

# WV410 WINDOW INSTALLATION INSTRUCTIONS



Part NO. Y007

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WHERE WINDOWS ARE JUST THE BEGINNING®



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**Minimizing Condensation**

Note: Please reference EFCO's "Understanding Condensation" brochure which can be obtained through your EFCO representative.

Condensation will form on any surface when unfavorable conditions (interior temperature and relative humidity and exterior temperature) are present. When the formation of excessive condensation is a concern, it is highly recommended that a design professional is utilized to perform an analysis of the shop drawings to recommend the best possible installation methods. Please contact your EFCO representative for information on EFCO's Thermal Analysis Services.

Many current installation practices lead to an increase in the possibility of the formation of condensation. Though not all inclusive, the list of examples below illustrates conditions under which condensation is likely to occur:

1. Bridging system thermal break with non-thermally broken metal flashing or lintels that are exposed to the exterior
2. System exposure to cold air cavities
3. Interior relative humidity levels not maintained at recommended levels, see EFCO's "Understanding Condensation" brochure
4. Inadequate separation between system and surrounding condition at perimeter
5. Product combinations during the shop drawing stage that result in bridging thermal breaks of one or all products involved

## **Section I – Product Description and Limitations**

The WV410 storefront window system is designed and engineered to be field glazed and installed with a limited amount of labor and tools. Although the WV410 window is designed to complement the S401, S402, S403, and S433 center set systems, it may be glazed into any system with a smooth surface opening that has a minimum depth of 3 7/16".

The WV410 allows the plane of glass to be equal to that of the S401, S402, S403, and S433 center set systems. The correct location or inset of the WV410 is easily found by measuring out from the interior surface to the storefront 1/32". This will allow a 1/32" offset from the storefront face to the window frame. If the WV410 intermediate mullion is used, the interior face of the mullion will align flush with the storefront horizontal.

## **Section II – General Statements and Definitions**

The user is encouraged to read and understand all of the instructions prior to proceeding with installation. These instructions define several configurations and methods of installation that may or may not apply to your project.

The instructions covered in this manual are pertinent to the S401, S402, S403, and S433 systems. Consult approved shop drawings for special applications not covered herein.

The following terminology will be utilized throughout these instructions and has been included to better orient the reader to the areas discussed.

**Storefront Opening:** Storefront or other mounting surface for the window are typically called D.L.O. (Day Light Opening).

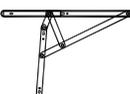
**WV410 Frame:** The interior mounting and fixed portion of the operable window.

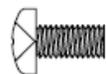
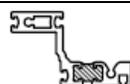
**Vent:** The operable and glazed portion of the window.

**Intermediate mullion:** The adaptor system designed to allow the windows to be stacked side by side in a dual or ribbon application.

The steps and details on the following pages have been developed to aid in the assembly and installation of the WV410 storefront window system.

**Section III – Standard Parts Identification**

Detail	Part No.	Description
	9833	WV410 Frame Use with 23X3 or 23X4 vent
	K320	WV410 Mullion Shear Block Package 2) packages required per mullion complete with fasteners
	MRF7	Shear block to storefront screw- included in K320
	SPC7	Mullion to shear block screw- included in K320
	1F10	Female Vertical Mullion Half Thermal Strut Connected Used with K320 and 9867
	9837	Male Vertical Mullion Half Used with K320 and 1F10
	HB64	Casement Vent Lift Block Use SFZ5 attachment screws
	SFZ5	Lift Block Attachment Screw
	SFP1	WV410 Frame to Storefront
	HN91	Perimeter Shim Block
	LA09 LA15 LA21 LA23	4-Bar Hinge used for casement and projected hinges
	LA01	90° 4-Bar Hinge Casement vents only- Minimum casement width = 19 5/8"
	STT5	4-Bar Hinge Attachment Screw (6) per hinge
	H927 H928 H935 H936	Cam Handle (RH) (CLR) Cam Handle (LH) (CLR) Cam Handle (LH) (BRZ) Cam Handle (RH) (BRZ)
	H987 H988	A.C. Lock (CLR) A.C. Lock (BRZ)

Detail	Part No.	Description
	H989 H990 H991 H992	Pole Ring Cam Handle (RH) (CLR) Pole Ring Cam Handle (LH) (CLR) Pole Ring Cam Handle (RH) (BRZ) Pole Ring Cam Handle (LH) (BRZ)
	MFM3 MFM4	Cam Handle Attachment Screw (CLR) Cam Handle Attachment Screw (BRZ)
	23X4	Standard Bead Glazed Vent
	23X3	Structural Glazed Vent
	9834	Removable Glass Stop Used with 23X4 Vent
	EY45	¼” Glazing Adaptor Channel use SFP1 attachment screws
	SFP1	Attachment screw Use at ¼” glazing adaptor
	W142	Vent Bulb Gasket
	W113	Perimeter Wiper Gasket
	WEB5	Removable Glass Stop Glazing Wedge
	HN91	Glass Setting Block (4) required per casement vent (8) required per projected vent
	W174	1/8” Pre-shim Gasket For bead glazed vents
	WEQ4	¼” SSG Pre-shim Gasket For SSG glazed vents
	HK15 HP15	Strike (CLR) Strike (BRZ)
	MON9 MOO0	Strike Attachment Screw (CLR) Strike Attachment Screw (BRZ)

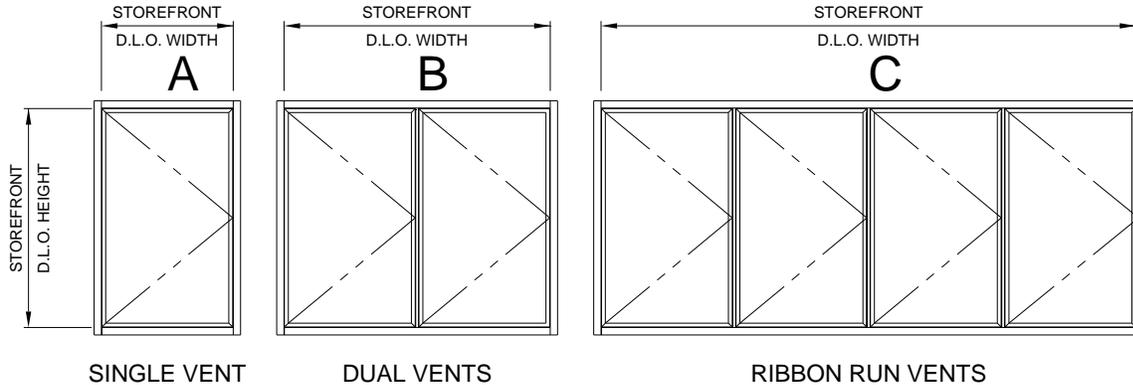
\* Drawings on this page are not to scale.

