, Captured*.
- For Pre-Glazed SSG units, if the Setting Blocks were installed in the Sill during *Flat Surface Assembly Prep*, skip *Step 14.1*.

- 14.1 Install Setting Blocks at Sill per shop drawings; depending on the glass size, Setting Blocks will be located at either 1/4 points or 1/8 points.
- 14.2 *Figure 38* shows Setting Block installation at Sill.
- 14.3 Install Setting Chair at Horizontal per shop drawings; depending on the glass size, Setting Chairs will be located at either 1/4 points or 1/8 points to support Setting Blocks.
- 14.4 *Figure 38* shows Setting Chair installation at Horizontal.
- 14.5 Install Setting Blocks on top of Setting Chairs at Horizontal per shop drawings; depending on the glass size, Setting Blocks will be located at either 1/4 points or 1/8 points.
- 14.6 *Figure 38* shows Setting Block installation at Sill and Horizontal.
- 14.7 Adhere Setting Blocks and Setting Chairs in place with a small amount of sealant.
- 14.8 Add **WB506** Side Blocks into the shallow pocket of the assembled panel using a small amount of Sealant to hold in place.

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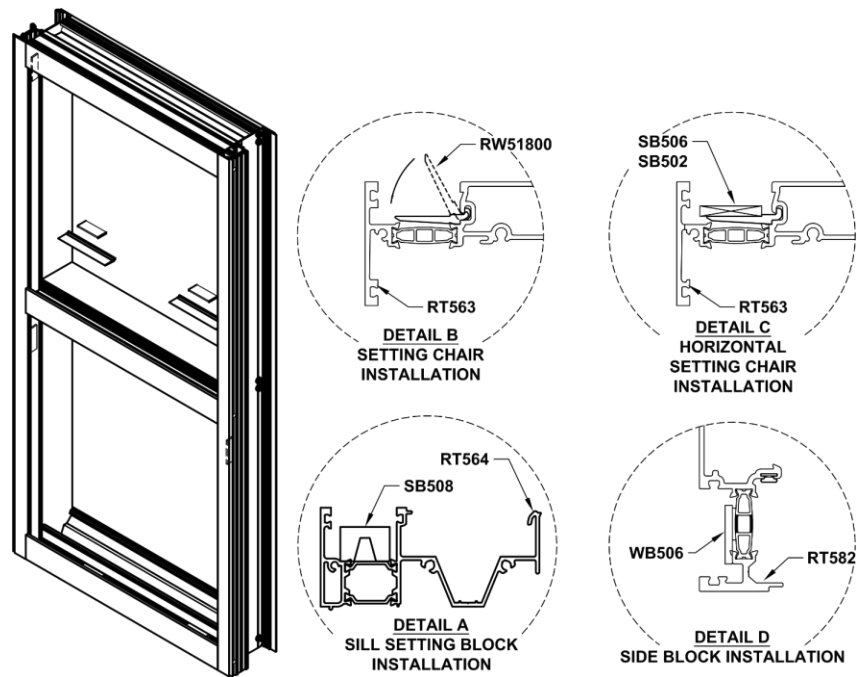


Figure 38: Setting Block Installation

14.9 A Note for Deflection

NOTE: If any Setting Block that was pre-installed with Sealant needs to be adjusted due to deflection of the weight of the glass, thoroughly clean the framing members and the Setting Block before re-installing. Use just enough Sealant to hold the Setting Block in place when re-installing.

14.9.1 If the 1/4 point location causes excessive deflection of the intermediate horizontal, move the setting blocks equally towards the corners of the lite as far as the 1/8 points. The outer end of the block **CANNOT** be closer than 6" to the corner of the glass.

14.9.2 The intermediate horizontal must not exceed 1/8" and a door header is limited to 1/16". Check deadload charts for proper setting block locations.

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Note: Mark glass as shown with 1" long reference lines to ensure proper glass bite is achieved in Vertical mullions.

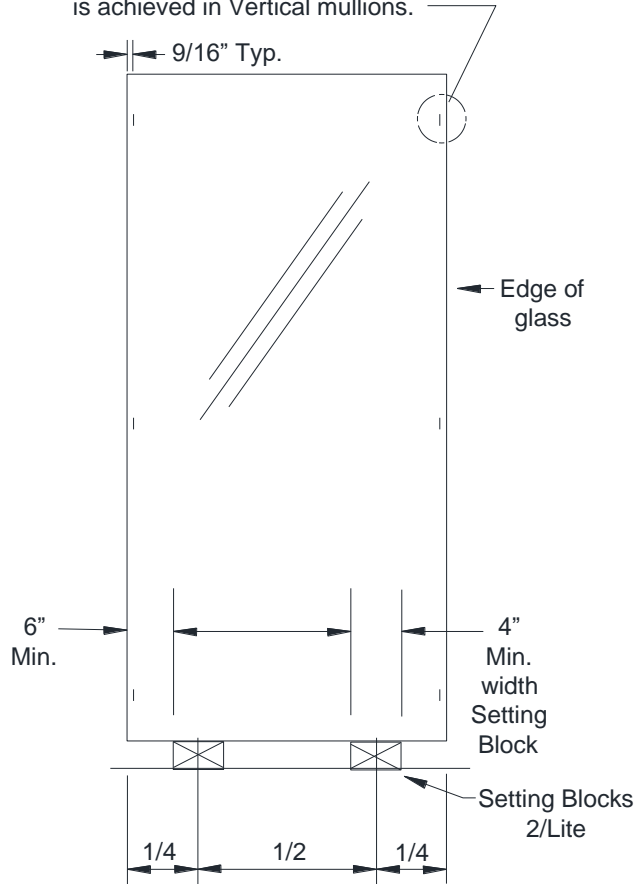


Figure 39: Glass Marking and Setting Block Locations

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15.0 Pre-Glazed, Captured

NOTES:

- Pre-Glazed details shown as Interior Glaze. Reference *FIELD GLAZING* for Exterior Glaze examples.
- Unit may be glazed upright or on a flat surface; *Figure 40* shows glazing orientation options.
- When glazing on a flat surface, ensure that the mullions are fully supported, free from bow and twist. Check the unit often to make sure that it is square.

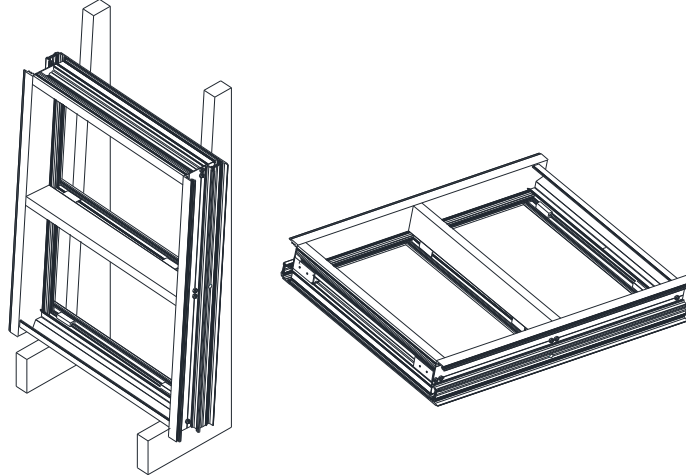


Figure 40: Glazing Orientations

15.1 Install Water Diverters and Joint Plugs

15.1.1 Install **SP550** Joint Plugs at Split Mullions. *Figure 41* shows the various views for Joint Plug installation. Seal all sides that contact the aluminum and place in the opening, sitting flush with the top of the horizontal glazing pocket. Be sure to keep the weep hole free of Sealant to ensure drainage.

15.1.2 Seal the small opening at the front of the Vertical to dam the area completely, as shown in *Figure 41*.

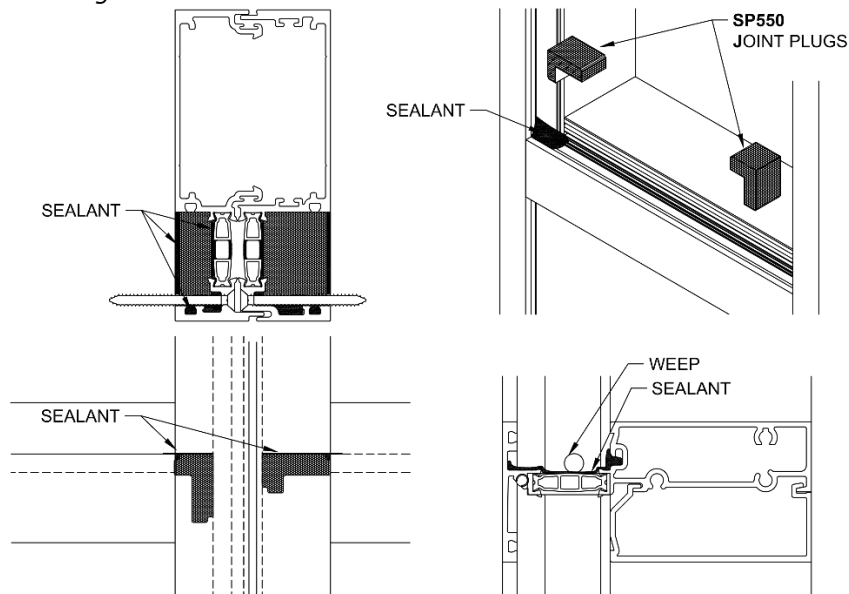


Figure 41: Joint Plug Installation

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15.1.3 Install **WD550** Water Diverter at Jamb. *Figure 42* shows the various views for Water Diverter installation. Embed the Water Diverter in Sealant and seal around the Horizontal to guide water flow.

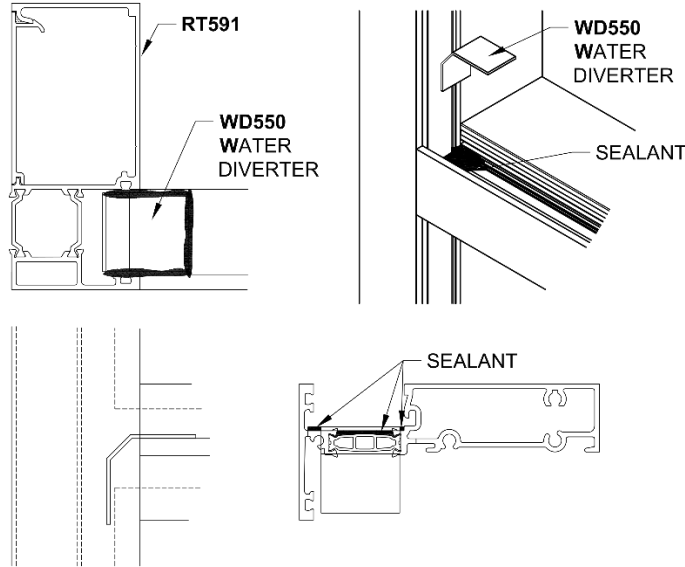


Figure 42: Pre-Glazed Water Diverter Installation

15.2 Prepare and Install Fixed Gasket

15.2.1 Verify the vertical **NP525** Fixed Gasket is cut to specification in *Section 3.0* to provide adequate compression.

15.2.2 Verify the horizontal **NP525** Fixed Gasket is cut to specification in *Section 3.0* to provide adequate compression. Miter the ends at a 15° angle, as shown in *Figure 43, Detail A*, to assure a proper seal.

15.2.3 Remove all debris from glazing pockets to prevent blockage of weeps/drain.

15.2.4 Insert the Fixed Gasket around the perimeter, verticals first and the horizontals second. Verticals run-through at corners. See *Figure 43* for a detail of the Gasket corner.

15.2.5 Pull back the horizontal gasket at the corners and apply Sealant to the connection between the horizontal and vertical gaskets. Reference *Figure 43, Detail B*, for a visual. Clean any squeeze out immediately.

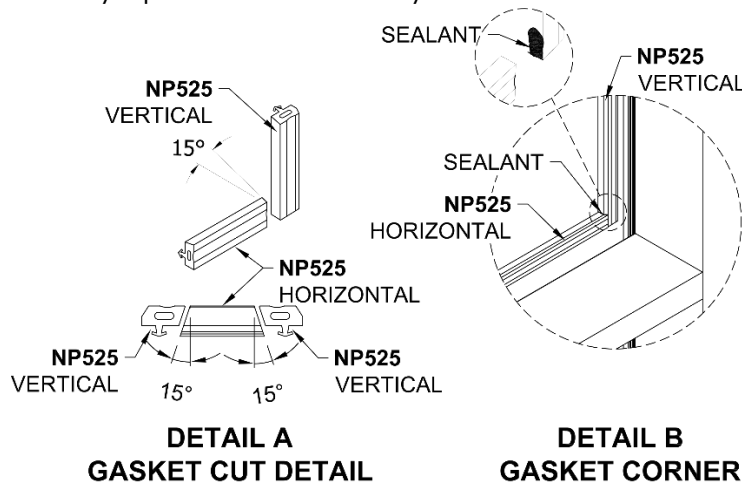


Figure 43: Fixed Gasket Installation

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15.3 Setting Glass

15.3.1 Insert Glass into the units, deep pocket first. Reference *Figure 44*.

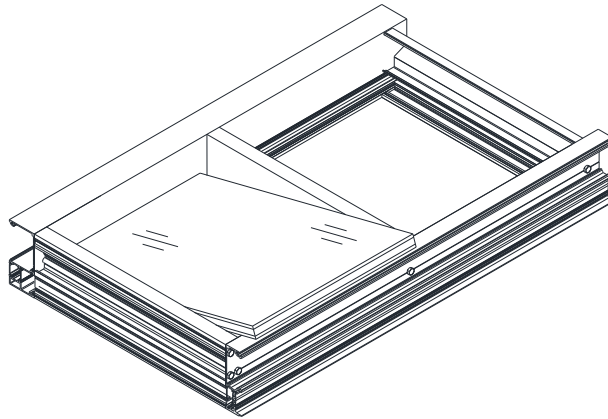


Figure 44: Inserting Glass

15.3.2 If crating panels, the glass needs to be supported at the Head to prevent shifting. Measure the glass pocket opening and subtract 1/16". Use this dimension to trim **SB508** Setting Blocks. Place the Setting Blocks 1/2" inward from the edges of glass. **DO NOT** place at 1/4 points. Use a small amount of silicone to keep the stop in place during installation.

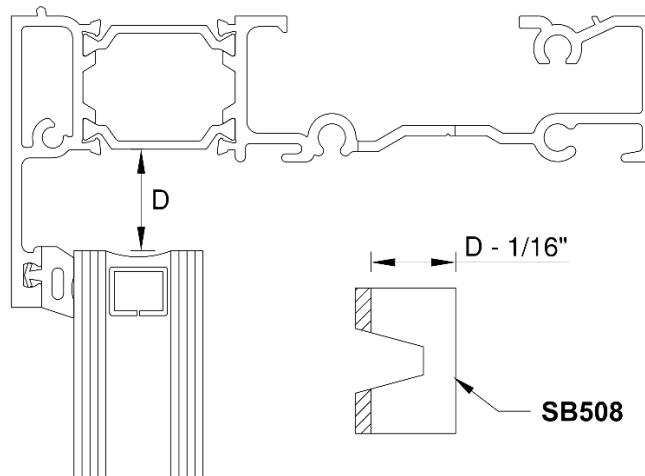


Figure 45: Optional Blocking at Head

15.4 Install Glass Stops

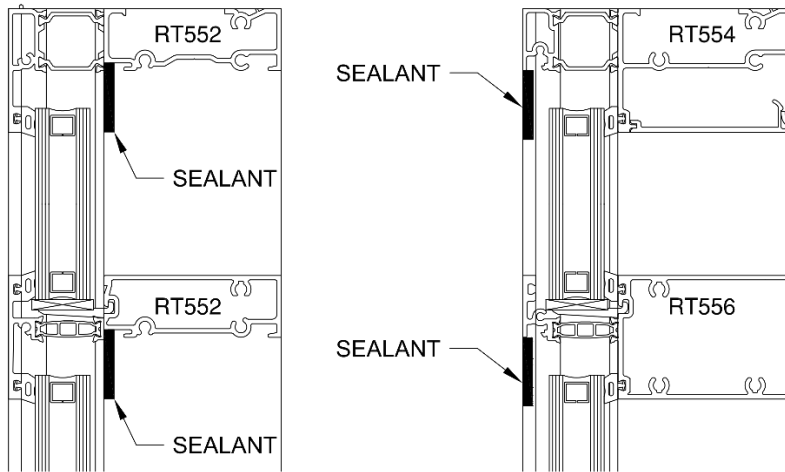
15.4.1 Clean the Vertical where the exterior face of the Head and Intermediate Horizontal glass stops will connect. Reference *Figure 46* for location.

15.4.2 Just prior to installing Glass Stop, apply Sealant to the Vertical where it connects to the Glass Stop, as detailed in *Figure 46*.

15.4.3 Install Glass Stops

- For Interior Glazed panels, install **RW557** Glass Stop with **MS17842** fasteners at Head and Intermediate Horizontals. Lift the Glass Stop into position and hook the legs into the Head. Pull the Glass Stop toward the interior of the unit to secure the Glass Stop. Reference *Figure 47*.
- For Exterior Glazed panels, install **RW563** Glass Stop at Head and Intermediate Horizontals. Tilt and roll the Glass Stop into place. Reference *Figure 47*.

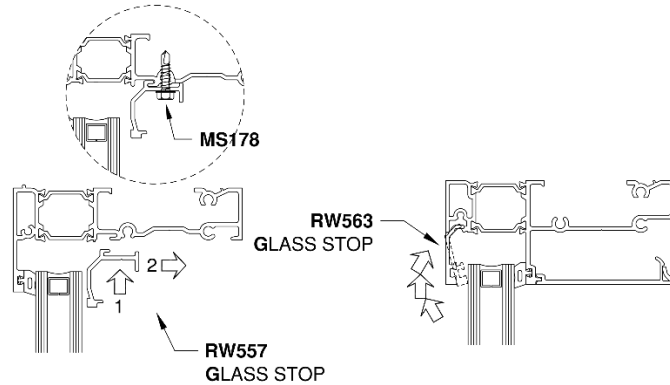
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**DETAIL A
INTERIOR GLAZE**

**DETAIL B
EXTERIOR GLAZE**

Figure 46: Sealant Application at Glass Stops



**DETAIL A
INTERIOR GLAZE**

**DETAIL B
EXTERIOR GLAZE**

Figure 47: RW557 Glass Stop Installation

15.5 Prepare and Install Wedge Gasket

- 15.5.1 Verify the vertical **NP506** Wedge Gasket is cut to specification in *Section 3.0* to provide adequate compression. Notch both ends of the gasket as shown in
- 15.5.2 *Figure 48, Detail A.*
- 15.5.3 Verify the horizontal **NP506** Wedge Gasket is cut to specification in *Section 3.0* to provide adequate compression.
- 15.5.4 Insert Wedge Gasket first in the corners and then the middle of the D.L.O., compressing toward the corners. Reference
- 15.5.5 *Figure 48, Detail B.*

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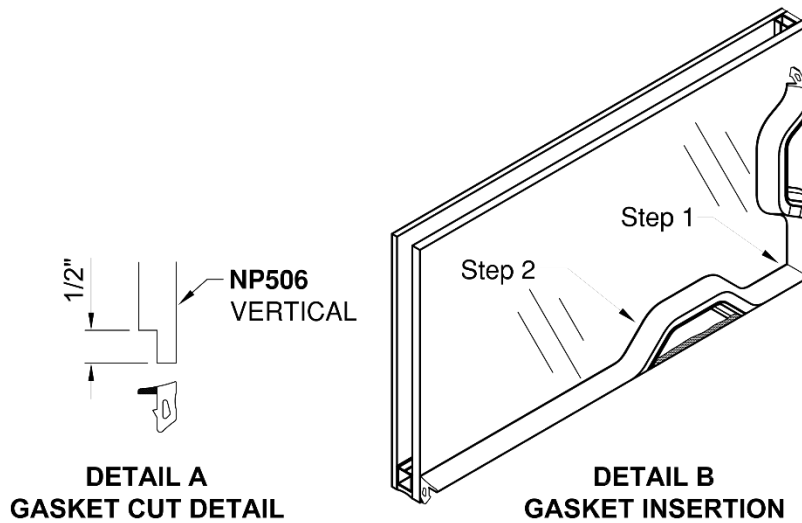


Figure 48: Wedge Gasket Notching and Installation

- 15.5.6 To prevent glass from shifting during transportation and hoisting the units in place, the glass needs to be blocked into place. At Verticals, trim **SB508** Setting Blocks to fit into the glass pockets; trim the Setting Blocks 1/16" smaller than the space in the pocket. At deep pocket of the Vertical, use a small drop of Sealant to hold the Setting Block in place. Be sure to leave a gap for water drainage.