**Section IV – Size Formulas**

**A. Window and Glass Size Formulas**

There are three (3) different configurations of the WV410 window system. Each of the configurations will determine the horizontal dimensions of the glass and individual units.

Note: The storefront D.L.O. horizontal and vertical dimensions must be known to calculate the sizes. Glass and window size formulas for the WV410 units are provided below for each configuration. Refer to the information given that corresponds with the appropriate configuration.



**Configuration "A"**

Window Width = Storefront D.L.O. Width – 3/8"  
 Window Height = Storefront D.L.O. Height – 3/8"

**Configuration "B"**

Window Width =  $\frac{\text{Storefront D.L.O. Width} - 1 \frac{3}{8}"}{2}$   
 Window Height = Storefront D.L.O. Height – 3/8"

**Configuration "C"**

Window Width =  $\frac{\text{Storefront D.L.O. Width} - 3/8"}{\text{Number of Intermediate Mullions} + 1}$   
 Window Height = Storefront D.L.O. – 3/8"

**Standard Glazing  
 Glass Size Formula**  
 Configurations "A", "B", & "C"  
 Glass width = Window width – 1 1/2"  
 Glass height = Window height – 1 1/2"

**Structural Glazed  
 Glass Size Formula**  
 Configuration "A", "B", & "C"  
 Glass width = Window Width – 1 1/2"  
 Glass Height = Window Height – 1 1/2"

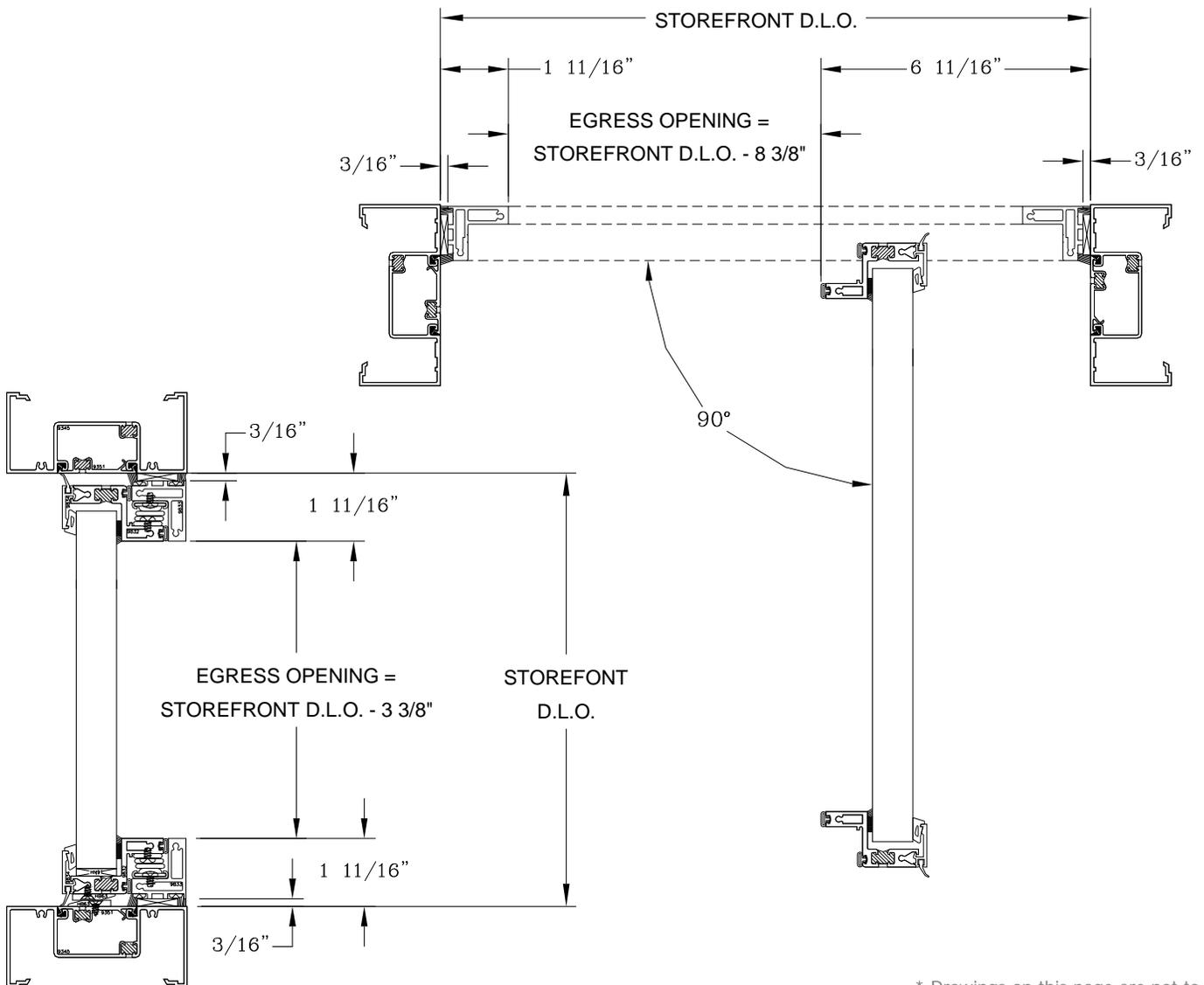
\* Drawings on this page are not to scale.

**Section IV- Size Formulas**

**B. Egress Formulas**

Egress openings must be figured based on the clear opening after the vent is opened to the 90 degree position. See the figures and equations below for window sizes at the egress opening. Use standard window sizing requirements as shown on Page 5 once the egress has been used to determine the storefront D.L.O. size.

**Egress Windows must use LA01 Arms Only!**



\* Drawings on this page are not to scale.

Storefront D.L.O. width –  $8 \frac{3}{8}''$  = 90 degree clear opening width  
 Storefront D.L.O. height –  $3 \frac{3}{8}''$  = Egress clear opening height

## **Section V – Captured WV410 Vent Glazing**

### **Step 1**

Unlock the cam locks and open the vent to expose the hardware. Remove the vent from the WV410 frame by removing the screws from the hinges. Be sure to mark the vent to correspond with the appropriate frame. This will insure that the vent is reinstalled correctly.

### **Step 2**

Lay the vent face up on a flat, smooth working surface. Remove the glass stops from the vent.

### **Step 3**

Make sure that the glazing surfaces of the vent are free from oil and metal shavings. Clean the glazing surfaces as needed with alcohol. (Do not use glass cleaners).

### **Step 4**

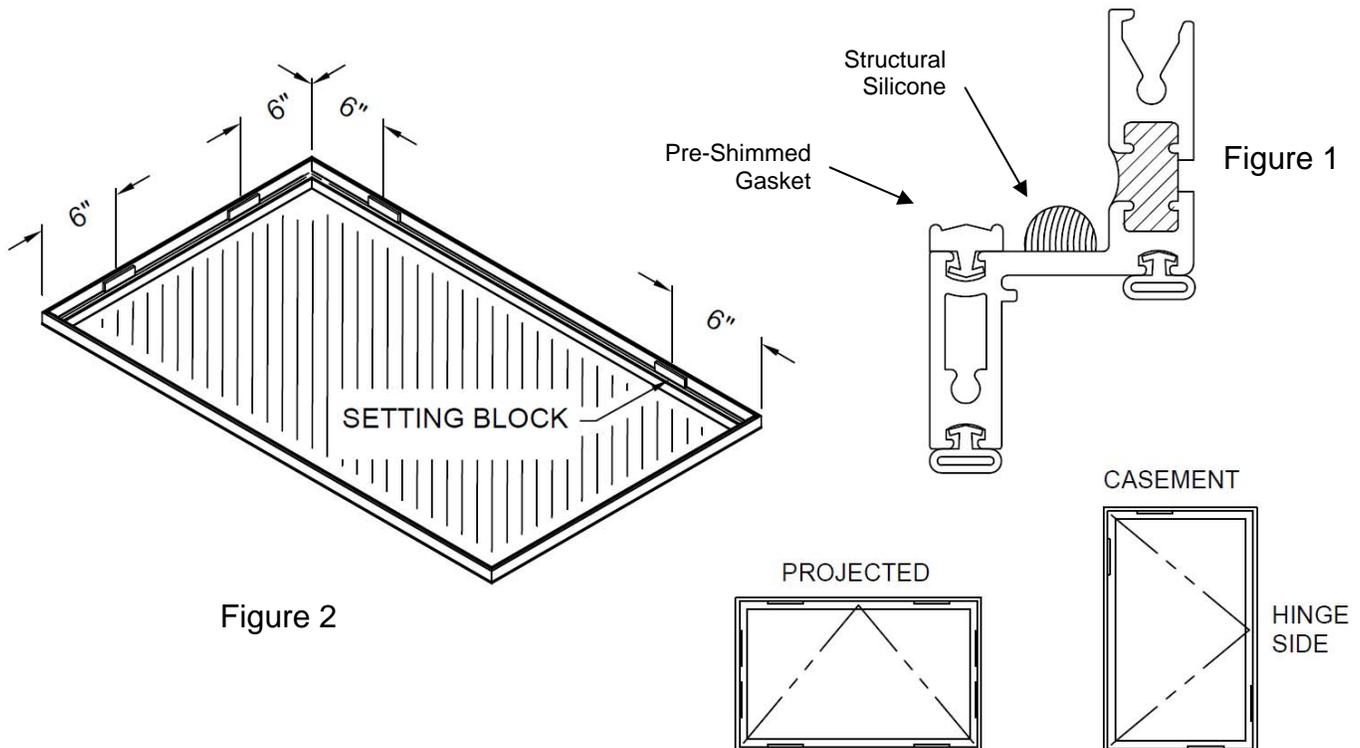
Insert a continuous row of pre-shimmed gasket W174 around the vent perimeter glazing leg. Insert the gasket beginning at each end of the frame and work toward the middle then work out any waves toward the ends forming tight joints. Do not stretch the gasket.

### **Step 5**

Run a continuous bead of structural silicone sealant behind the tape as shown in Figure 1.

### **Step 6**

Keeping the glass level and centered within the vent material, lower the glass down into place.



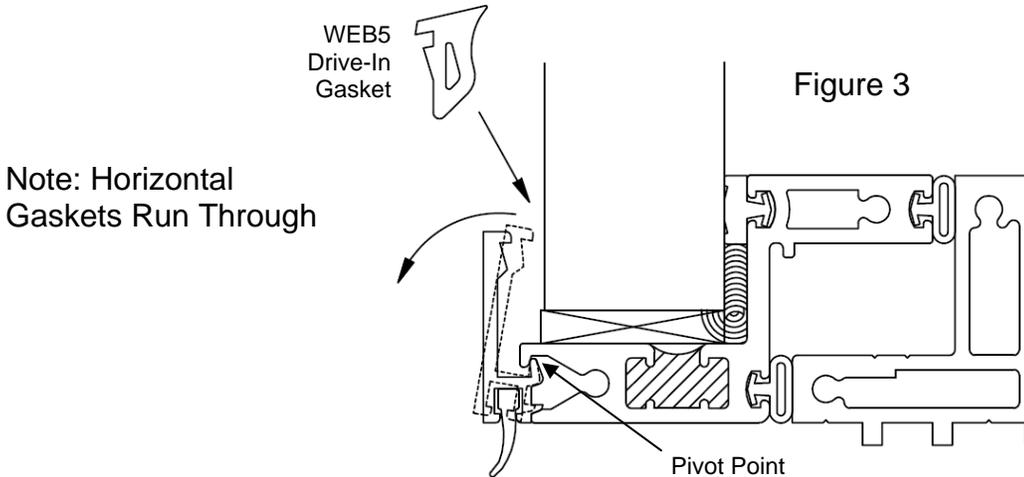
### **Step 7**

Insert two (2) HN91 - 3/16" x 1" x 4" setting blocks on each side of the glass 6" from the corners, as required, based on the configurations shown in Figure 2 above. Adjust the blocks as required to keep the vent square.