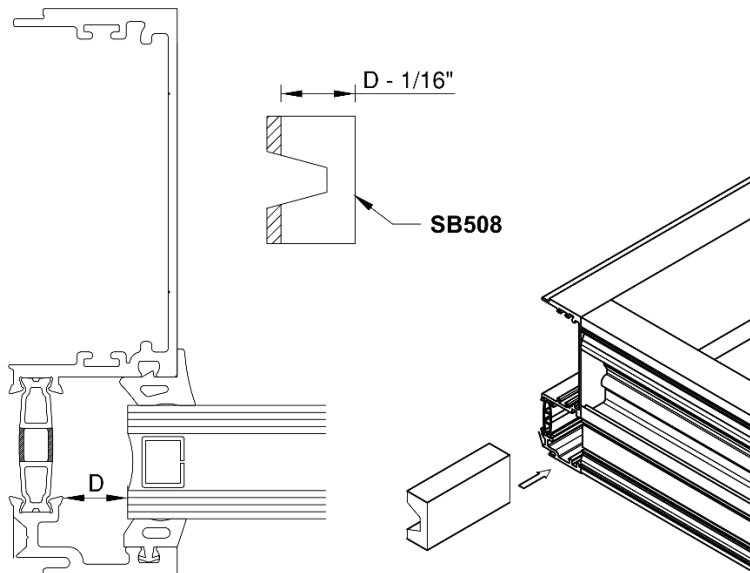


Figure 49: Optional Side Blocking

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16.0 Pre-Glazed, SSG

NOTES:

- US Aluminum ® recommends pre-glazing SSG panels prior to installation.
- Panels must be square and without bow in any direction as the unit is glazed and allowed to cure. If not, the panels will not install correctly and will lead to poor air and water performance.
- Glass and Framing Members are to be cleaned and prepped for Glazing according to the Structural Sealant manufacturer's recommendation.

16.1 Prepare and Install Fixed and Spacer Gasket

- 16.1.1 Remove **NP525**, **NP506**, **SP451** and **WH546** Gaskets from rolls, cut to length per *Section 3.0*, and allow to relax in a protected location overnight.
- 16.1.2 Cut Gaskets per material cut list on *Page 10*.
- 16.1.3 Remove all debris from glazing pockets to prevent blockage of weeps/drain.
- 16.1.4 Install **NP525** Fixed Gasket in Head and Sill. Start gaskets at the middle of the glass opening and work out toward the corners.
- 16.1.5 Install **SP451** Spacer Gasket in Horizontals. Start gaskets at the middle of the glass opening and work out toward the corners.

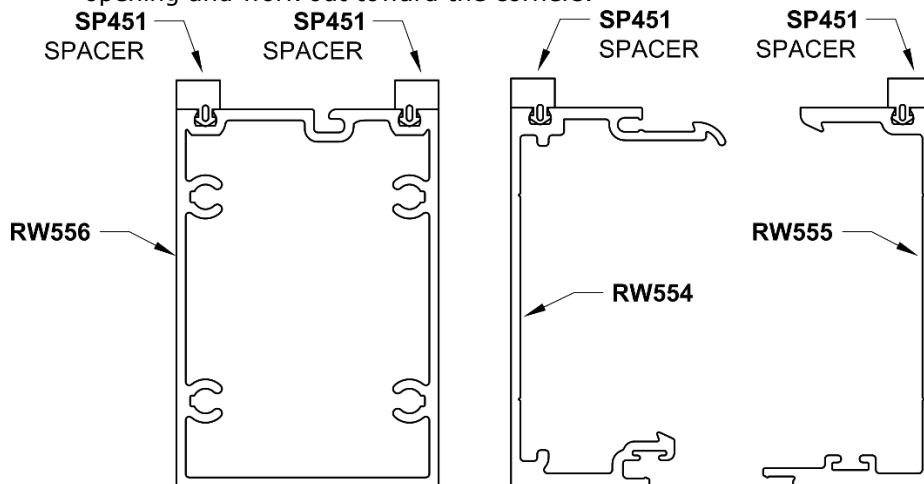


Figure 50: SP451 Spacer Gasket Installation

16.2 Setting Glass

- 16.2.1 Center glass in the opening. Make sure proper glass penetration is achieved. Insertion steps are shown in *Figure 51*.
- 16.2.2 Rest glass on Setting Blocks and press tightly against **SP451** Gasket.
- NOTE:** to prevent glass from coming off the **SP451** spacer, multiple clamps are recommended to keep the glass tight and the frame square. Reference *Figure 52*.

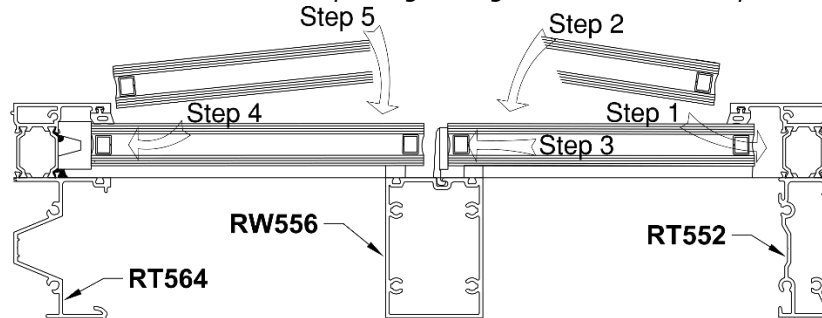


Figure 51: SSG Glass Installation

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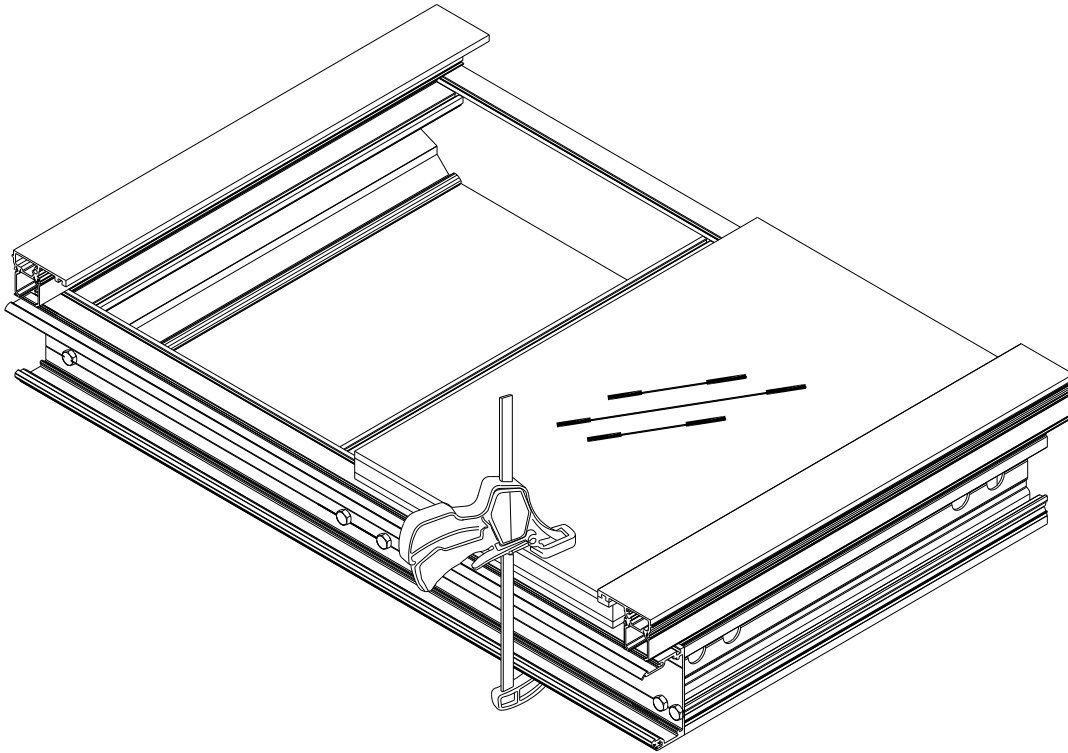


Figure 52: Glass Clamping

16.3 Install Glass Stops

16.3.1 Install **RW557** Glass Stop with **MS17842** fasteners as shown in *Figure 53*. Apply sealant to the Verticals where the front face of the glass stop will join and place the stop into position. Tool the sealant into the corners between the Glass Stop and the Vertical to ensure a watertight seal. Clean excess sealant.

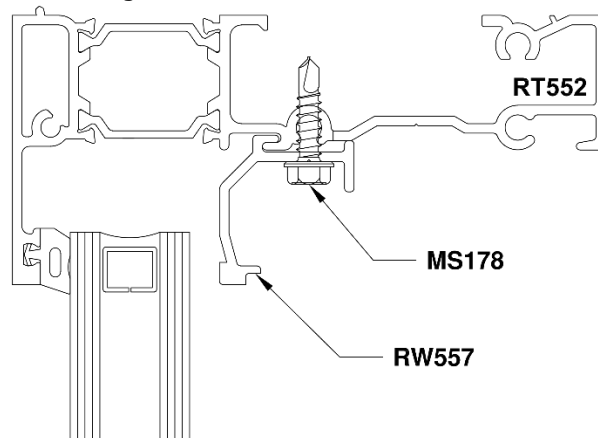


Figure 53: RW557 Glass Stop Installation

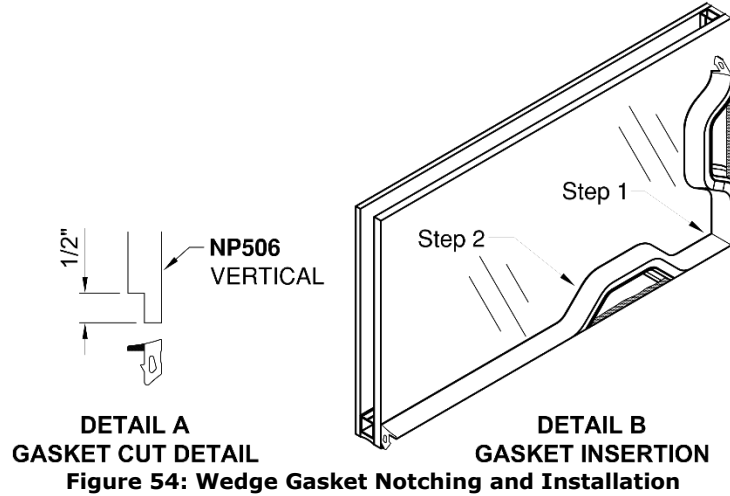
16.3.2 Verify the glass bite per *1.0 Glass Size* or approved shop drawings.

NOTE: There is a small groove at the front of the SSG Mullion that will line up with the edge of glass. If glass is over or undersized, center glass equally over these marks.

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16.4 Prepare and Install Wedge Gasket

- 16.4.1 When vertical Wedge Gasket is required, verify the vertical **NP506** Wedge Gasket is cut to specification in *Section 3.0* to provide adequate compression. Notch ends of the gasket at horizontal Wedge Gasket connection per *Detail A* in *Figure 54*.
- 16.4.2 Verify the horizontal **NP506** Wedge Gasket is cut to specification in *Section 3.0*.
- 16.4.3 Insert the **NP506** Gasket into the glazing pocket, first inserting the horizontal and then the vertical, when required. Insert the ends into the corners first, then insert the middle of the D.L.O., compressing out toward the corners. Reference *Figure 54*.



16.5 Structural Silicone Application

- 16.5.1 With the panel frame **square and without bow**, clamp the glass to the frame to ensure prevent structural silicone from pushing past spacer gasket, similar to *Figure 52*.
- 16.5.2 Apply structural silicone to vertical members, ensuring the glazing cavity is completely filled to the **SP451** Spacer Gasket and tool flush with edge of glass.
- 16.5.3 Seal the very bottom of the Gasket and the reglet in the mullion to prevent water from wicking up the gasket.
- 16.5.4 Apply structural silicone to Horizontals, ensuring the glazing cavity is completely filled to the **SP451** spacer gasket. Tool flush with edge of glass. Reference *Figure 56*
NOTE: Slide Setting Chair with Setting Block to ensure adequate silicone application, returning the Setting Chair with Setting Block to their original position after tooling.

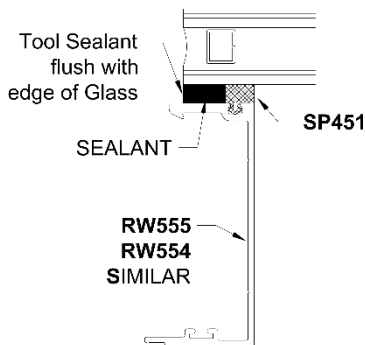


Figure 55:
Structural Sealant at SSG Vertical Mullion

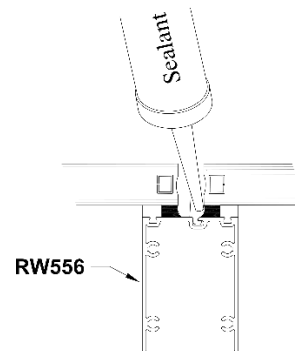


Figure 56:
Structural Sealant Application at Horizontals

- 16.5.5 Allow Sealant to cure per manufacturer's recommendation for cure time.

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16.5.6 After the structural sealant has cured, add a backer rod between the glass at the horizontal location and face seal flush with Silicone Sealant.

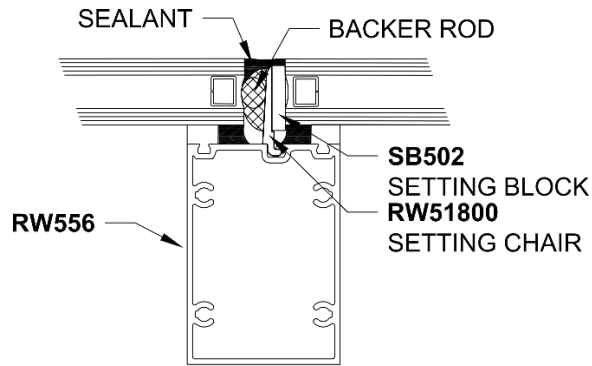


Figure 57: SSG Face Seal

16.5.7 Tape the end of the front face and apply silicone sealant to the ends of the glass and the front glazing pockets. Tape location shown in *Figure 58, Detail B*.

NOTE: Glass is not flush with the edge of the cut extrusion and will require a thicker silicone seal.

16.5.8 Apply the **EC552** Sponge Cover to sit centered and flush with the edge of the front face. Temporarily tape the cap in place, being careful to not pull off center. Reference *Figure 58, Detail C*.

16.5.9 Repeat 16.5.7 and 16.5.8 on all four corners at all Head and Sill conditions. Finished corners should resemble *Figure 58, Detail A*.

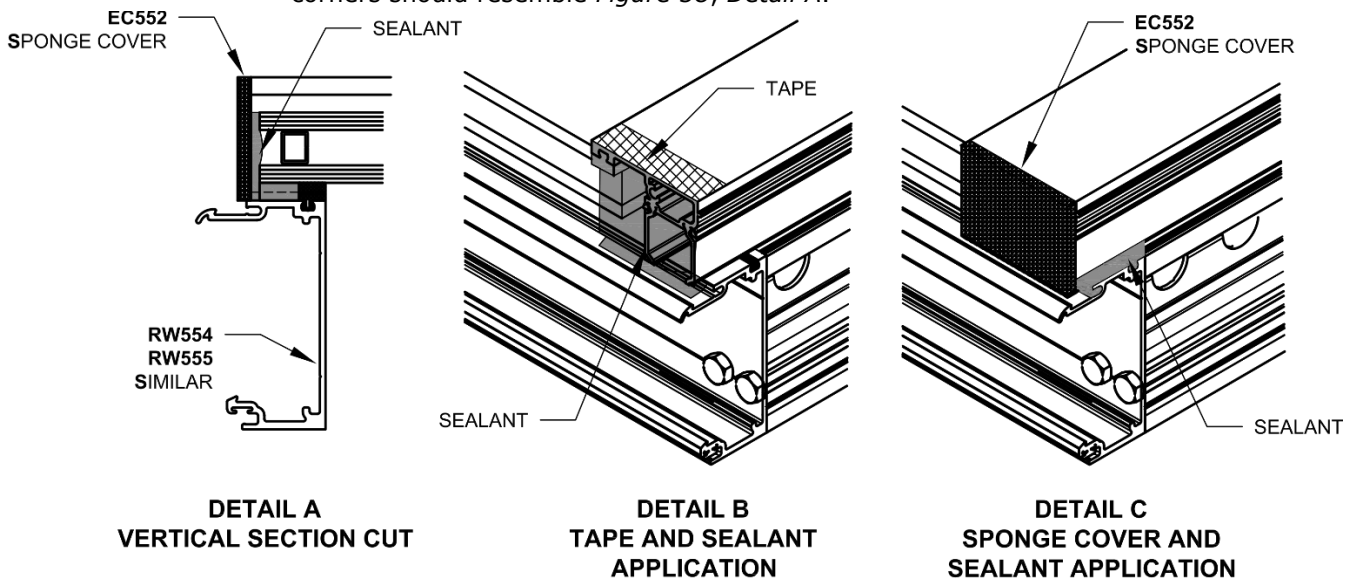


Figure 58: SSG End Cap Sealing

16.5.10 Verify the **WH546** Rainscreen Gasket is cut to specification in *Section 3.0*.

16.5.11 Using a small amount of Sealant at the top and bottom, install into the Vertical's reglet, as shown in *Figure 59*.