**Section V – Captured WV410 Vent Glazing**

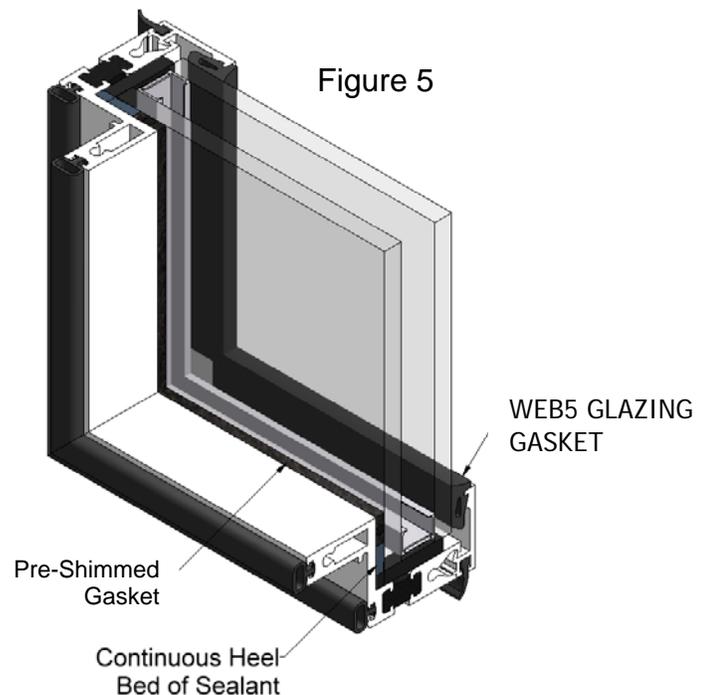
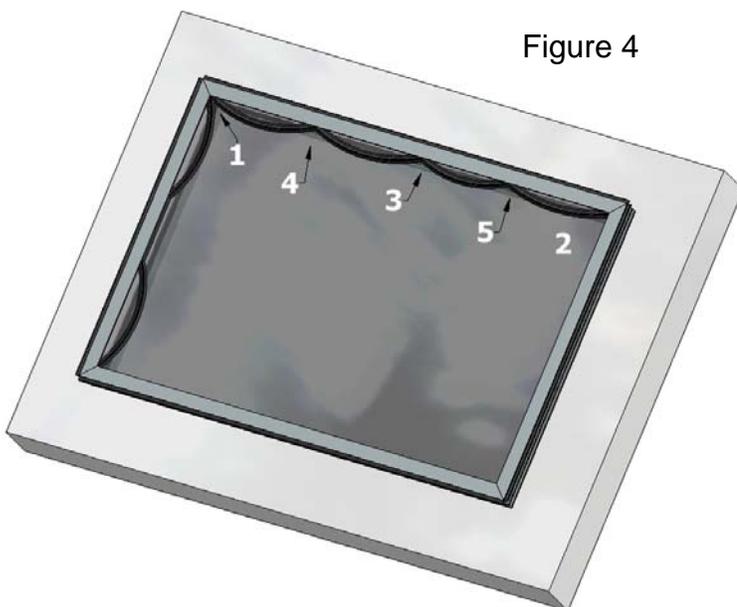
**Step 8**

Reinstall the glass stops. The glass stops are designed to be inserted into the vent material and rotated up and out toward the edges to lock into place. Insert a 3" long temporary piece of the glazing wedge WEB5 at the midpoint of each stop until all four (4) are in place. See Figure 3.



**Step 9**

Cut the horizontal and vertical lengths of the WEB5 drive-in gasket to the exterior daylight opening of the vent plus 2% to allow for shrinkage. Insert the glazing wedge, beginning at each end of the stops and the middle of the gasket. Continue to divide each loop in half, working out the "waves" toward the ends of the glass stops. Do not stretch the gasket. See Figure 4.



**Step 10**

After all of the gaskets are in place, flip the vent over and check for squeeze out that may have appeared. Clean off any excess with a razor blade and paper towels.

\* Drawings on this page are not to scale.

## **Section VI – SSG WV410 Vent Glazing**

### **Step 1**

Unlock the cam locks and open the vent to expose the hardware. Remove the vent from the WV410 frame by removing the screws from the hinges. Be sure to mark the vent to correspond with the appropriate frame. This is to insure that the vent is reinstalled correctly.

### **Step 2**

Lay the vent face up on a flat, smooth working surface.

### **Step 3**

Make sure that the glazing surfaces of the vent are free from oil and metal shavings. Clean the glazing surfaces as needed with alcohol. (Do not use glass cleaners).

### **Step 4**

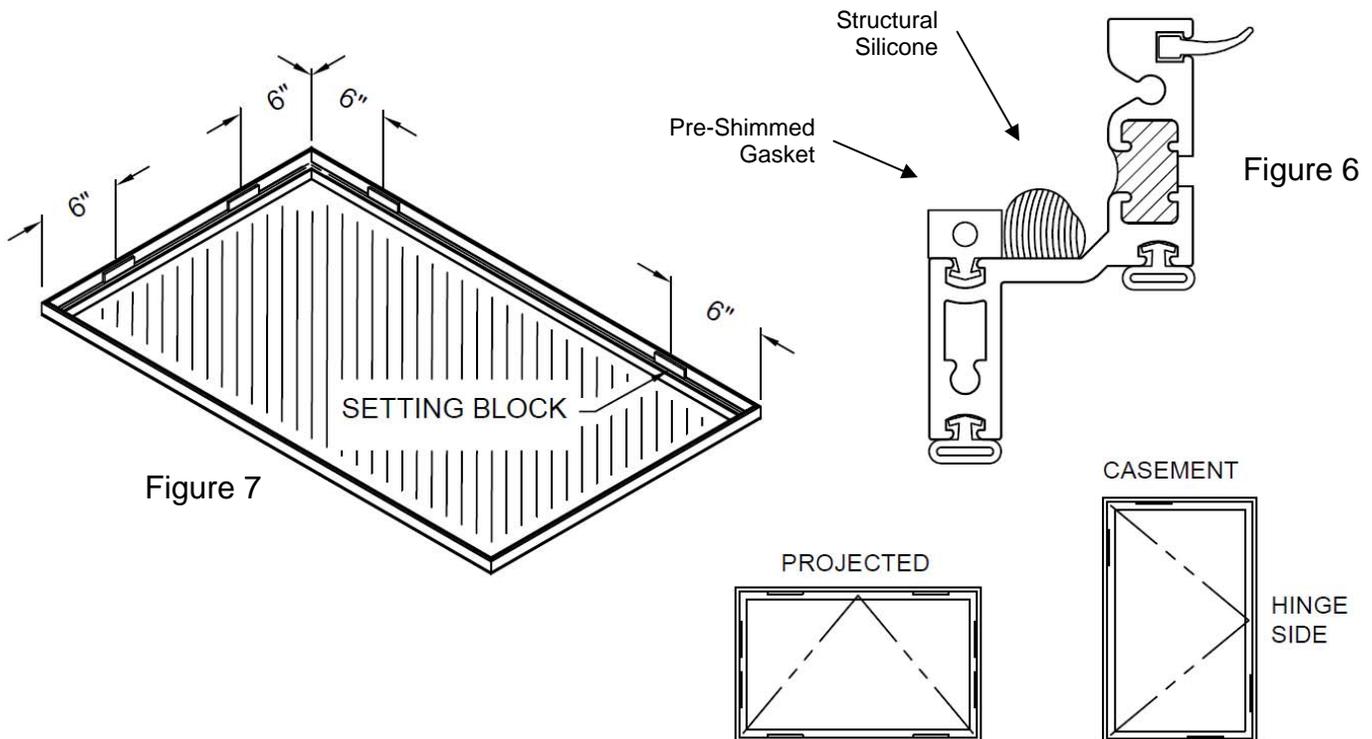
Insert a continuous row of pre-shimmed gasket WEQ4 around the vent perimeter glazing leg. Insert the gasket beginning at each end of the frame and work toward the middle then work out any waves toward the ends forming tight joints. Do not stretch the gasket.

### **Step 5**

Run a continuous bead of structural silicone sealant behind the tape as shown in Figure 6.

### **Step 6**

Keeping the glass level and centered within the vent material lower, the glass down into place.



\* Drawings on this page are not to scale.

## **Section VI – SSG WV410 Vent Glazing**

### **Step 7**

Insert two (2) HN91 - 3/16" x 1" x 4" setting blocks on each side of the glass 6" from the corners, as required, based on the configurations shown in Figure 7. Adjust the blocks as required to keep the vent square.

### **Step 8**

Insert backer rod material between the glass and the vent material around the entire perimeter except at setting block locations. The backer rod needs to be recessed far enough to leave the end of the outer glass lite exposed. See figure 8.

### **Step 9**

Mask off the outside edges of the glass and vent to minimize cleanup and provide a professional appearance. Fill the void between the glass and the vent with structural sealant. Tool in sealant and remove the masking tape before a skin begins to form. See Figure 8.

An overnight setup is required to allow the silicone to partially cure before movement of the unit.

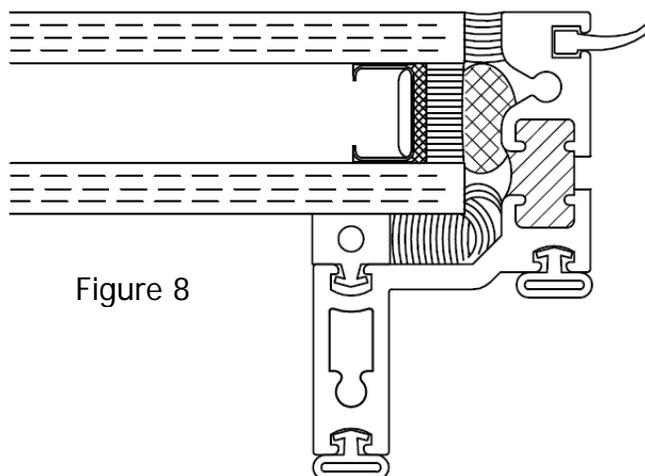


Figure 8

\* Drawings on this page are not to scale.

## **Section VII – Vent Gasket Preparation**

The exterior weatherstrip flap is to be trimmed at the sill to jamb corners. Trim the weatherstrip 3" from the sash corner both horizontally and vertically. This gasket preparation applies to both Captured & SSG versions of the WV410 vents. See Figure 9.