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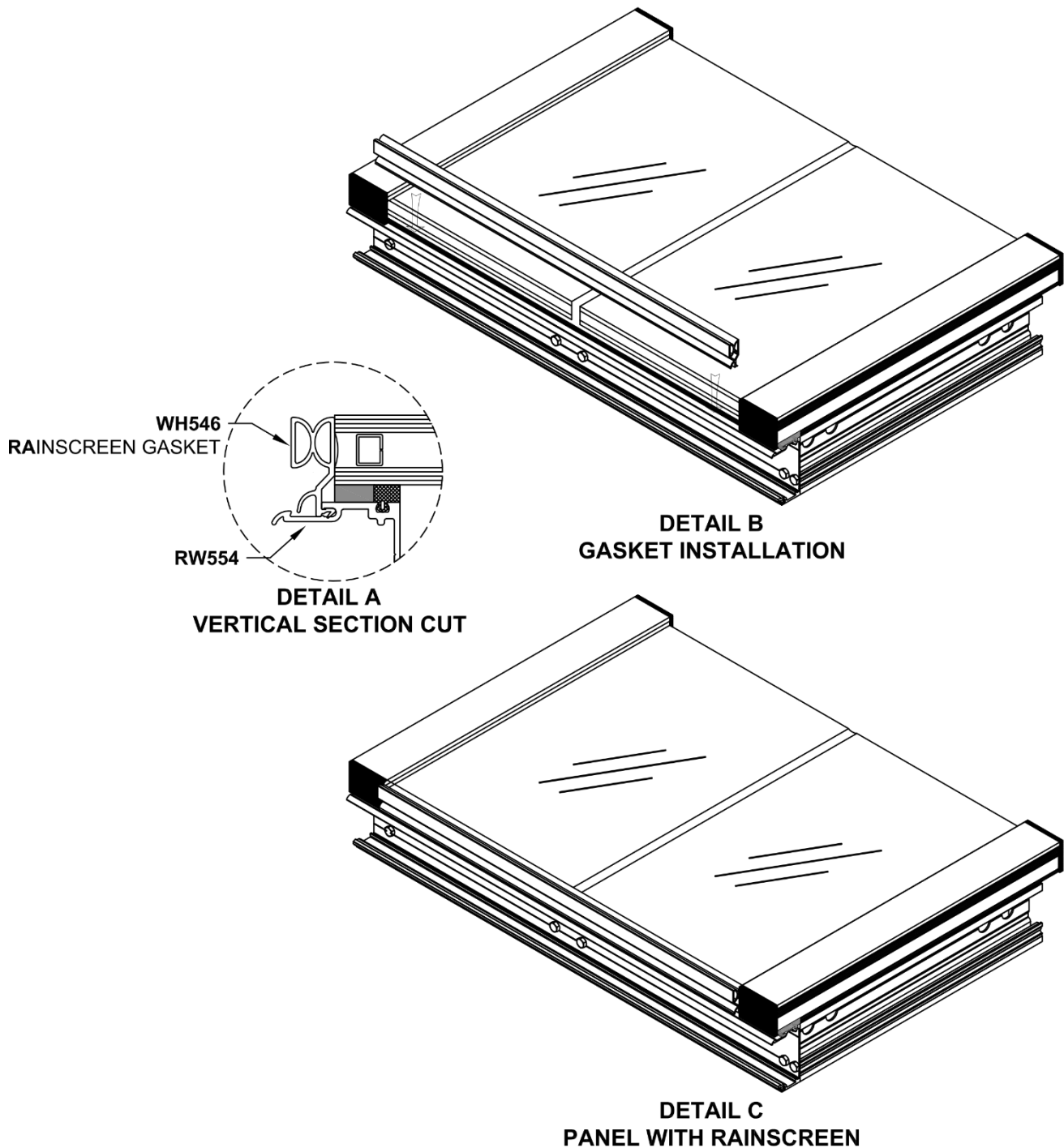


Figure 59: SSG Rainscreen Gasket Installation and Panel Completion

- 16.5.12 Allow all silicone to fully cure before moving the unit. See Sealant manufacturer recommendation for cure time.
- 16.5.13 If crating, add blocking to keep the glass safe from breaking and the unit secure.

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FRAME INSTALLATION

17.0 Sill Receptor Installation

- 17.1 Center the assembled Sill Receptor into the opening, allowing shim space at jambs. Shim to level with 1/4" of shim at highpoint, adding shims at each fastener, reference *Figure 60*.
- 17.2 Anchor the Sill Receptor to the structure as noted per approved shop drawings, engineered calculations, or state approvals. Anchors should be no more than a maximum of 4" from each end and 18" to 24" on center.

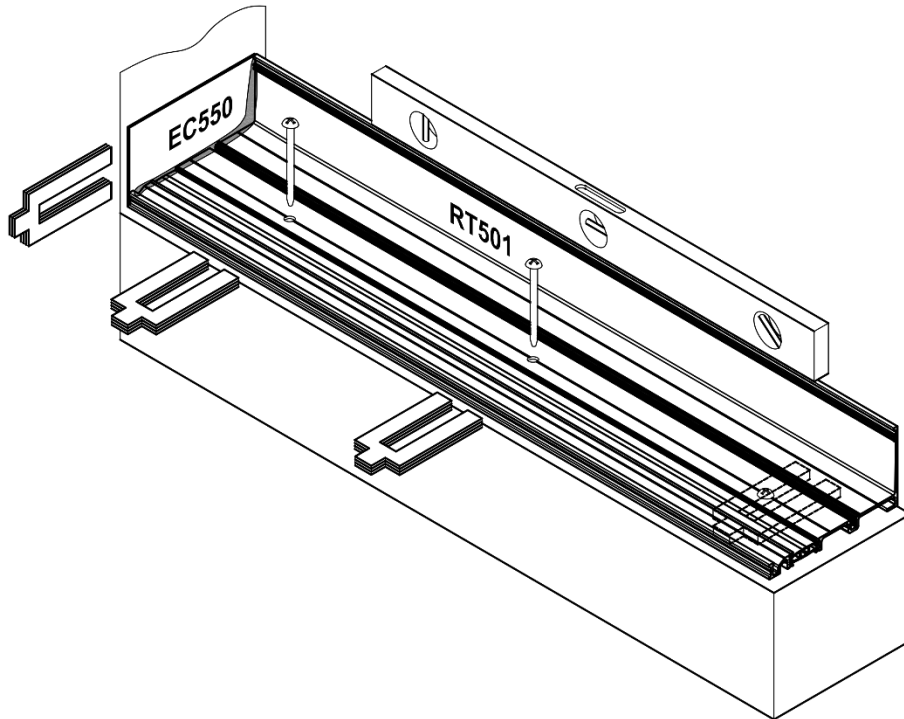


Figure 60: Sill Receptor Installation

- 17.3 Wedge shims tightly between End Dams and jamb substrate at each end prior to installing frame panels. These shims prevent the End Dams from being dislodged while frame panels are being installed. Completely seal End Dams as shown in *Figure 61*.

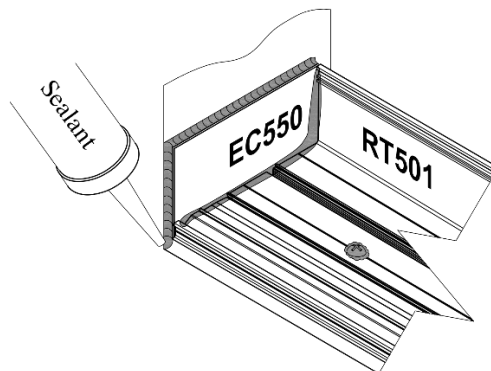


Figure 61: Sill Receptor Sealing at End Dam

- 17.4 Cap seal all fasteners. Check that the sealant over the perimeter fasteners has a 1" separation centered at the spline channel for the **ST22000** fastener, as shown in *Figure 62*.

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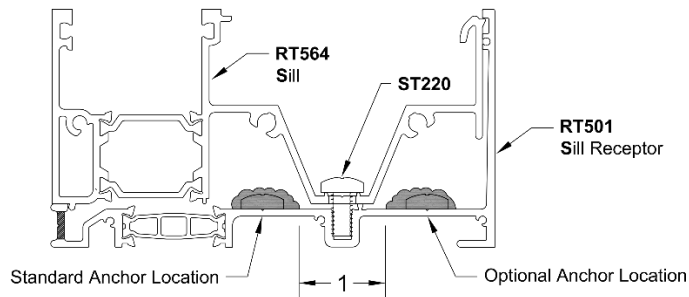


Figure 62: Sill Receptor Cap Seal Detail

Sill Receptor Splice Installation

- 17.5 At splice locations, remove 1-1/2" of the tab on each side of the splice at the Sill Receptor's spline channel. Reference Detail A in *Figure 63*.
- 17.6 Insert Backer Rod and Sealant into the end of each Sill Receptor's strut and screw raceway, as shown in *Figure 63*.
- 17.7 Apply Sealant to both sides of splice location and place **SL501** Splice.
- 17.8 Once **SL501** Splice is in place, apply Sealant on edges to seal the Splice.

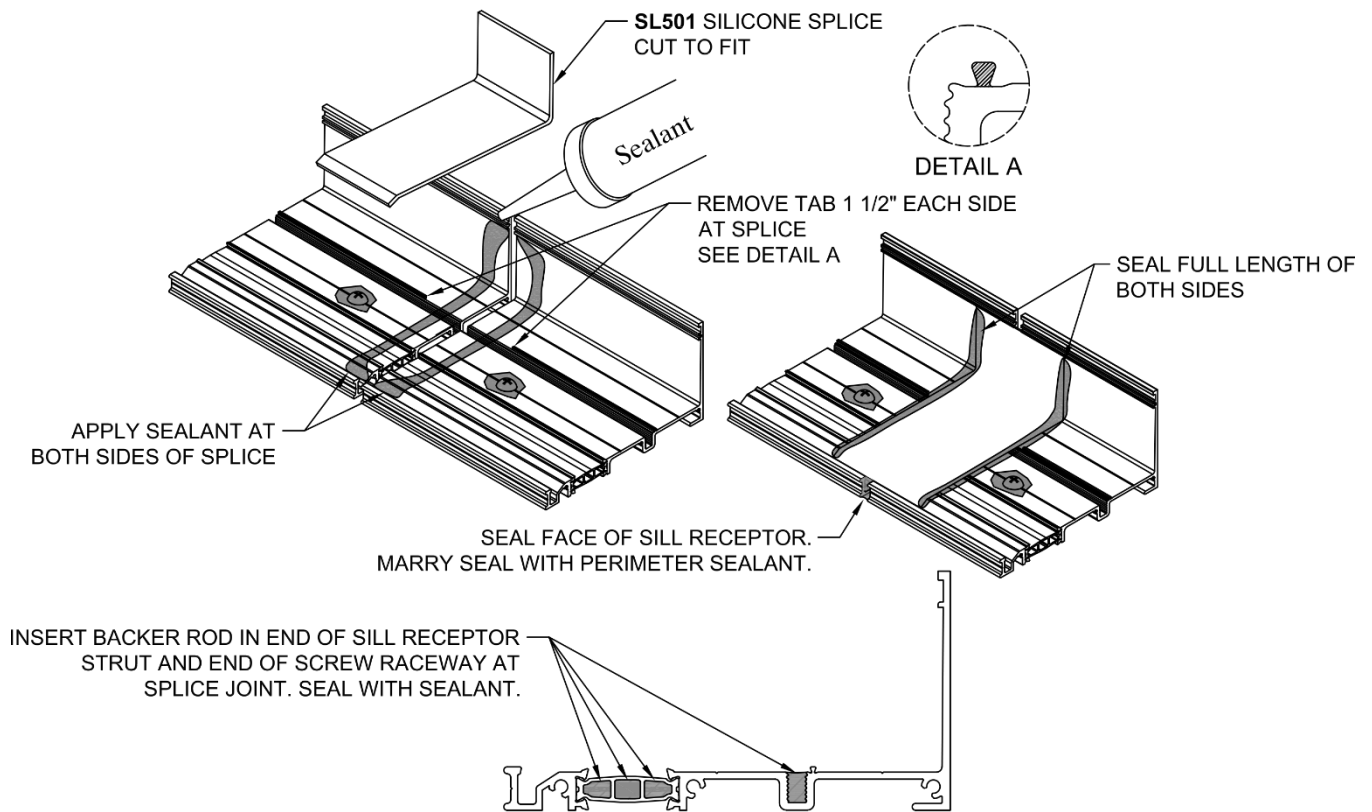


Figure 63: Sill Receptor Splice Installation

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Sill Receptor Corner Splice Installation

NOTE: At all corner conditions, add a standard splice at mid-D.L.O. of adjacent panels to reduce horizontal movement in Sill Receptor.

- 17.9 Prepare and install the mid-D.L.O. splice per standard splice instructions.
- 17.10 For the mitered splice, remove 1-1/2" of the tab at miter end of each Sill Receptor piece. Reference Detail A in Figure 64.
- 17.11 Insert Backer Rod and Sealant into each end of the Sill Receptor strut and screw raceway, as shown in the section cut of Figure 63.
- 17.12 Install Sill Receptor with 1/4" spacing in the miter to allow for potential expansion and contraction movement. Fill this space with Sealant.
- 17.13 Cut (2) **SL501** Splice sheets for the corner, following the visual guide in Figure 64:
 - For the bottom surface of Sill Receptor, cut a chevron shape that will wrap around and slightly up the back leg.
 - For the back leg of Sill Receptor, cut a straight flap to wrap around and overlap the chevron piece.
- 17.14 Apply Sealant to both sides of splice location and place **SL501** Splice, starting with the chevron piece and then the back leg flap.
- 17.15 Once **SL501** Splice is in place, apply Sealant on edges and at seam to seal the Splice.

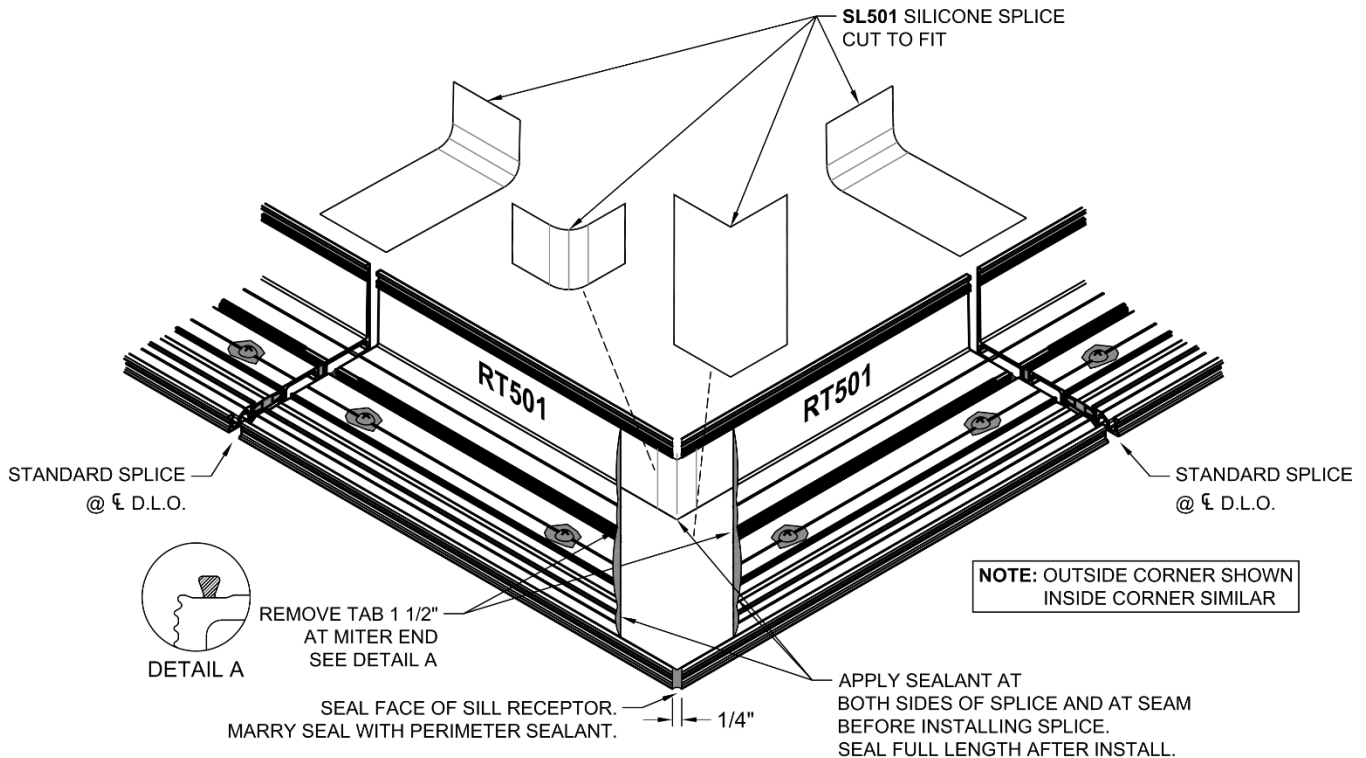


Figure 64: Sill Receptor Splice Installation at Corners (Outside Corner shown, Inside Corner similar)

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18.0 Head Receptor Installation

- 18.1 Attach the **EC556** End Dam with (2) **MF232** fasteners. Center the assembled Head Receptor into the opening, allowing shim space at jambs. Shim to level with 1/4" of shim at highpoint, adding shims at each fastener, reference *Figure 65*.
- 18.2 Anchor the Head Receptor to the structure as noted per approved shop drawings, engineered calculations, or state approvals. Anchors should be no more than a maximum of 4" from each Vertical mullion.
- 18.3 Wedge shims tightly between End Dams and jamb substrate at each end prior to installing frame panels. These shims prevent the End Dams from being dislodged while frame panels are being installed. Completely seal End Dams as shown in *Figure 66*.

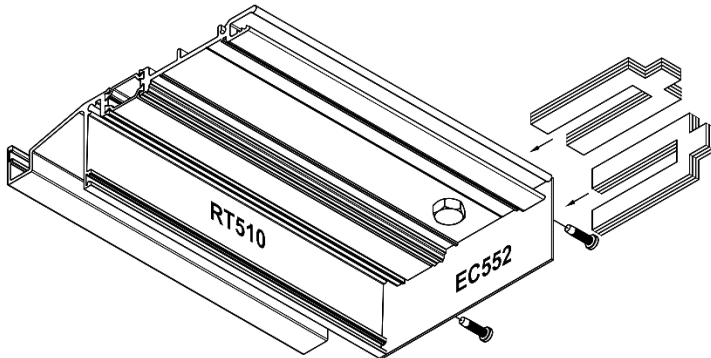


Figure 65: Head Receptor Installation

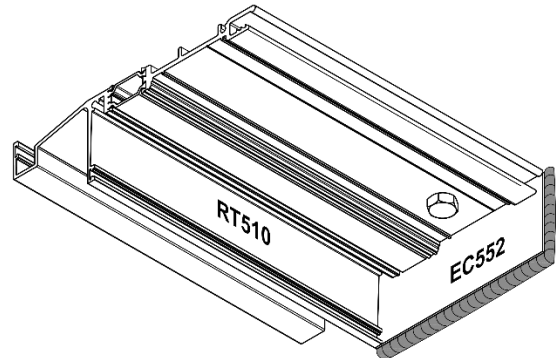


Figure 66: Head Receptor Sealing at End Dam

Head Receptor Splice Installation

- 18.4 Apply Sealant to both sides of splice location and place **SL501** Splice per *Figure 67*.
- 18.5 Once **SL501** Splice is in place, apply Sealant on edges to seal the splice.
- 18.6 Seal **RW513** Receptor Stop with silicone sheet at splice locations, as shown in *Figure 67*.