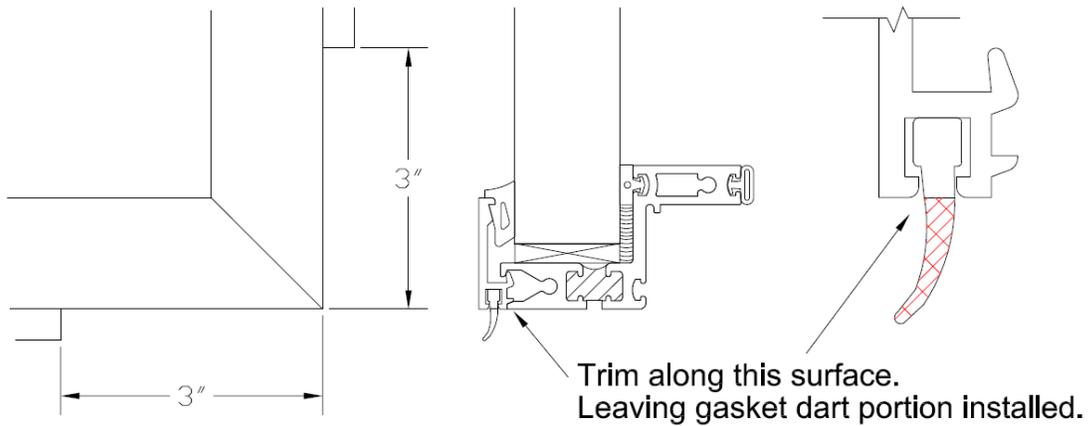


Figure 9

## Section VIII – Window Installation

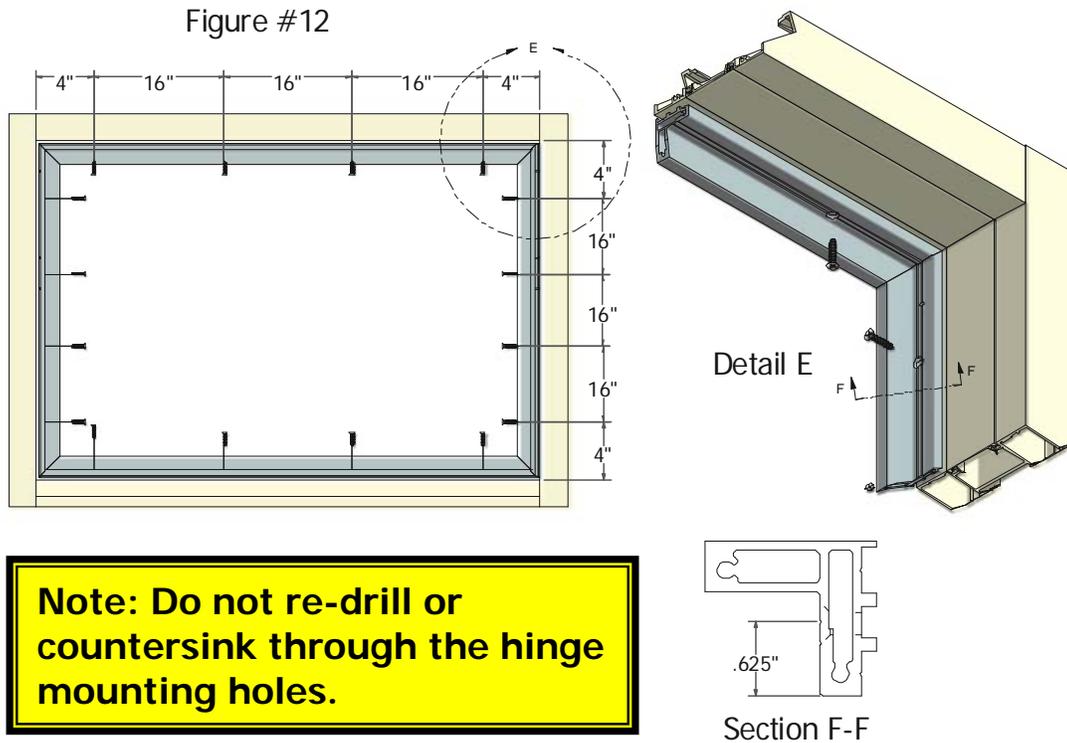
### A. Single Window Installation

#### Step 1

Locate the 1/32" inset for the WV410 frame at the horizontal mullions of the storefront D.L.O.

#### Step 2

The WV410 frame is mounted into the storefront opening by first drilling and countersinking attachment holes. Drill .201" diameter (No. 7 drill) mounting holes at the WV410 frame and countersinking for No. 10 FH-SMS SFP1 screws, 4" from the ends and 16" on center maximum. NOTE: Be sure not to re-drill or countersink through the hinge mounting holes. See Figure 12 below.



\* Drawings on this page are not to scale.

#### Step 3

Place the WV410 frame into position keeping the 1/32" offset from the interior face of the storefront to the interior face of the WV410 frame. Place HN91 shims at the mounting screw location and clamp the WV410 frame into place. Using the WV410 frame as a guide, drill .159" diameter (No. 21 drill) holes into the storefront frame. Secure the vent with SFP1 screws.

#### Step 4

Prior to installing the window, refer to Step 8 on page 14 for the required sealing locations. If casement vents are used, see Section VIII for lift block installation. If projected windows are used, continue to Step 5 for vent installation.

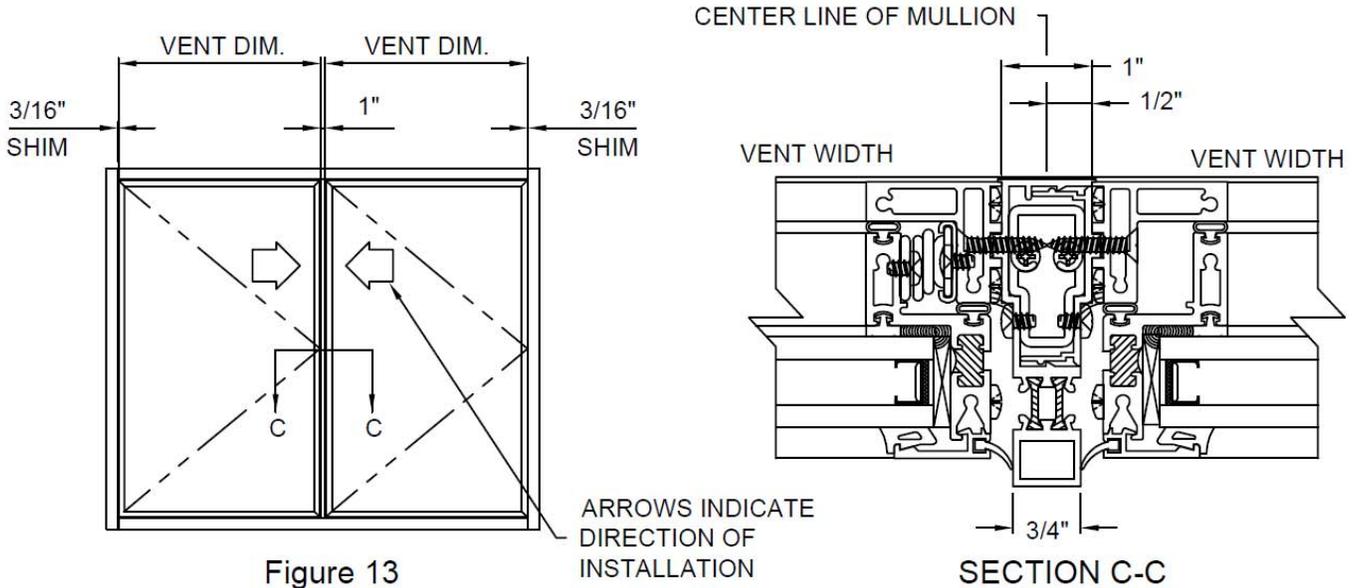
#### Step 5

Reinstall the vent into the WV410 frame. Be sure to mount the hinge to the same location as preinstalled by EFCO. See Section IX on page 20.

## Section VIII – Window Installation

### B. Dual Window Installation

The procedure for installing the vertical mullion in a dual window application differs from the ribbon run application. In a dual window application, the WV410 frame side clearances are ample enough to install the windows after the vertical mullion. In a dual window application the mullion is always installed first.