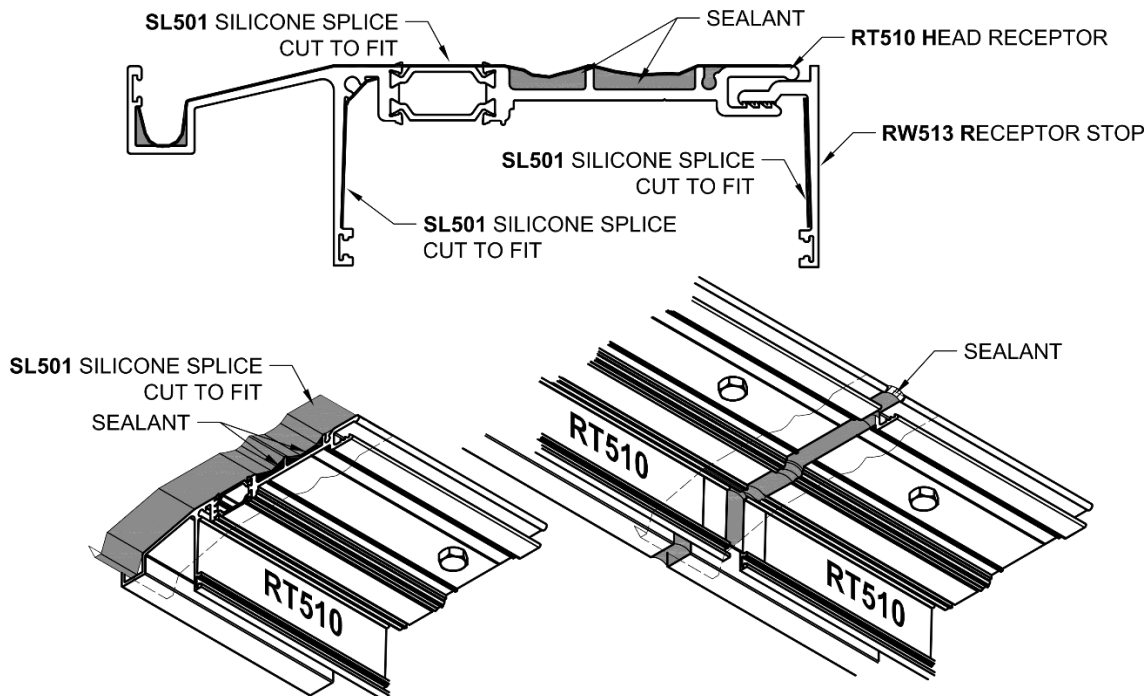


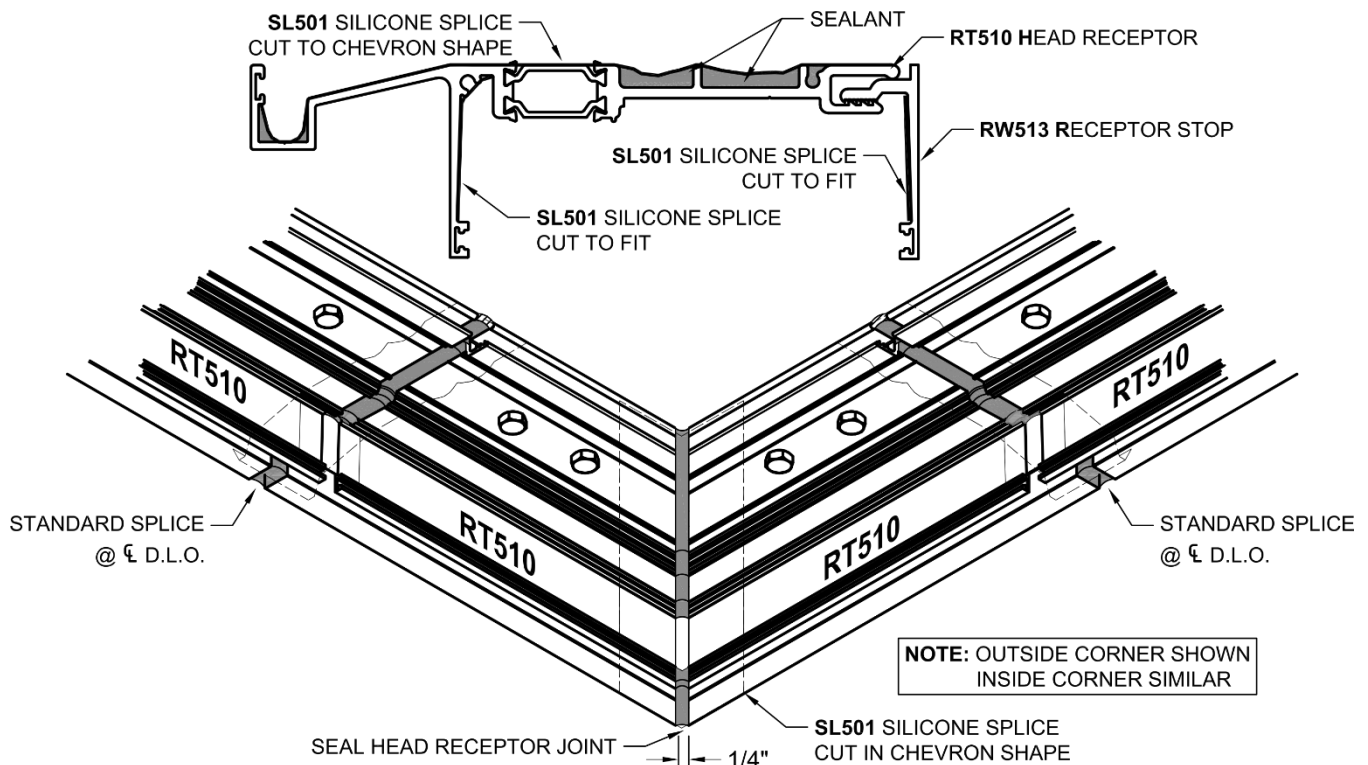
Figure 67: Head Receptor Splice Installation

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Head Receptor Corner Splice Installation

NOTE: At all corner conditions, add a standard splice at mid-D.L.O. of adjacent panels to reduce horizontal movement in Head Receptor.

- 18.7 Prepare and install the mid-D.L.O. splice per standard splice instructions.
- 18.8 Install Head Receptor with 1/4" spacing in the miter to allow for potential expansion and contraction movement. Fill this space with Sealant.
- 18.9 Cut **SL501** Splice sheet into a chevron shape for the corner, following the visual guide in Figure 68.
- 18.10 Apply Sealant to both sides of splice location and place **SL501** Splice per Figure 68.
- 18.11 Once **SL501** Splice is in place, apply Sealant on edges to seal the splice.
- 18.12 Seal **RW513** Receptor Stop with silicone sheet at splice locations, as shown in Figure 68.



**Figure 68: Head Receptor Splice Installation at Corners
(Outside Corner shown, Inside Corner similar)**

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19.0 Installation of Panels without Head Receptor

NOTES:

- Work one bay at a time, fully install each panel before moving on to the next.
- Install assembled frame panels into the opening starting at either Jamb and continue toward the opposite Jamb.
- If panels are to be pre-glazed (Captured or SSG) prior to installation, see glazing instruction in *PRE-GLAZING, Section 13.0* and *Section 15.0* (Captured) or *Section 16.0* (SSG), prior to panel installation. **SSG should be pre-glazed prior to installation for ease of glazing.**
- Field Glaze details shown. Pre-Glaze similar.

w/o Head Receptor

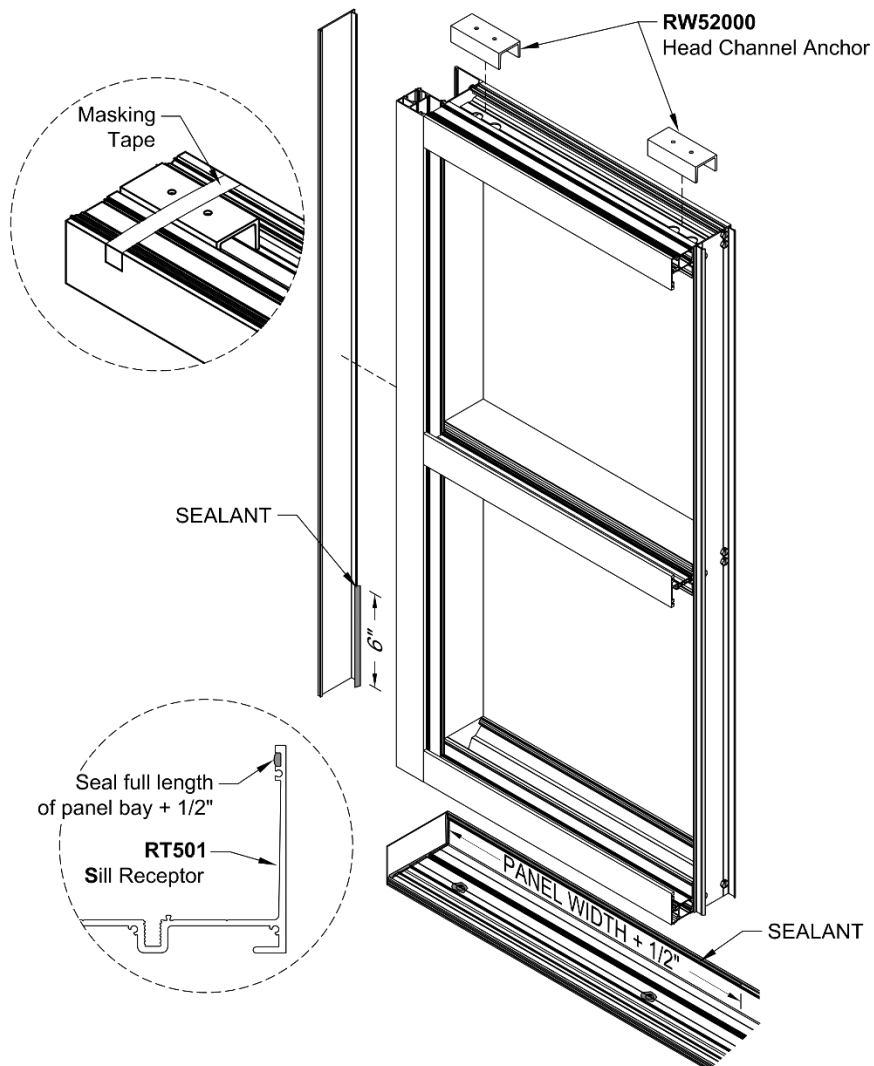


Figure 69: Panel Installation, First Panel

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- 19.1 For every panel to be installed, temporarily tape the **CW47-01** Head Channel Anchors to the Head, aligning the access holes in the anchor with the holes in the head member, as shown in *Figure 69*.
- 19.2 For the panels with a Filler at the jamb, apply 6" of Sealant at the bottom interior leg of the Filler and snap the Filler into the Vertical.
- 19.3 Just prior to placing the first panel, apply Sealant the full width of the panel bay plus 1/2" in the top of the Sill Receptor. Reference *Figure 69* for location.
- 19.4 Raise panel into place, removing tape at Anchor Channel just prior to final position.
- 19.5 Ensure that the frame panel is pushed tight against the upright leg of the Sill Receptor and remove excess Sealant once panel is installed.
- 19.6 Verify that the Sill has snapped into the Sill Receptor. If not, gentle pressure can be added to assist the engagement. *Figure 70* is an optional technique to connect the Sill to the Sill Receptor. Use care when applying pressure so as not to deform or break the Sill. Clean excess Sealant from the Sill Receptor.
- 19.7 Remove any debris from the Sill and secure the panel to the Sill Receptor with **ST22000** fasteners, *Figure 71*. Do not cap seal the **ST22000** fasteners.
- 19.8 Match drill holes at Head anchor points into substrate. Shim and anchor as required. It is not necessary to cap seal fasteners. Reference, *Figure 71*.
NOTE: If the top perimeter joint is larger than 1/2", shim between the channel anchor to ensure proper engagement of the anchor into the Head.

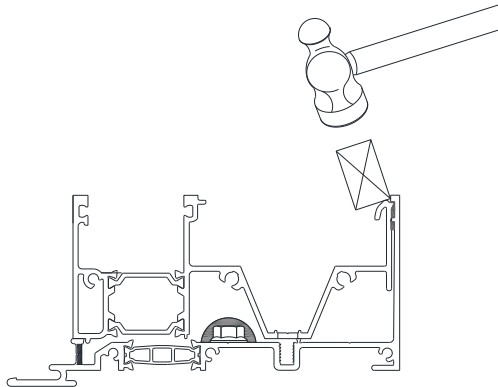


Figure 70: Optional Method to Snap Sill to Sill Receptor

- 19.9 Prepare previous panel for incoming panel with Sealant:
Field Glazed:
 - 19.9.1 Apply 6" of Silicone Sealant vertically to very bottom of interior snap engagement of the previously installed panel.
 - 19.9.2 Apply sealant to the ends of all horizontal members on the mullion filler side of the assembly.
 - 19.9.3 Reference *Figure 71* for all sealant locations.
Pre-Glazed:
 - 19.9.4 Apply 6" of Silicone Sealant to very bottom of interior vertical gasket of the male mullion. This may be the panel being installed or it may be the previous panel.
 - 19.9.5 Reference *Figure 71* for all sealant locations.
- 19.10 When installing a panel across a Sill Receptor splice, add **Bond Breaker Tape** to the back of the Sill where the Sill meets the Sill Receptor splice.
- 19.11 Just prior to placing the next panel, apply Sealant the full width of the panel bay plus 1/2" in the top of the Sill Receptor. Reference *Figure 71* for location.

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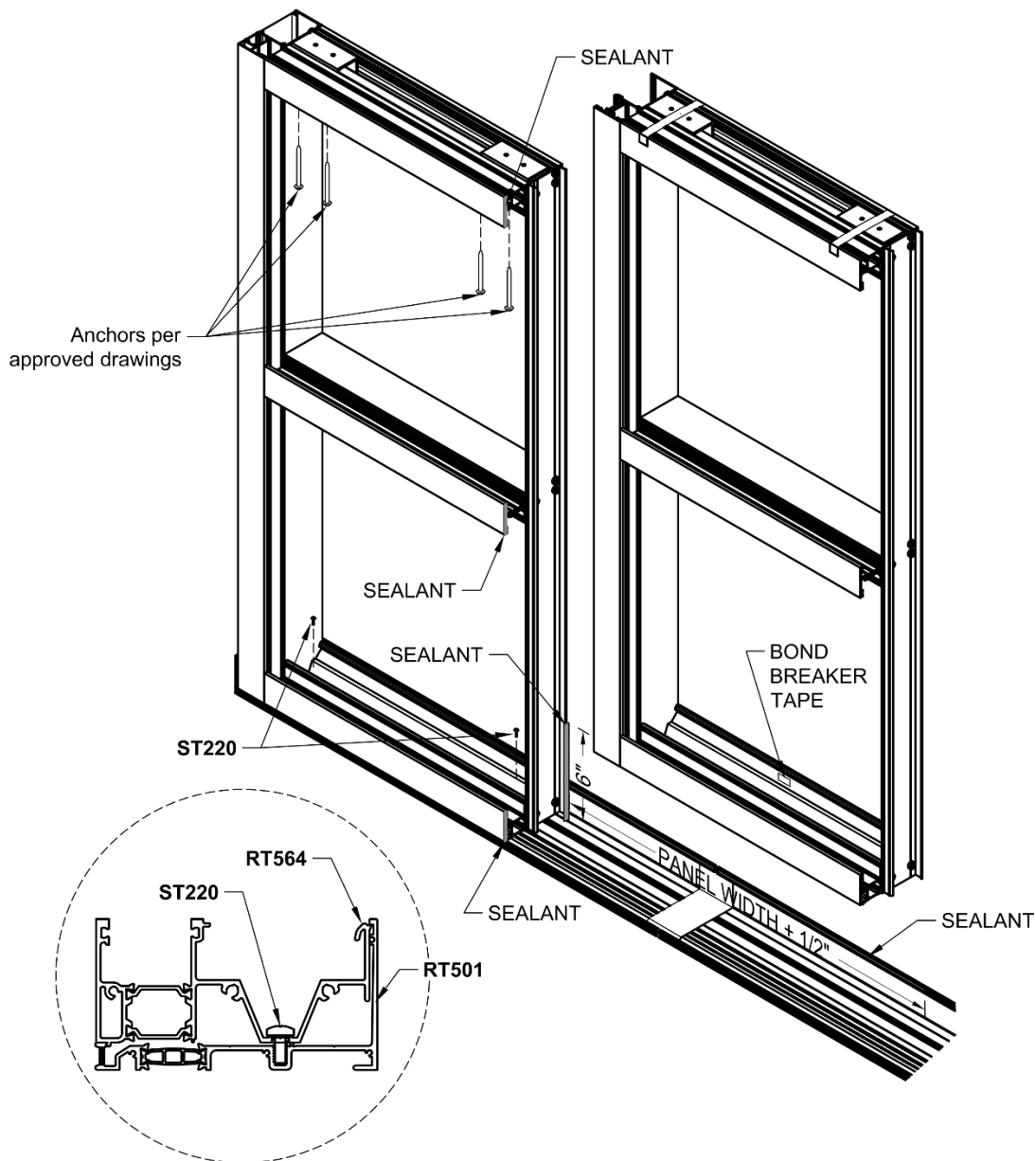


Figure 71: Panel Installation, Additional Panels

19.12 Raise panel into place:

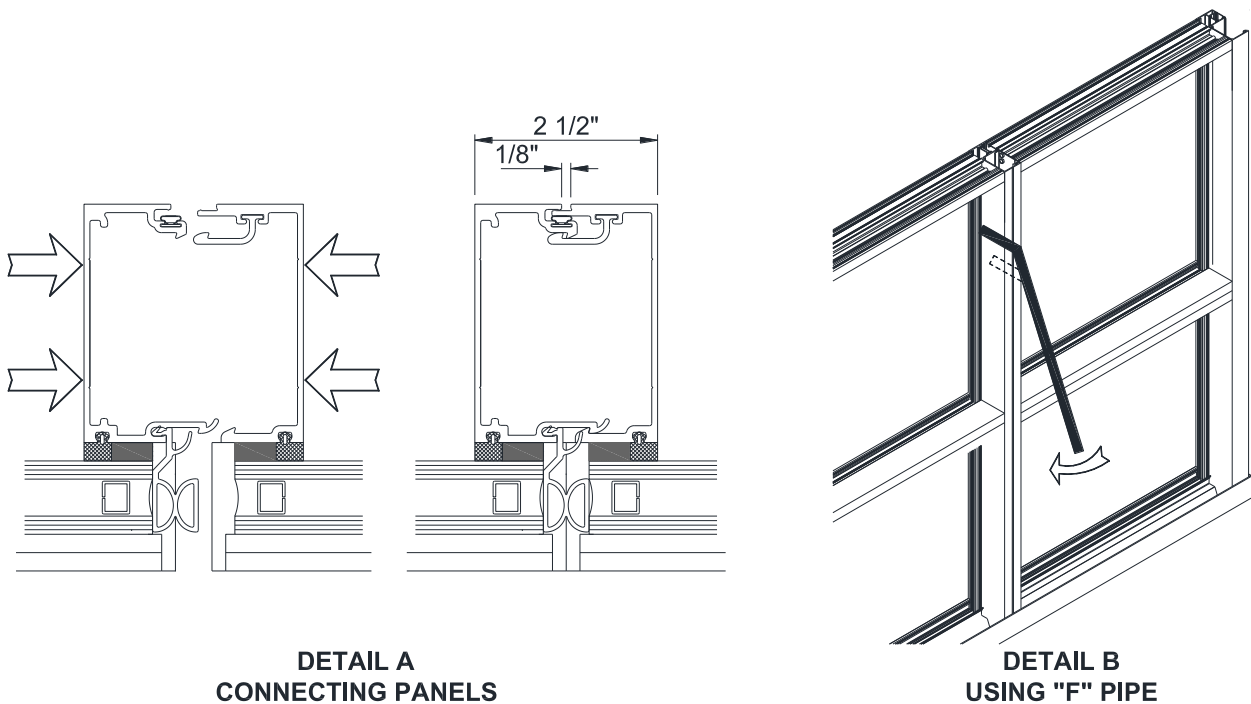
Field Glazed:

- 19.12.1 Remove tape at Anchor Channel just prior to final position.
- 19.12.2 Slide panel into place, snapping the two panels together.

Pre-Glazed:

- 19.12.3 Place the vertical male mullion half into the vertical female mullion half. Engage the units together, as shown in *Figure 72, Detail A*, until 1/8" of gap or less is in the interior reveal.
- 19.12.4 Clamps or a large "F" shaped pipe assembly, *Figure 72, Detail B*, are recommended to snap the mullions together, being careful not to mar the finish.
- 19.12.5 Reference *Figure 72* for Pre-Glazed panel install details.

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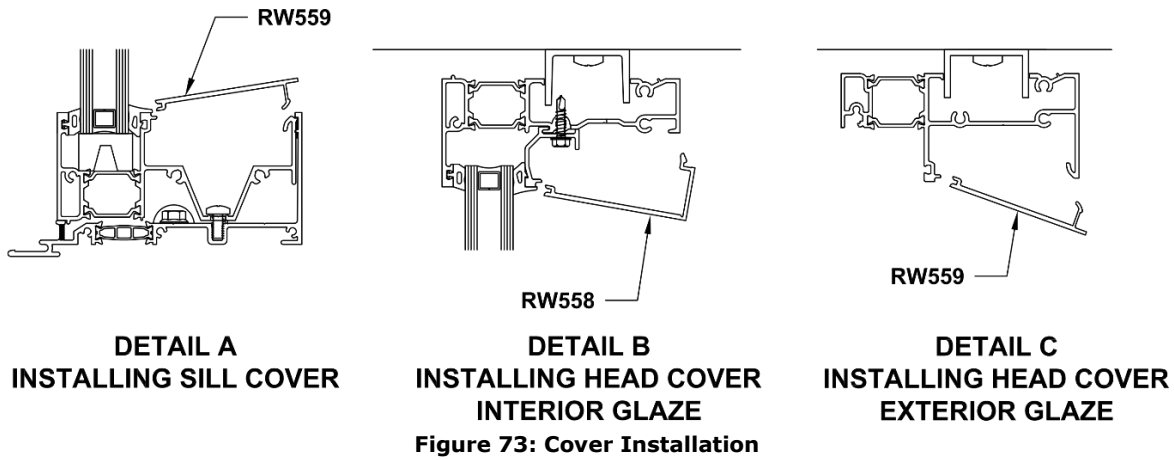
**DETAIL A
CONNECTING PANELS**

**DETAIL B
USING "F" PIPE**

Figure 72: Panel Installation, Connecting Pre-Glazed Panels

- 19.13 Verify that the Sill has snapped into the Sill Receptor. If not, gentle pressure can be added to assist the engagement. *Figure 70* is an optional technique to connect the Sill to the Sill Receptor. Use care when applying pressure so as not to deform or break the Sill. Clean excess Sealant from the Sill Receptor.
- 19.14 Check Vertical Mullions for plumb.
- 19.15 Remove any debris from the Sill and secure the panel to the Sill Receptor with **ST22000** fasteners, *Figure 71*. Do not cap seal fasteners.
- 19.16 Match drill holes at Head anchor points into substrate. Shim and anchor as required. It is not necessary to cap seal fasteners. Reference, *Figure 71*.
- 19.17 **NOTE:** If the top perimeter joint is larger than 1/2", shim between the channel anchor to ensure proper engagement of the anchor into the Head.
- 19.18 To prevent dimensional buildup, check diagonal dimensions every (4) bays to ensure spacing and frame squareness.
- 19.19 After all individual units are secured, complete the exterior and interior perimeter seal with a continuous bead of sealant across the Head and Sill and at each Jamb.
- 19.20 Install covers:
 - Field Glazed:
 - 19.20.1 It is OPTIONAL to install the Sill Cover before glazing. To install the Sill Cover, snap **RW559** Sill Cover into place at Sill, *Figure 73, Detail A*.
 - 19.20.2 **DO NOT** install Head Cover.
 - Pre-Glazed:
 - 19.20.3 Snap **RW559** Sill Cover into place at Sill *Figure 73, Detail A*.
 - 19.20.4 If Interior Glazing, install **RW558** Head Cover, *Figure 78, Detail B*.
 - 19.20.5 If Exterior Glazing, install **RW559** Head Cover, *Figure 78, Detail C*.

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20.0 Installation of Panels with Head Receptor

NOTES:

- Work one bay at a time, fully installing each panel before moving on to the next.
- Install assembled frame panels into the opening starting at either Jamb and continue toward the opposite Jamb.
- If panels are to be pre-glazed (Captured or SSG) prior to installation, see glazing instruction in *PRE-GLAZING, Section 13.0* and *Section 15.0* (Captured) or *Section 16.0* (SSG), prior to panel installation. **SSG should be pre-glazed prior to installation for ease of glazing.**
- Field Glaze details shown. Pre-Glaze similar.

- 20.1 For every panel to be installed, temporarily tape the **RW51900** Head Channel Anchors to the Head, aligning the access holes in the anchor with the holes in the head member, as shown in *Figure 74*.
- 20.2 For the panels with a Filler at the jamb, apply 6" of Sealant at the bottom interior leg of the Filler and snap the Filler into the Vertical.
- 20.3 Just prior to placing the first panel, apply Sealant the full width of the panel bay plus 1/2" in the top of the Sill Receptor. Reference *Figure 74* for location.
- 20.4 Raise panel into place, removing tape at Anchor Channel just prior to final position.
- 20.5 Ensure that the frame panel is pushed tight against the upright leg of the Sill Receptor and remove excess Sealant once panel is installed.
- 20.6 Verify that the Sill has snapped into the Sill Receptor. If not, gentle pressure can be added to assist the engagement. *Figure 75* is an optional technique to connect the Sill to the Sill Receptor. Use care when applying pressure so as not to deform or break the Sill. Clean excess Sealant from the Sill Receptor.

Head Receptor

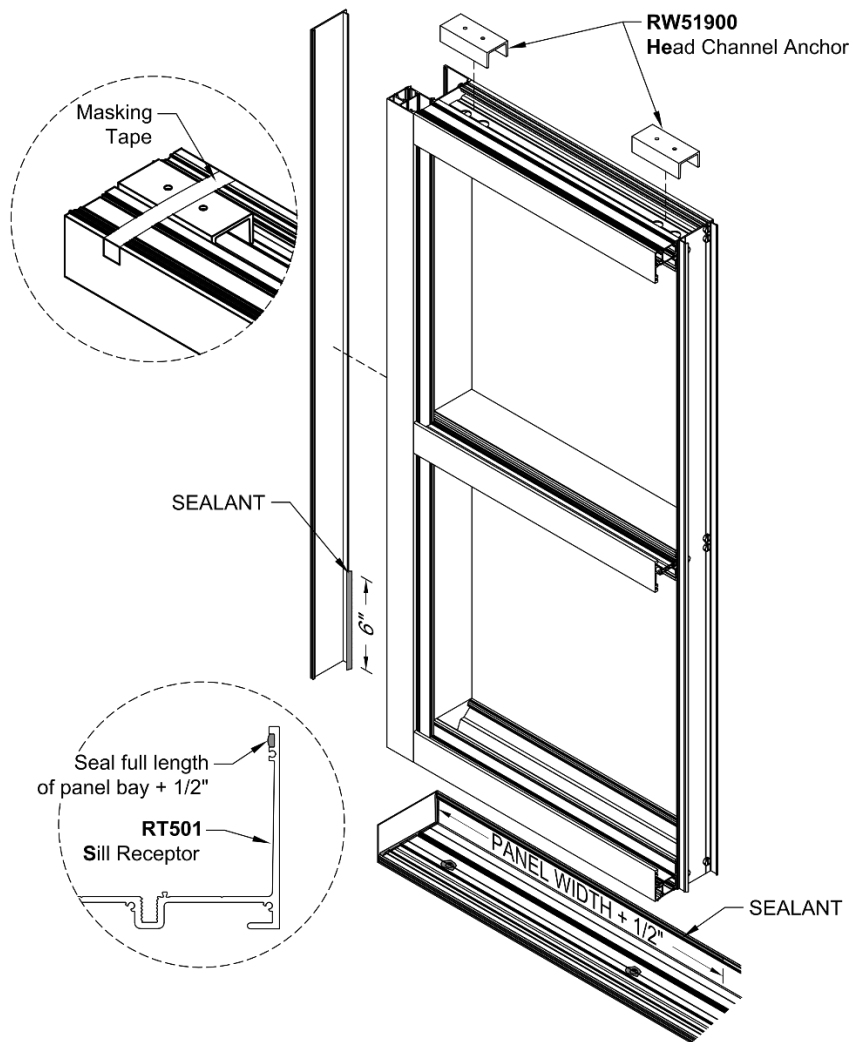


Figure 74: Panel Installation, First Panel

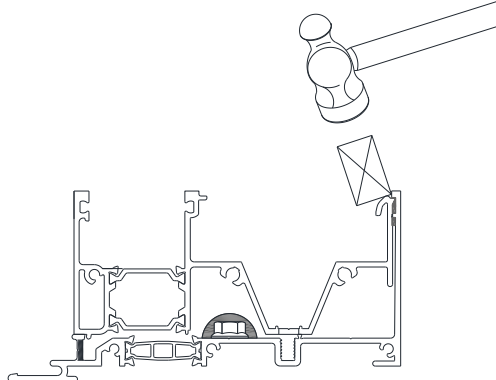


Figure 75: Optional Method to Snap Sill to Sill Receptor

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- 20.7 Remove any debris from the Sill and secure the panel to the Sill Receptor with **ST22000** fasteners, *Figure 76*. Do not cap seal fasteners.
- 20.8 Match drill holes at Head anchor points into Head Receptor and attach panel with **MS17842** fasteners or approved Anchors. It is not necessary to cap seal fasteners. Reference, *Figure 76*.

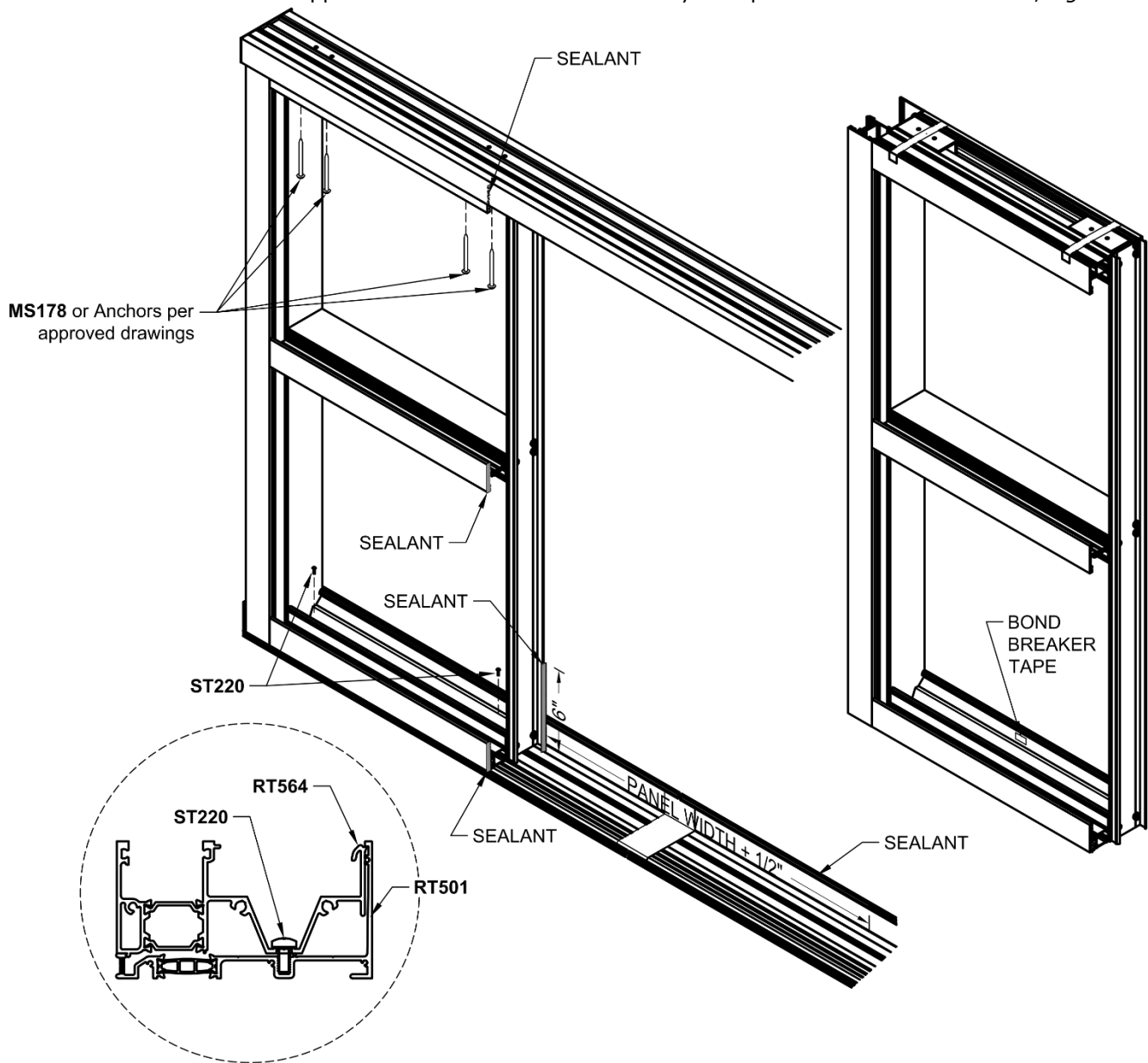


Figure 76: Panel Installation, Additional Panels

- 20.9 Prepare previous panel for incoming panel with sealant:
Field Glazed:
- 20.9.1 Apply 6" of Silicone Sealant vertically to very bottom of interior snap engagement of the previously installed panel.
- 20.9.2 Apply sealant to the ends of all horizontal members on the mullion filler side of the assembly.
- 20.9.3 Reference *Figure 76* for all sealant locations.

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Pre-Glazed:

20.9.4 Apply 6" of Silicone Sealant to very bottom of interior vertical gasket of the male mullion. This may be the panel being installed or it may be the previous panel.

20.9.5 Reference *Figure 76* for all sealant locations.

20.10 When installing a panel across a Sill Receptor splice, add **Bond Breaker Tape** to the back of the Sill where the Sill meets the Sill Receptor splice.

20.11 Just prior to placing the next panel, apply Sealant the full width of the panel bay plus 1/2" in the top of the Sill Receptor. Reference *Figure 76* for location.

20.12 Raise panel into place:

Field Glazed:

20.12.1 Remove tape at Anchor Channel just prior to final position.

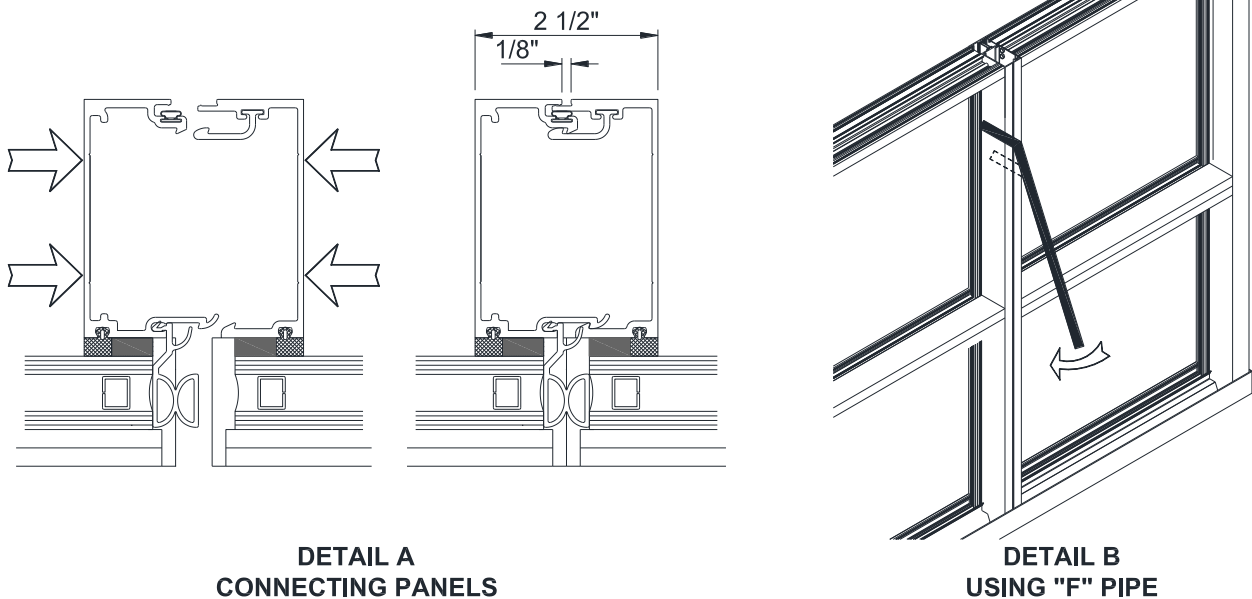
20.12.2 Slide panel into place, snapping the two panels together.