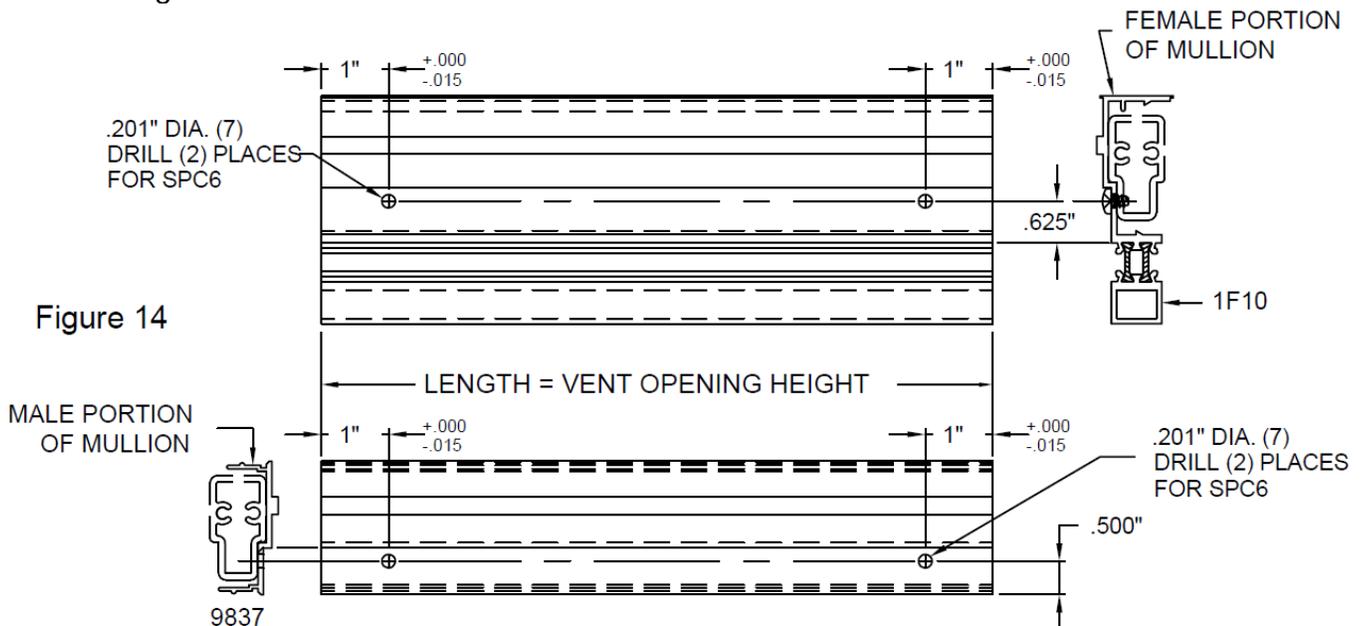


**Step 1**

Establish the mullion center lines in the opening per the approved shop drawings. Refer to the elevation in Figure 13 to locate the mullion center.

**Step 2**

Cut the vertical mullion halves 1F10/9837 to the daylight opening height and prep the ends as detailed in Figure 14 below.



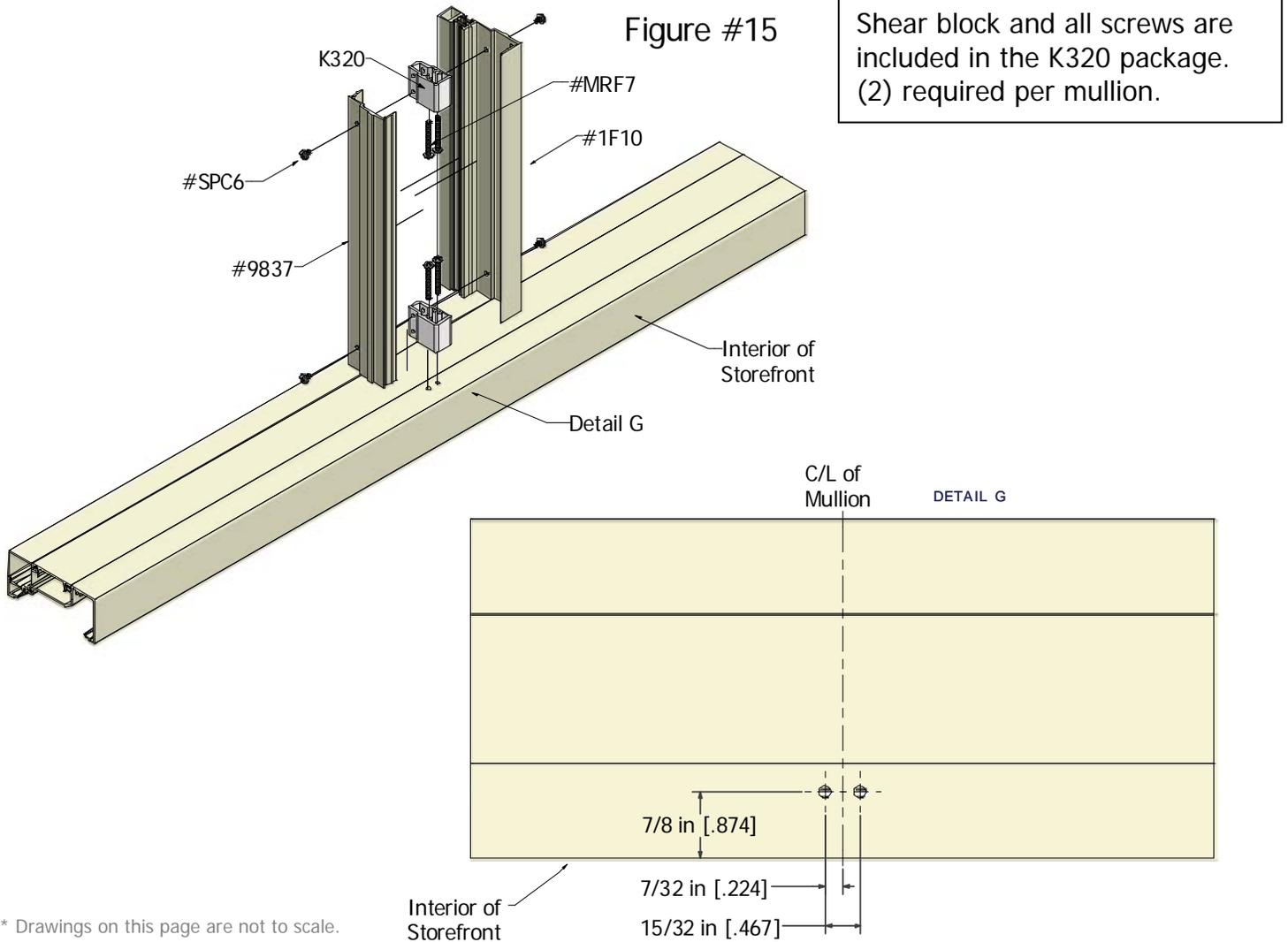
\* Drawings on this page are not to scale.

## Section VIII – Window Installation

### **B. Dual Window Installation**

#### Step 3

At the predetermined mullion locations, drill and tap the storefront horizontals for two (2) MRF7 10-24 PH-SMS fasteners. See Figure 15 below.