Pre-Glazed:

20.12.3 Place the vertical male mullion half into the vertical female mullion half. Engage the units together, as shown in *Figure 77, Detail A*, until 1/8" of gap or less is in the interior reveal.

20.12.4 Clamps or a large "F" shaped pipe assembly, *Figure 77, Detail B*, are recommended to get the mullions together, being careful not to mar the finish.

20.12.5 Reference *Figure 77* for Pre-Glazed panel install details.



20.13 Verify that the Sill has snapped into the Sill Receptor. If not, gentle pressure can be added to assist the engagement. *Figure 75* is an optional technique to connect the Sill to the Sill Receptor. Use care when applying pressure so as not to deform or break the Sill. Clean excess Sealant from the Sill Receptor.

20.14 Check Vertical Mullions for plumb.

20.15 Remove any debris from the Sill and secure the panel to the Sill Receptor with **ST22000** fasteners, *Figure 76*. Do not cap seal fasteners.

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- 20.16 Match drill holes at Head anchor points into Head Receptor. It is not necessary to cap seal fasteners. Reference, *Figure 76*.
- 20.17 To prevent dimensional buildup, check diagonal dimensions every (4) bays to ensure spacing and frame squareness.
- 20.18 After all individual units are secured, complete the exterior and interior perimeter seal with a continuous bead of sealant across the Head and Sill and at each Jamb.

20.19 Install covers:

Field Glazed:

- 20.19.1 It is OPTIONAL to install the Sill Cover before glazing. To install the Sill Cover, snap **RW559** Sill Cover into place at Sill, *Figure 78, Detail A*.
- 20.19.2 **DO NOT** install Head Cover.

Pre-Glazed:

- 20.19.3 Snap **RW559** Sill Cover into place at Sill, *Figure 78, Detail A*.
- 20.19.4 If Interior Glazing, install **RW558** Head Cover, *Figure 78, Detail B*.
- 20.19.5 If Exterior Glazing, install **RW559** Head Cover, *Figure 78, Detail C*.

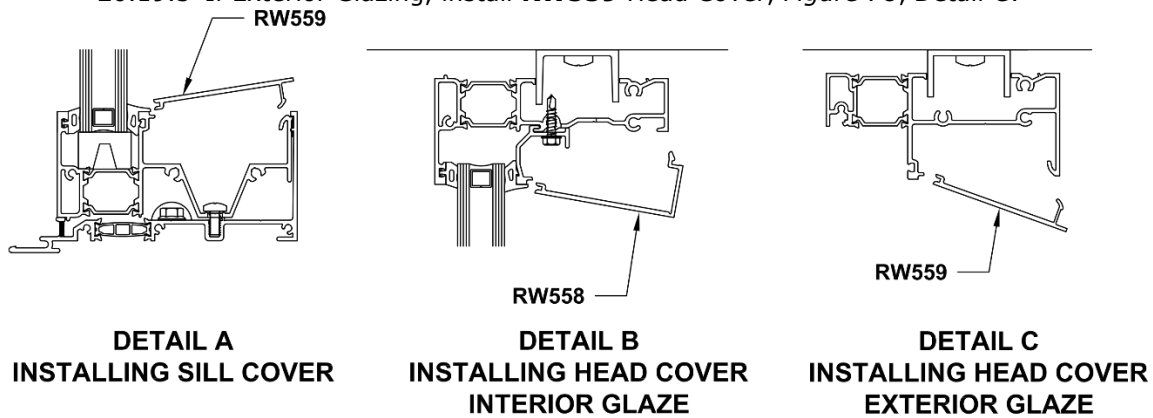


Figure 78: Cover Installation

21.0 Corner Condition

- 21.1 Install corner panels in the same manner as standard panels. If the unit will be installed without a Head Receptor, reference the steps in *Section 19.0*. If the unit will be installed with a Head Receptor, reference the steps in *Section 20.0*.
- 21.2 For 90° corners, reference *Figure 79* for connection detail and fastener information.
NOTE: Weep Hole should be located at the bottom of the glazing pocket.
- 21.3 For 135° corners, reference *Figure 80* for connection detail and fastener information.
NOTE: Weep Hole should be located at the bottom of the glazing pocket.

22.0 Perimeter Seal

Install Backer Rod and Sealant around the perimeter if not already complete.

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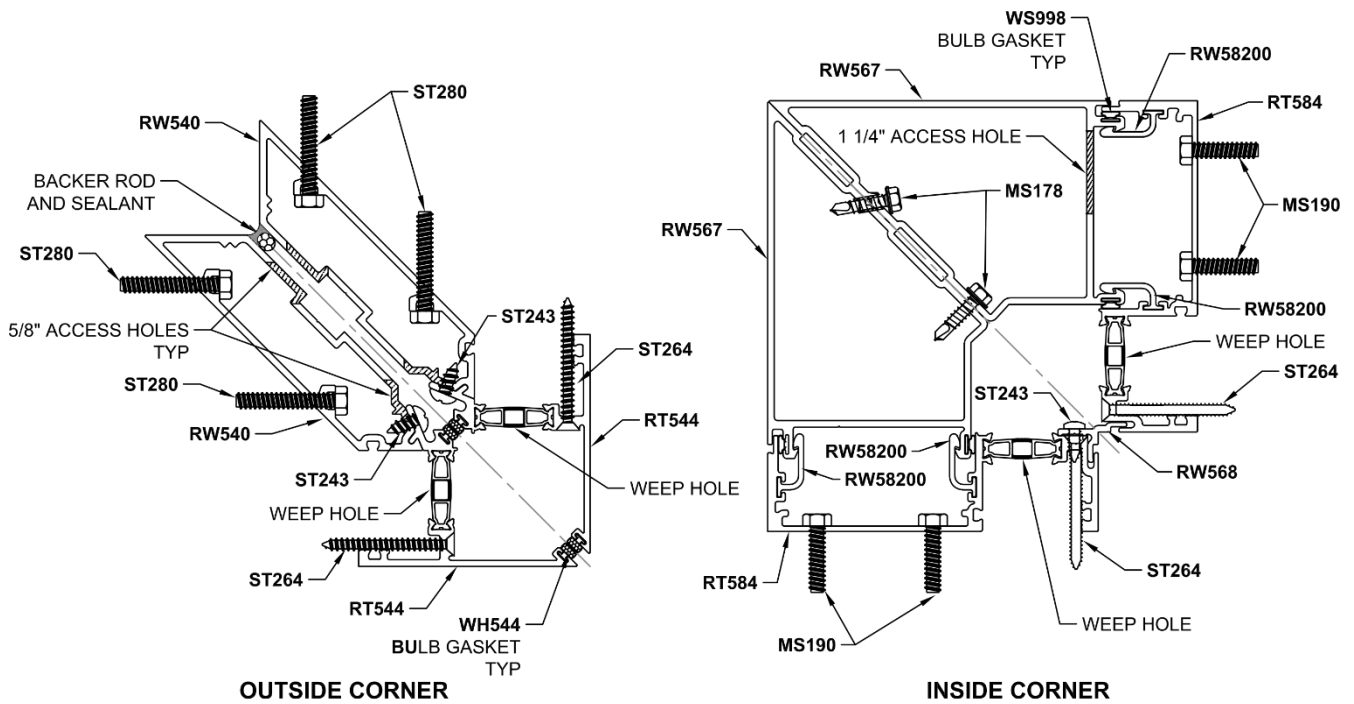


Figure 79: 90° Corners

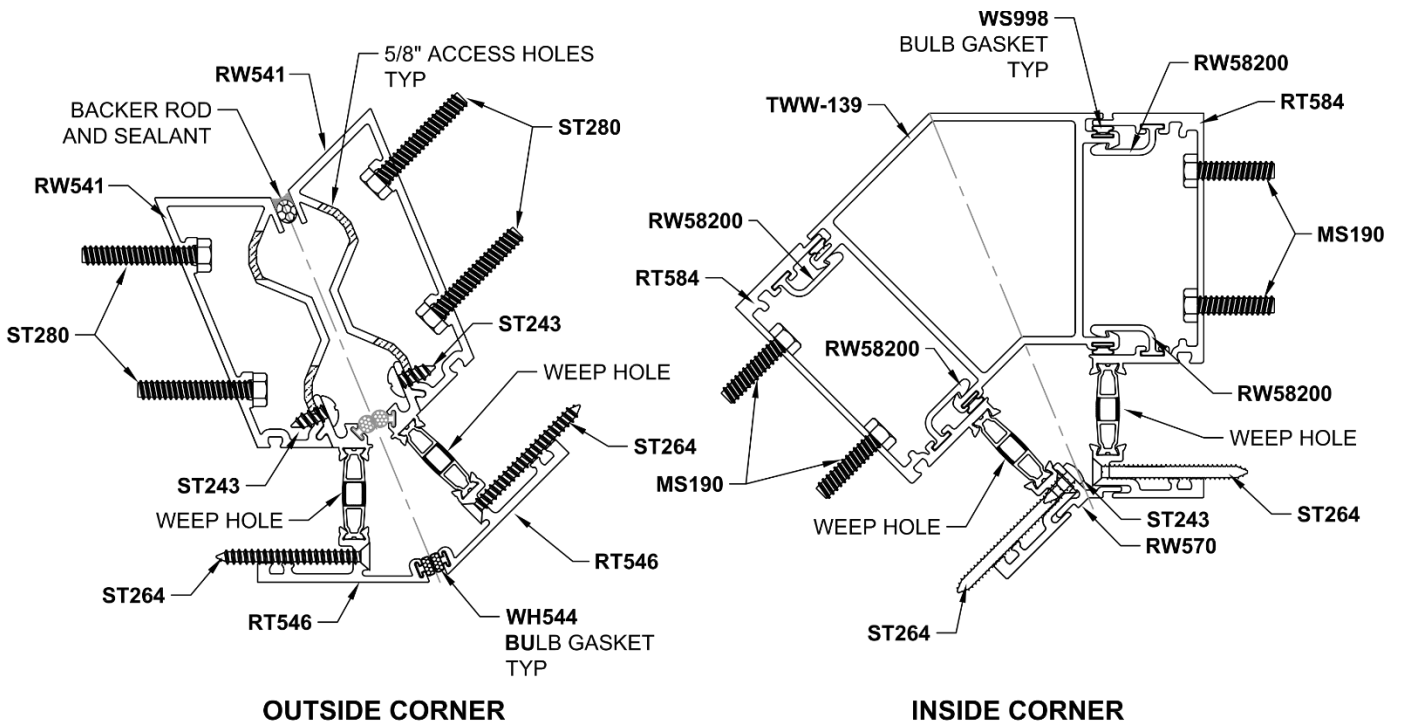


Figure 80: 135° Corners

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FIELD GLAZING

NOTE: Verify glass sizing per *Section 1.0 Glass Size*.

23.0 Preparation of Frame Opening for Glass

- 23.1 Prepare the frame opening by removing all dirt and debris from the glazing pockets and gasket reglets.

24.0 Install Setting Blocks

- 24.1 Install Setting Blocks at Sill and Horizontal per shop drawings; depending on the glass size, Setting Blocks will be located at either 1/4 points or 1/8 points.
- 24.2 *Figure 38* shows setting block installation at Sill and Horizontal.
- 24.3 Adhere setting blocks and setting block chairs to the extrusion assemblies with a small amount of sealant to keep them in place.
- 24.4 Add **WB502** Side Blocks into the shallow pocket of the assembled panel, using a small amount of Sealant to hold the Side Block in place.

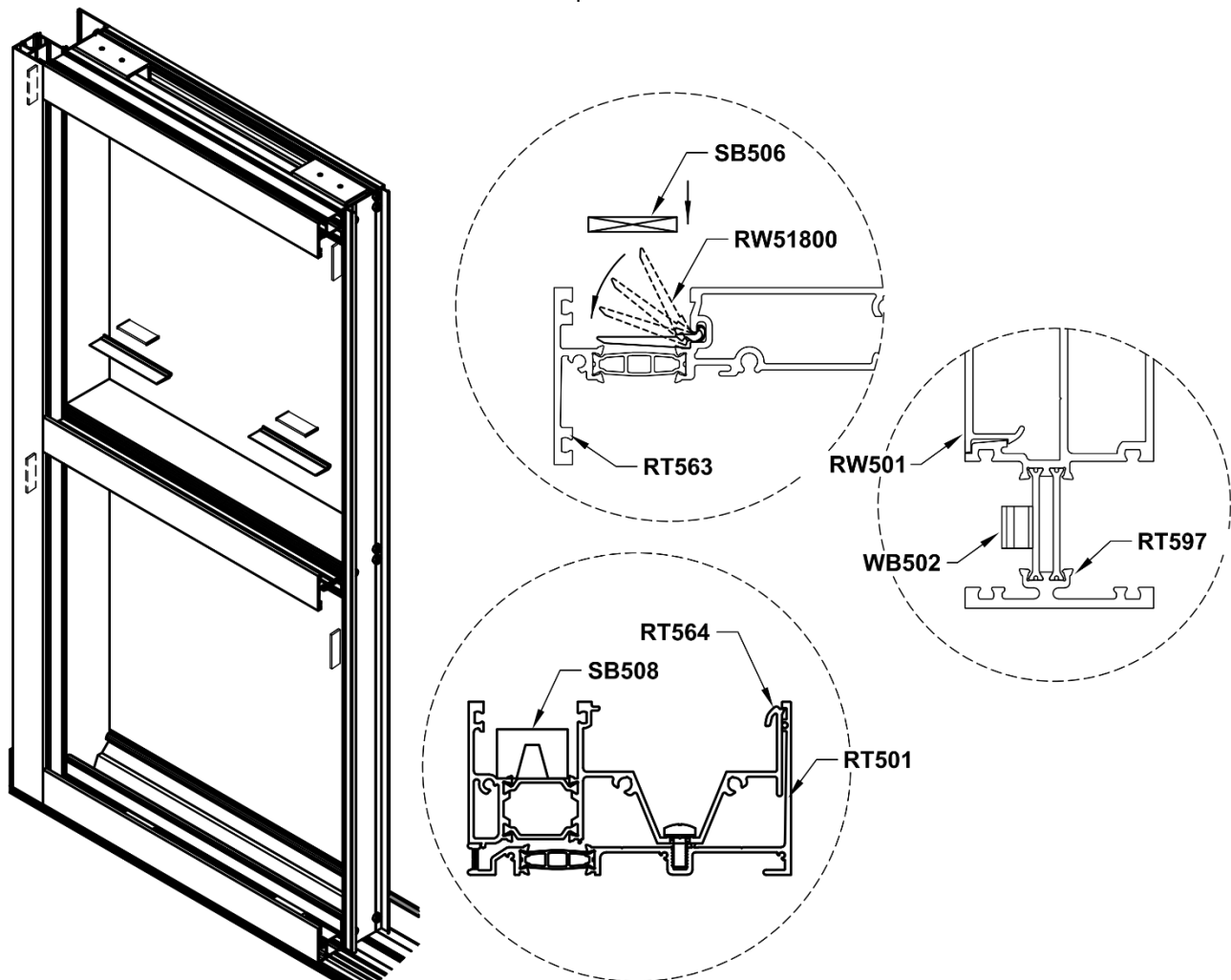


Figure 81: Setting Block Installation

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24.5 A Note for Deflection

- 24.5.1 If the 1/4 point location causes excessive deflection of the intermediate horizontal, move the setting blocks equally towards the corners of the lite as far as the 1/8 points. The outer end of the block **CANNOT** be closer than 6" to the corner of the glass.
- 24.5.2 The intermediate horizontal must not exceed 1/8" and a door header is limited to 1/16". Check deadload charts for proper setting block locations.

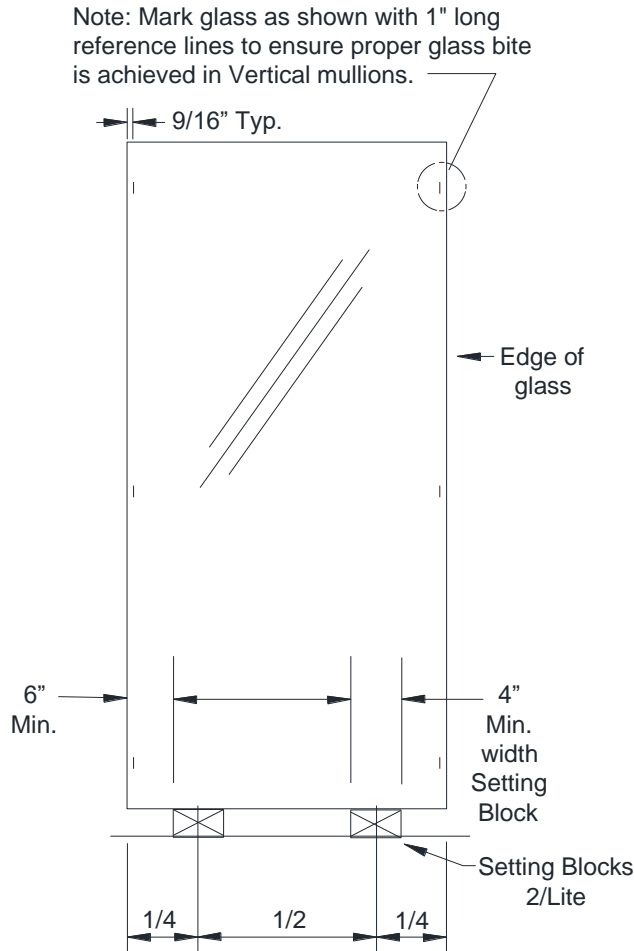


Figure 82: Glass Marking and Setting Block Locations

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25.0 Installing Water Diverters and Joint Plugs

25.1 At Standard Mullions and Jambs, install Water Diverters. Place a bed of sealant on the end of the Horizontal and place the Water Diverter. *Figure 83* shows the various views for the Water Diverter installation. Embed the Water Diverter in Sealant and seal around the Horizontal to guide water flow.

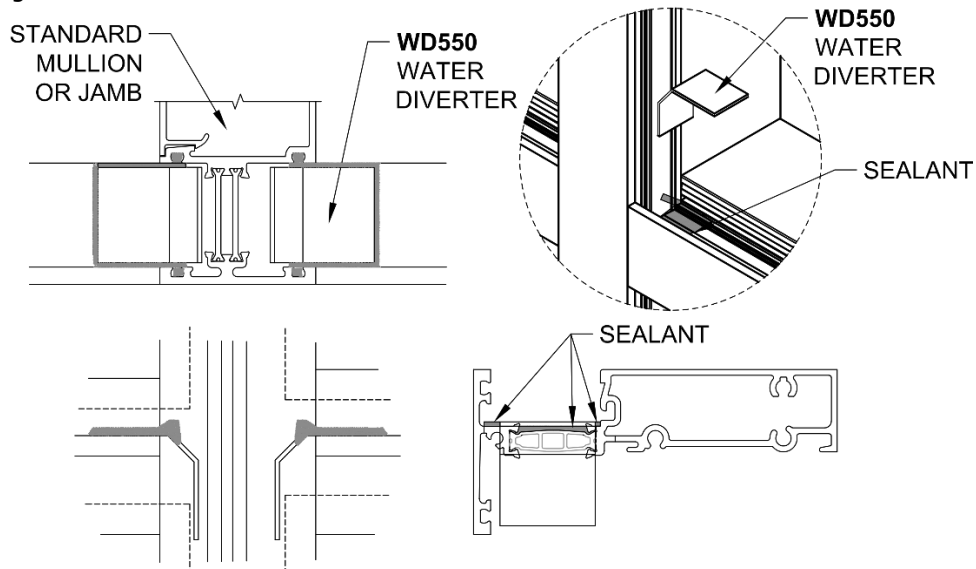


Figure 83: Water Diverter Installation

25.2 At Split Mullions, install Joint Plugs. Apply Sealant to one end of **SP550** Joint Plug and position at the end of the Horizontal. Rotate as needed for the deep and shallow pockets. Thoroughly coat the Joint Plug on all sides in contact with the Mullion. Insert into the glazing pocket flush with the top of the Horizontal. Be sure to keep the weep hole free of Sealant to ensure drainage. Reference *Figure 84*.

25.3 Seal the small opening at the front of the Vertical to dam the area completely, as shown in *Figure 84*.

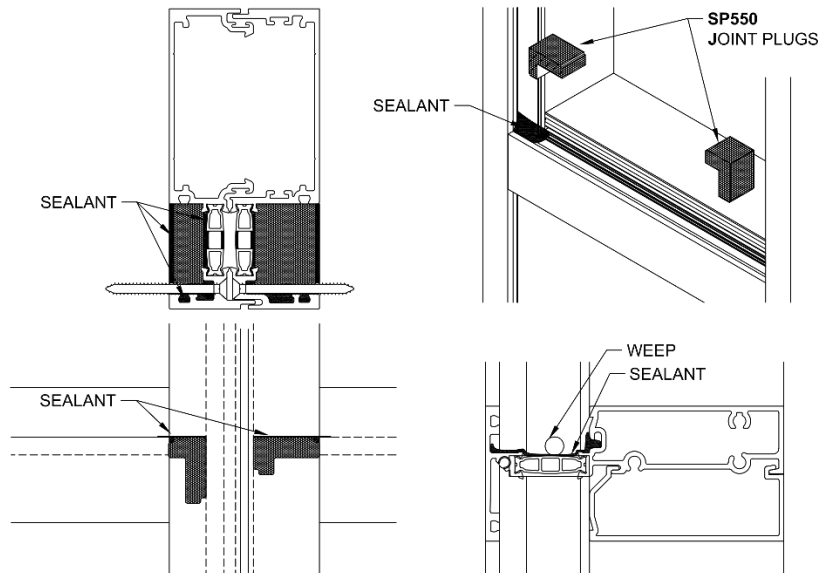


Figure 84: Joint Plug Installation and Sealing

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26.0 Install Covers

26.1 Snap covers into place:

Interior Glazed:

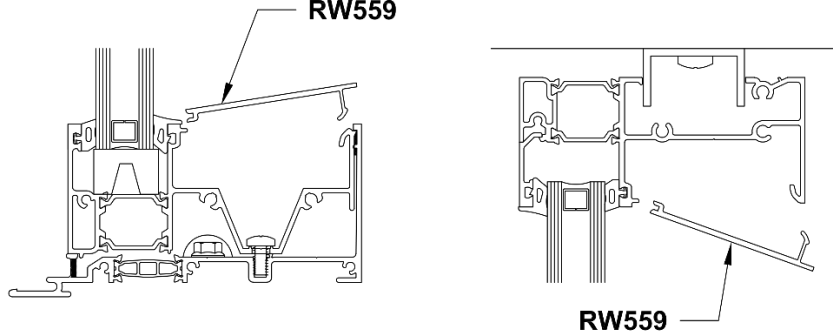
26.1.1 At the Sill, snap **RW559** Sill Cover into place, *Figure 85, Detail A*.

26.1.2 At the Head, there is no cover. A full-depth Glass Stop will be installed later.

Exterior Glazed:

26.1.3 At the Sill, snap **RW559** Sill Cover into place, *Figure 85, Detail A*.

26.1.4 At the Head, snap **RW558** Head Cover into place, *Figure 85, Detail B*.



DETAIL A
INSTALLING SILL COVER

DETAIL B
INSTALLING HEAD COVER

Figure 85: Cover Installation

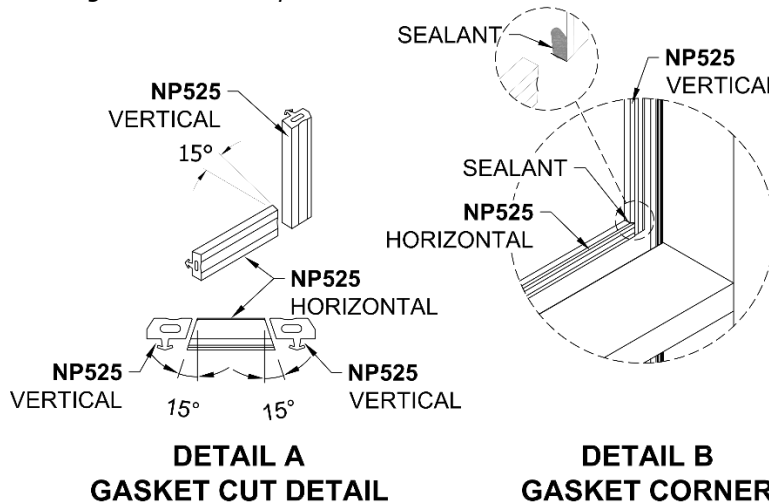
27.0 Prepare and Install Fixed Gasket

NOTE: System may be glazed in any order. For ease of installation, US Aluminum ® recommends glazing from bottom up.

27.1 Remove Gaskets from rolls and allow to relax in a protected location overnight.

27.2 Cut Fixed Gasket per material cut list on *Page 10*, miter the ends on the horizontals at a 15° angle, as shown in *Figure 86, Detail A*, to assure a proper seal.

Note: When installed, vertical Gasket runs through while horizontal Gasket butts into vertical Gasket. See *Figure 86* for a representation of the Gasket corner.



DETAIL A
GASKET CUT DETAIL

DETAIL B
GASKET CORNER

Figure 86: Fixed Gasket Installation (Interior Glazing Shown, Exterior Glazing Similar)

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27.3 Remove all debris from glazing pockets to prevent blockage of weeps/drains.

27.4 Insert **NP525** Fixed Gasket

NOTE: Vertical Gasket runs through while horizontal Gasket butts into vertical Gasket.

Interior Glazed:

27.4.1 At the exterior reglet, insert Fixed Gasket around the perimeter, verticals first and the horizontals second. Verticals run-through at corners. Start Gasket first in the corners and then at the middle of the glass opening and work back out toward the corners.

Exterior Glazed:

27.4.2 At the interior reglet, insert Fixed Gasket around the perimeter, verticals first and the horizontals second. Verticals run-through at corners. Start Gasket first in the corners and then at the middle of the glass opening and work back out toward the corners.

27.5 Pull back the horizontal gasket at the corners and apply Sealant to the connection between the horizontal and vertical gaskets. Reference *Figure 86, Detail B*, for a visual. Clean any squeeze out immediately.

28.0 Setting Glass

28.1 Center glass into opening making sure proper glass penetration is achieved with a 7/16" glass bite on each side. Rest glass on Setting Blocks and press against **NP525** Fixed Gasket.

28.2 Insert **WB504** W-Block into the deep pocket.

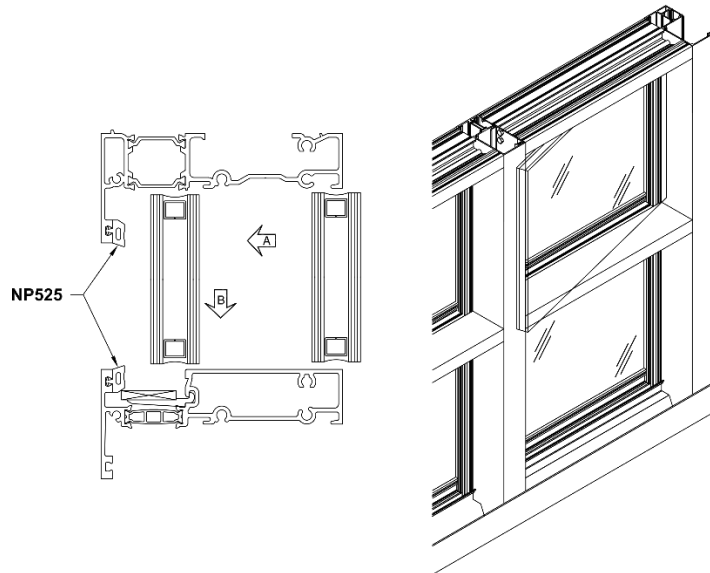


Figure 87: Glass Installation (Interior Glaze Shown)

29.0 Install Glass Stops

29.1 Clean the Vertical where the exterior face of the Head and Intermediate Horizontal glass stops will connect. Reference *Figure 88* for location.

29.2 Just prior to installing Glass Stop, apply Sealant to the Vertical where it connects to the Glass Stop, as detailed in *Figure 88*.

29.3 Install Glass Stops

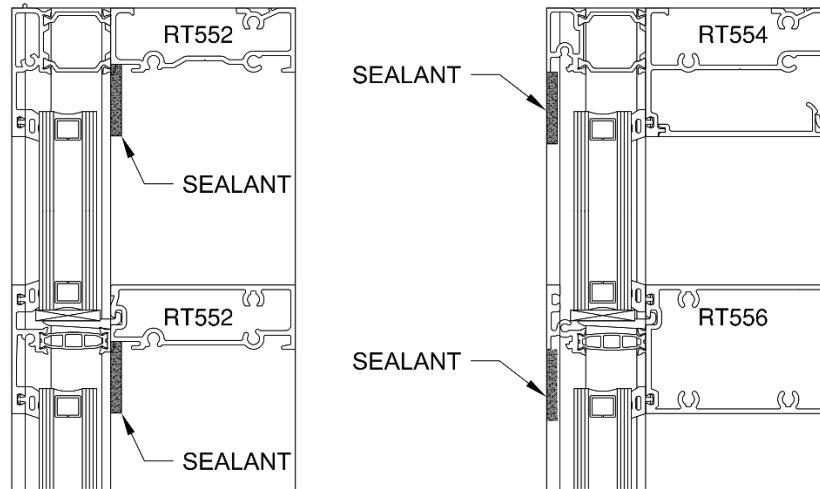
Interior Glazed:

29.3.1 At Head and Intermediate Horizontals, install **RW553** Glass Stop. Lift the Glass Stop into position and hook the legs into the Head. Pull the Glass Stop toward the interior of the unit to secure the Glass Stop. Reference *Figure 89, Detail A*.

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Exterior Glazed:

29.3.2 At Head and Intermediate Horizontals, install **RW563** Glass Stop. Tilt and roll the Glass Stop into place. Reference *Figure 89, Detail B*.

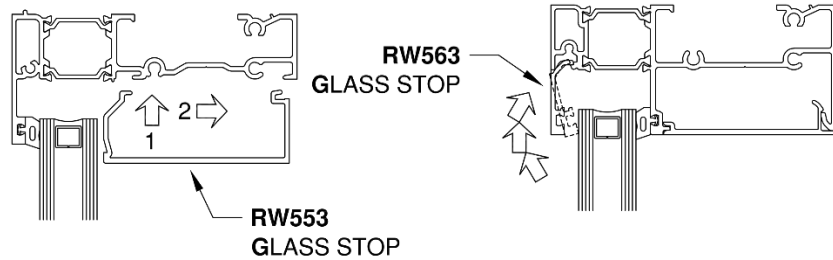


DETAIL A
INTERIOR GLAZE

DETAIL B
EXTERIOR GLAZE

Figure 88: Sealant Application at Glass Stops

29.4 Tool the Sealant into the corners between the Glass Stop and the Vertical to ensure a watertight seal. Clean excess Sealant immediately.



DETAIL A
INTERIOR GLAZE

DETAIL B
EXTERIOR GLAZE

Figure 89: RW553 Glass Stop Installation

30.0 Prepare and Install Wedge Gasket

30.1 Verify the vertical Wedge Gasket is cut a minimum of 1/8" per foot plus 1" longer than the D.L.O. to provide adequate compression. Notch both ends of the gasket as shown in *Figure 90, Detail A*.

30.2 Verify the horizontal Wedge Gasket is cut a minimum of 1/8" per foot longer than the D.L.O. to provide adequate compression.

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30.3 Insert Wedge Gasket

NOTE: Vertical Gasket runs through while horizontal Gasket butts into vertical Gasket.

Interior Glazed:

30.3.1 At the interior reglet, insert **NP506** Wedge Gasket around the perimeter, verticals first and the horizontals second. Verticals run-through at corners. Start Gasket first in the corners and then at the middle of the glass opening and work back out toward the corners. Reference *Figure 90, Detail B*.

Exterior Glazed:

30.3.2 At the exterior reglet, insert **NP556** Wedge Gasket around the perimeter, verticals first and the horizontals second. Verticals run-through at corners. Start Gasket first in the corners and then at the middle of the glass opening and work back out toward the corners. Reference *Figure 90, Detail B*.

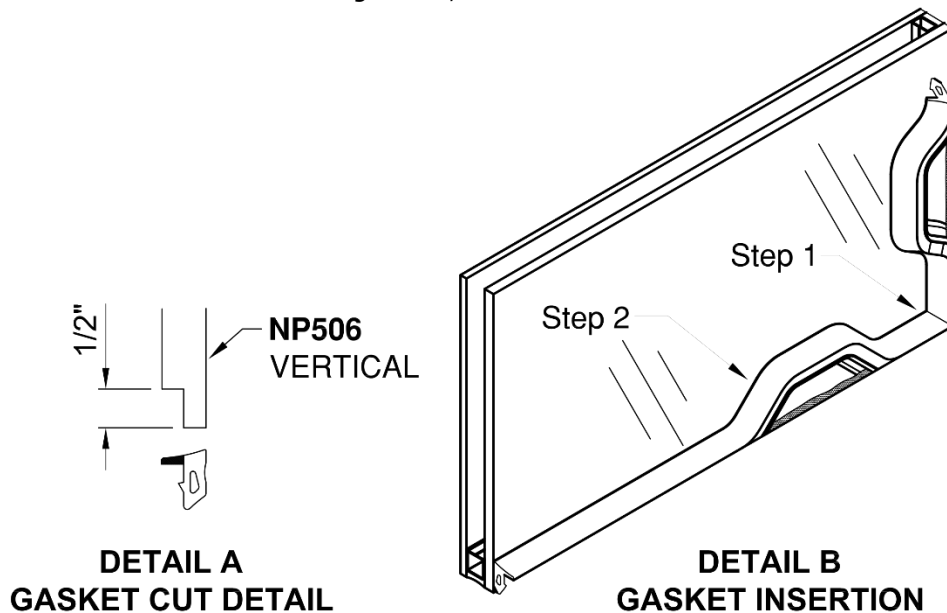


Figure 90: Wedge Gasket Notching and Installation

30.3.3 At each corner, pull back the Horizontal Wedge Gasket and apply Sealant to the end of the Gasket. Re-insert into the glazing pocket against the Vertical Wedge Gasket, working any slack in towards the center. Tool the excess sealant immediately.

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SLAB EDGE CONDITION

31.0 Installation of Slab Edge Cover

- 31.1 If not pre-installed, slide **WS998** Bulb Gasket into **RT510** Slab Edge Head Receptor.
- 31.2 Insert **UB500** Foam Baffle over Slab Edge Head Receptor's weep holes and cover with **RC100** Baffle Retainer.
- 31.3 Add **WH544** Bulb Gaskets to the **RW100** Slab Edge Cover, front and back, as shown in *Figure 91*.
- 31.4 Install the Slab Edge Cover over the front lip of the Slab Edge Receptor.
- 31.5 Slide **RW511** Fascia Retainer over the top of the slab edge cover and attach to the Sill Receptor with **MS280** Fasteners at 18" on center, or as detailed in approved shop drawings, 2" from each end.

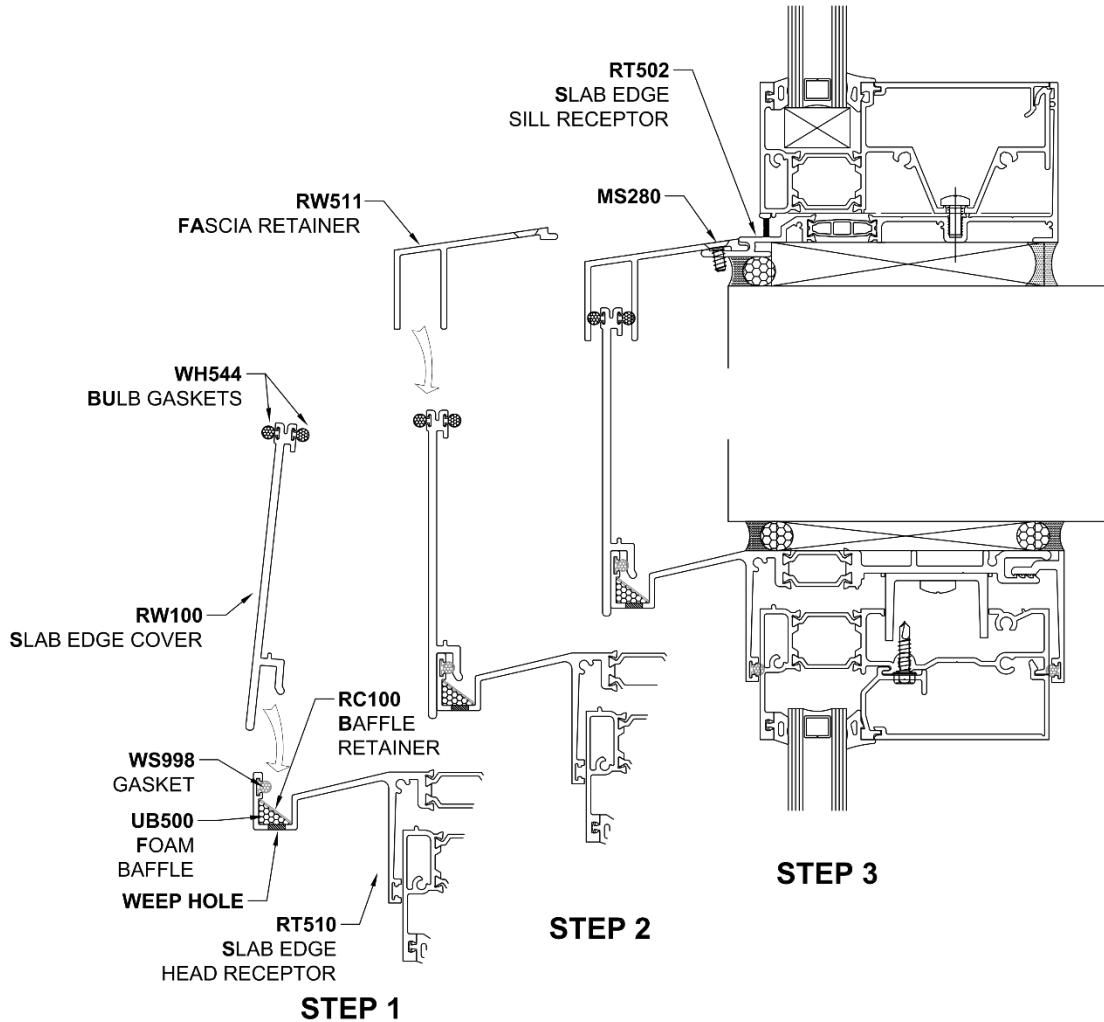


Figure 91: Slab Edge Cover Installation

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MISCELLANEOUS

32.0 Expansion Mullion

Multiple units may require the use of an Expansion mullion if the total width of a mullion exceeds 24 feet. In these cases, Locate Expansion Mullions no greater than 20 feet on center.

NOTE: A minimum of 7/16" clearance is required to install Expansion Mullion panels.

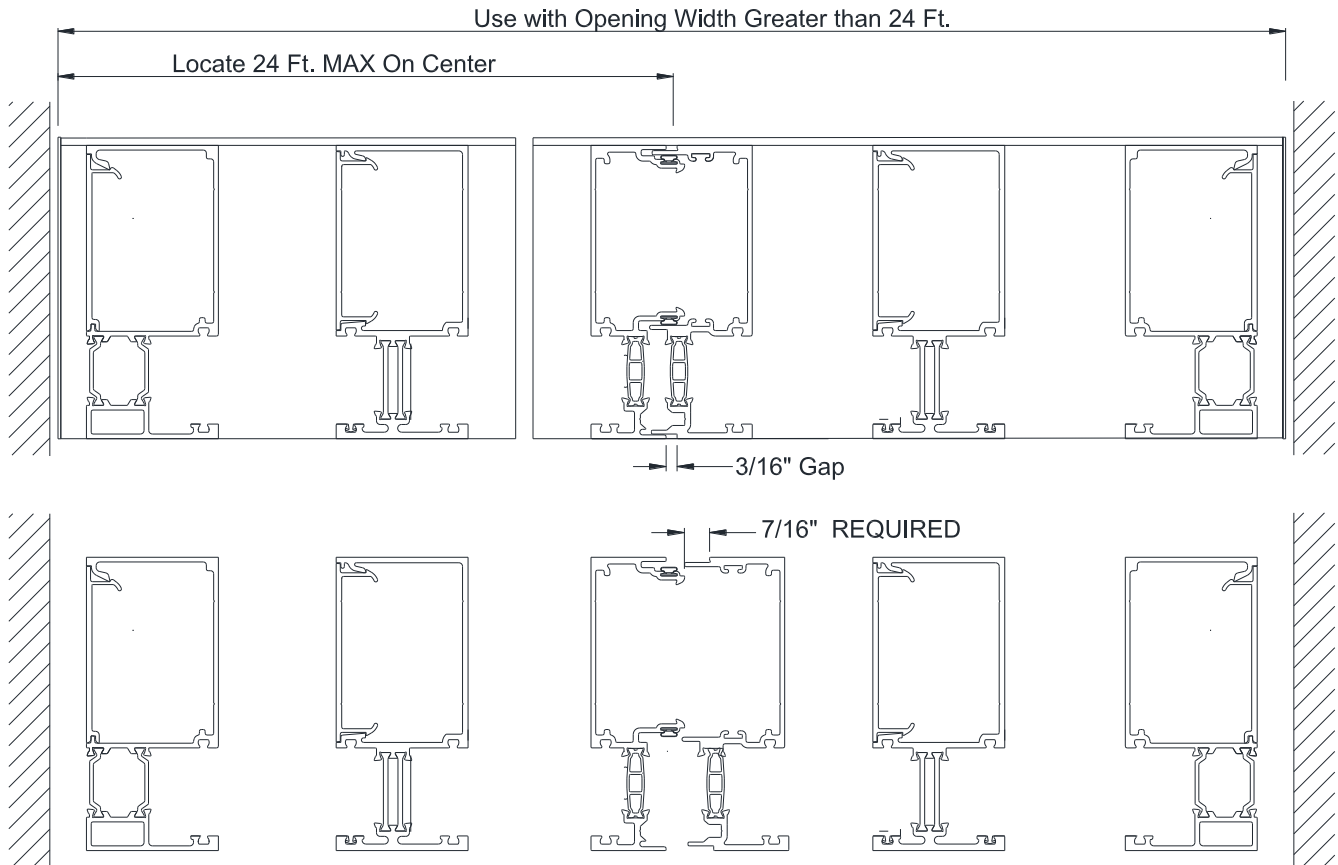


Figure 92: Expansion Mullion Installation

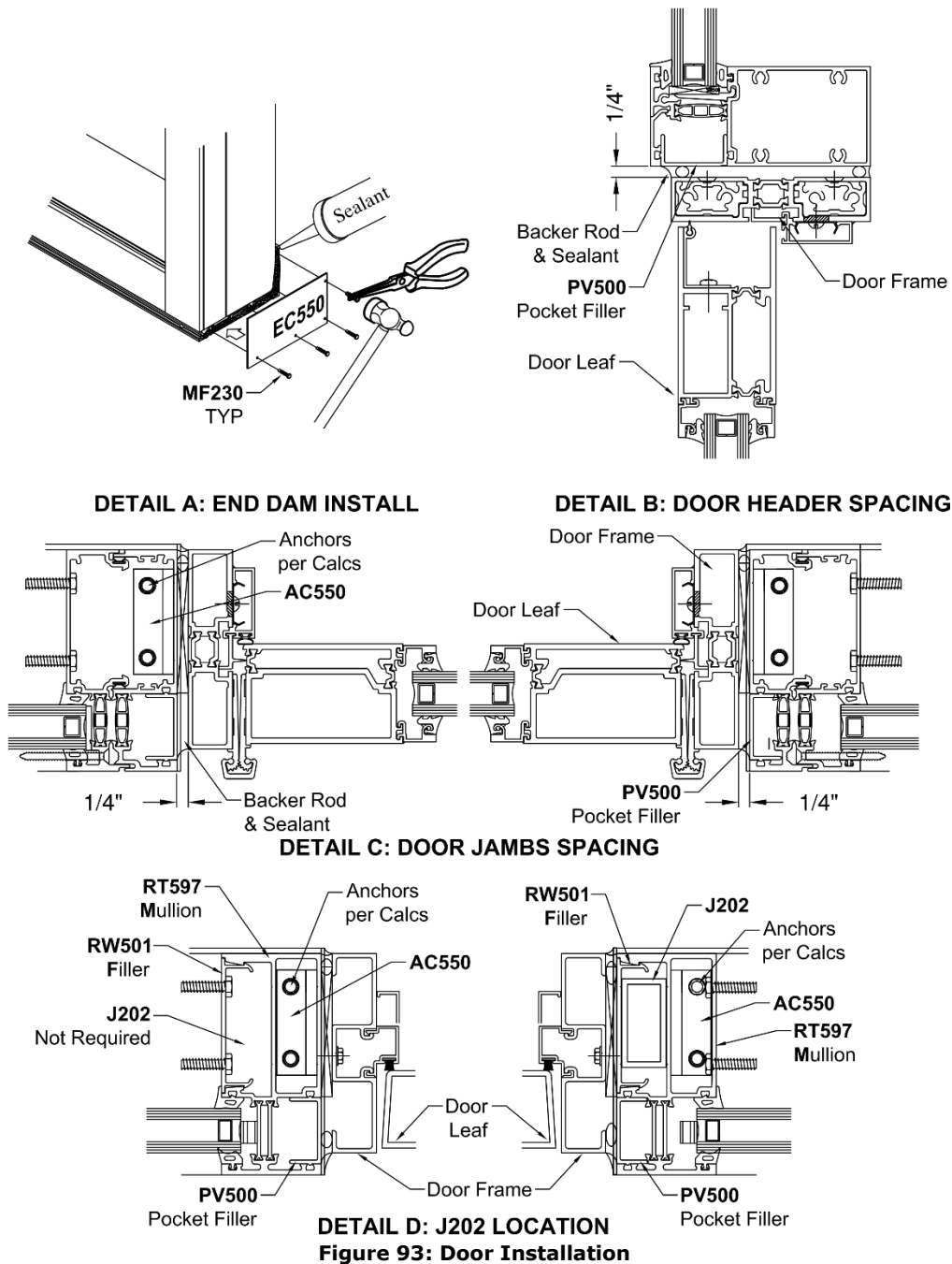
33.0 Door Installation

NOTES:

- Subframe at door installation requires a 1/4" minimum joint around the perimeter of the system. Reference *Figure 93, Details B and C.*
- For Field Glazed applications, insert **J202** as needed at the Filler side of Door Jambs, *Figure 93, Detail D.*

- 33.1 Clean the surface of the **EC550** End Dam, the face of the Door Jamb, and the end of the Sill Receptor using cleaner approved by sealant manufacturer.
- 33.2 Following the method shown in *Figure 93, Detail A*, attach End Dam with (4) **MF230** fasteners, stopping 1/4" short of attaching completely.
- 33.3 Gently pull the End Dam back from the end of the Sill Receptor and apply silicone sealant in the gap. Push the End Dam back into place and gently drive the fasteners tight. Tool sealant smooth.
- 33.4 Cap-seal fasteners.
- 33.5 Install the Door Frame per Door Installation instructions and/or approved shop drawings.
- 33.6 After Door Frame installation, add Backer Rod and Sealant around the perimeter of the Door Frame.

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34.0 Shipping / Crating

- 34.1 US Aluminum ® does not instruct on how crate or ship glazed units to the jobsite. Please note that all parts must fastened or held in properly and be able to withstand movement of the vehicle due to road conditions, wind, braking, etc.
- 34.2 Glass units must be blocked to avoid glass shifting during transit. See *PRE-GLAZING* section for details per pre-glazed unit type.

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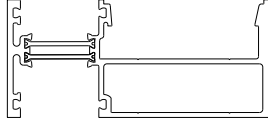
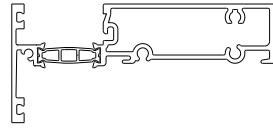
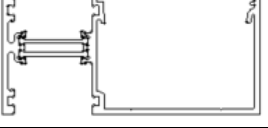
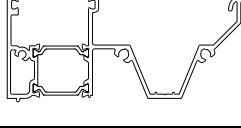
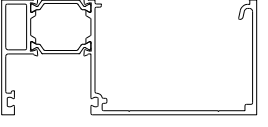
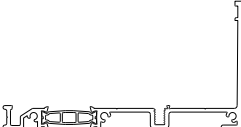
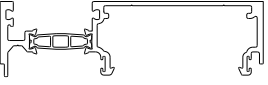
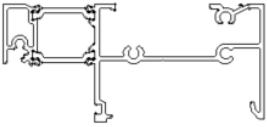
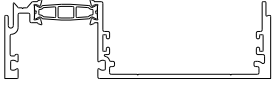
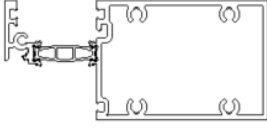
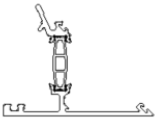
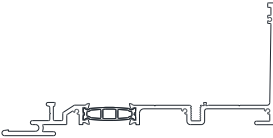
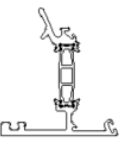
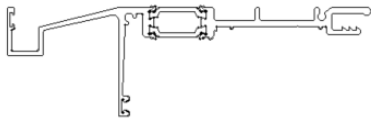
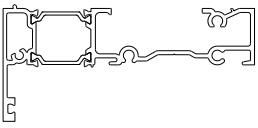
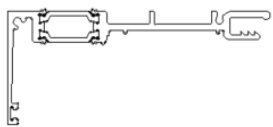
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PARTS LIST

Parts not shown to scale.

RT597 	MULLION HEAVY	RT563 	HORIZONTAL INSIDE GLAZE
RT591 	MULLION STANDARD	RT564 	SILL
RT590 	JAMB	RT501 	SILL RECEPTOR
RT582 	MULLION PRE-GLAZE MALE HALF	RT554 	HEAD OUTSIDE GLAZE
RT584 	MULLION PRE-GLAZE FEMALE HALF	RT556 	HORIZONTAL OUTSIDE GLAZE
RT544 	90 DEGREE FRONT	RT502 	SILL RECEPTOR SLAB EDGE
RT546 	135 DEGREE FRONT	RT510 	HEAD RECEPTOR SLAB EDGE
RT552 	HEAD INSIDE GLAZE	RT508 	HEAD RECEPTOR

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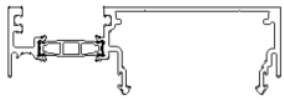
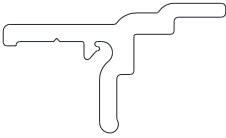
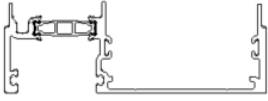
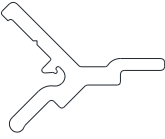
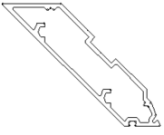



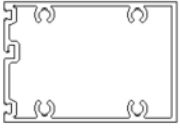





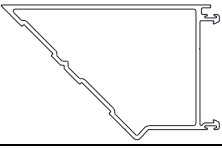

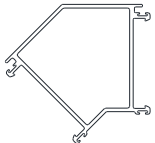

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RT532 	EXPANSION MULLION MALE HALF	RW568 	90° INSIDE CORNER FRONT
RT536 	EXPANSION MULLION FEMALE HALF	RW570 	135° INSIDE CORNER FRONT
RW540 	90 DEGREE MULLION HALF	RW553 	GLASS STOP INSIDE GLAZE
RW541 	135 DEGREE MULLION HALF	RW563 	GLASS STOP OUTSIDE GLAZE
RW556 	HORIZONTAL SSG	RW501 	RECEPTOR STOP
RW554 	MULLION SSG MALE HALF	RWW557 	GLASS STOP PRE-GLAZED INSIDE GLAZE
RW555 	MULLION SSG FEMALE HALF	RW501 	FILLER
RW567 	90° CORNER CLOSURE	RW558 	HEAD COVER
RW569 	135° CORNER CLOSURE	RW559 	SILL COVER

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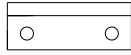




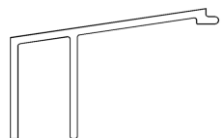


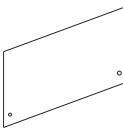

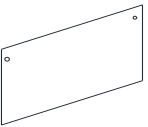

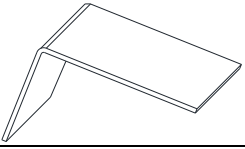

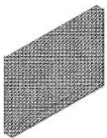
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Parts not shown to scale.

RW582-01 	MULLION CLIP	RC100 	BAFFLE RETAINER
PV500 	VINYL POCKET FILLER	AC550 	ANCHOR DOOR JAMB
RW581 	REINFORCEMENT CLIP 24'-0"	RW52000 	ANCHOR HEAD
RW58100 	REINFORCEMENT CLIP 3"	RW51900 	ANCHOR RECEPTOR HEAD
RW511 	SLAB EDGE FASCIA RETAINER	RW51800 	SETTING BLOCK CHAIR
RW100 	6" SLAB EDGE COVER	TWW-311 	END DAM SILL
SL500 	SPLICE SLAB EDGE COVER	EC556 	END DAM RECEPTOR
HC501 	SLAB EDGE COVER SUPPORT	WD550 	WATER DIVERTER
EC500 	SLAB EDGE COVER END CAP	EC552 	SSG SPONGE END CAP

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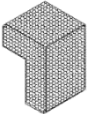


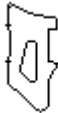
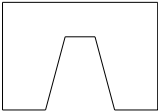







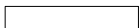


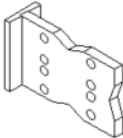

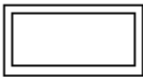
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SP550 	JOINT PLUG	SP451 	SSG SPACER
SB506 	SETTING BLOCK HORIZONTAL	NP556 	WEDGE GASKET OUTSIDE GLAZE
SB508 	SETTING BLOCK SILL	NP506 	WEDGE GASKET
WB502 	SIDE BLOCK SHALLOW POCKET FILED GLAZE	WH544 	BULB GASKET CORNER
WB504 	W BLOCK DEEP POCKET FILED GLAZE	WH546 	SSG RAINSCREEN GASKET
WB506 	SIDE BLOCK SHALLOW POCKET PRE-GLAZE	UB500 	SLAB EDGE FOAM BAFFLE
SB502 	SETTING BLOCK SSG	SL501 	SPLICE 10' ROLL
WS998 	BULB GASKET	DJ501 	DRILL JIG
NP525 	FIXED GLAZING GASKET	J202 	SHIM DOOR FRAME 1" X 2"

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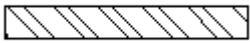

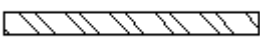
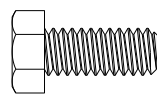
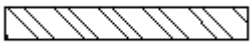
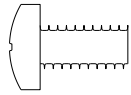

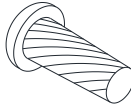
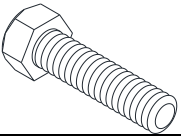

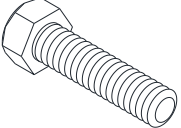
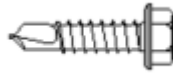
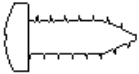

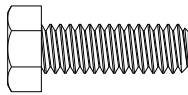
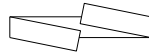
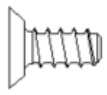
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SS557 	STEEL REINFORCEMENT 3/8" X 3"	ST26442 	#10 X 2" SS TYPE A
SS558 	STEEL REINFORCEMENT 1/4" X 3"	MF142 	1/4-20 x 5/8" HH BOLT
SS556 	STEEL REINFORCEMENT 3/8" X 2 7/8"	ST22000 	1/4"-20 x 1/2" SSMS
SS554 	STEEL REINFORCEMENT 1/4" X 2 1/2"	MF232 	M4 X 16mm Helical Knurled Pin
MS19042 	#14 x 1" HHSTS ASSEMBLY SCREW	MF230 	#2 X 5/8 Round Head U- Drive SS Screw
ST280 	#14 x 1-1/2" HHSTS ASSEMBLY SCREW	MS17842 	#12 x 3/4 STS
ST243 	#12 x 1/2" PHSTS	MF26642 	1/4" NUT
MF20642 	1/4-20 x 3/4" HH BOLT	MF25200 	1/4" LOCK WASHER
MS280 	#12 x 1/2" PFH UC		

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