\* Drawings on this page are not to scale.

#### Step 4

First apply sealant to the attachment hole in the storefront horizontals to insure against water penetration, then install the K320 shear blocks using (2) MRF7 screws.

#### Step 5

Apply sealant to both ends of the female 1F10 and the male 9837 halves of the vertical mullion.

#### Step 6

Attach female portion 1F10 of the mullion to the shear block with (1) SFP6 screws at each end of the mullion half. See Figure 15 above.

## **Section VIII – Window Installation**

### **B. Dual Window Installation**

#### **Step 7**

Install the male portion 9837 of the mullion over the shear blocks and snap into the female portion of the mullion. Attach the male mullion half to the shear blocks with (1) SPC6 fastener at each end. See Figure 15 on page 13.

#### **Step 8**

NOTE: Do not complete this step unless you are prepared to install the window into the prepared openings. Seal around the top and bottom edge of the mullion. Additionally, apply a continuous bead of sealant along the mullion at the interlock location at both sides of the mullion as shown in Figures 16 and 17.

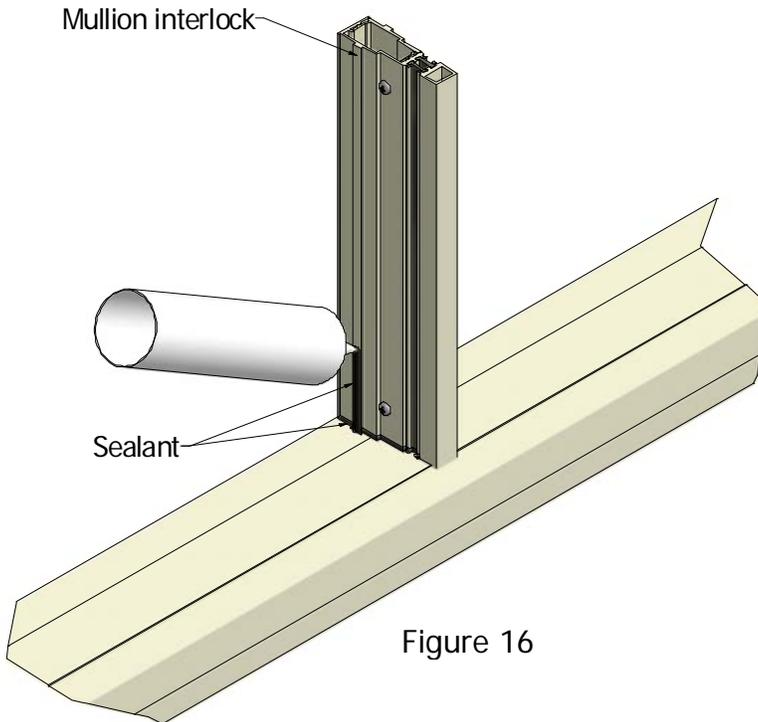


Figure 16

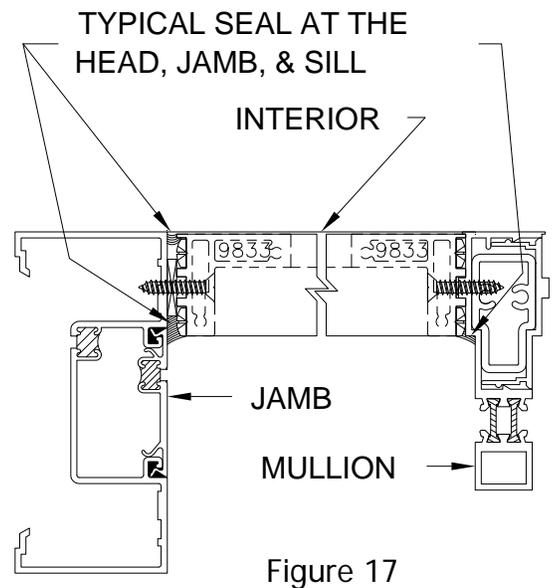


Figure 17

\* Drawings on this page are not to scale.

#### **Step 9**

The WV410 frame installation may now be completed. Both WV410 frames are installed by inserting the windows into the openings at the jamb sides and sliding them toward the mullion. Position the WV410 frames tight against the interlock of the mullion and shim into place with one (1) HN91 shim at the top, bottom, and extreme jambs at each fastener location. Refer to Steps 1 through 3 on pages 11 and 12 for the recommended fastener locations. No shims are required at the mullion anchor locations.

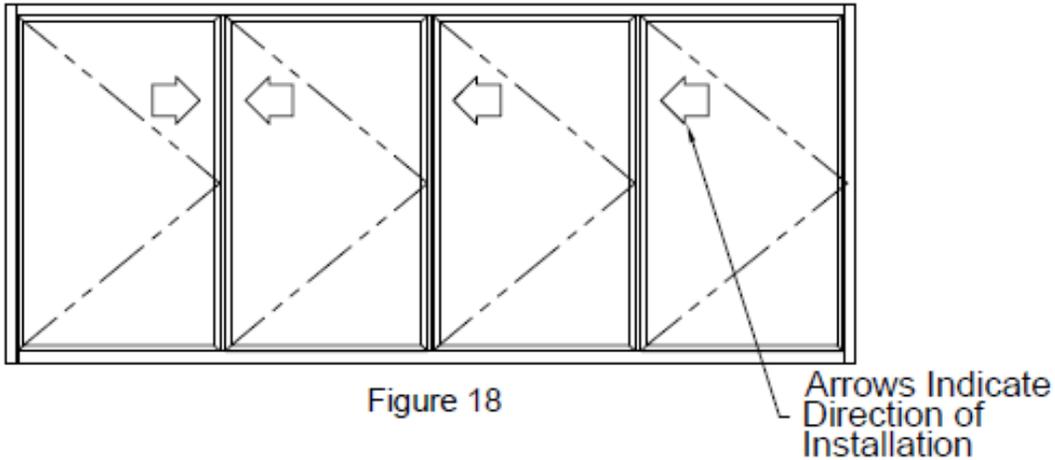
#### **Step 10**

After the WV410 frames have been installed, seal the exterior perimeter joint between the WV410 frame and the storefront frame and the mullion. At the interior of the storefront jamb, seal the joint between the WV410 frame and the storefront frame. No additional sealant is required at the interior surface of the mullions. See Figure 17.

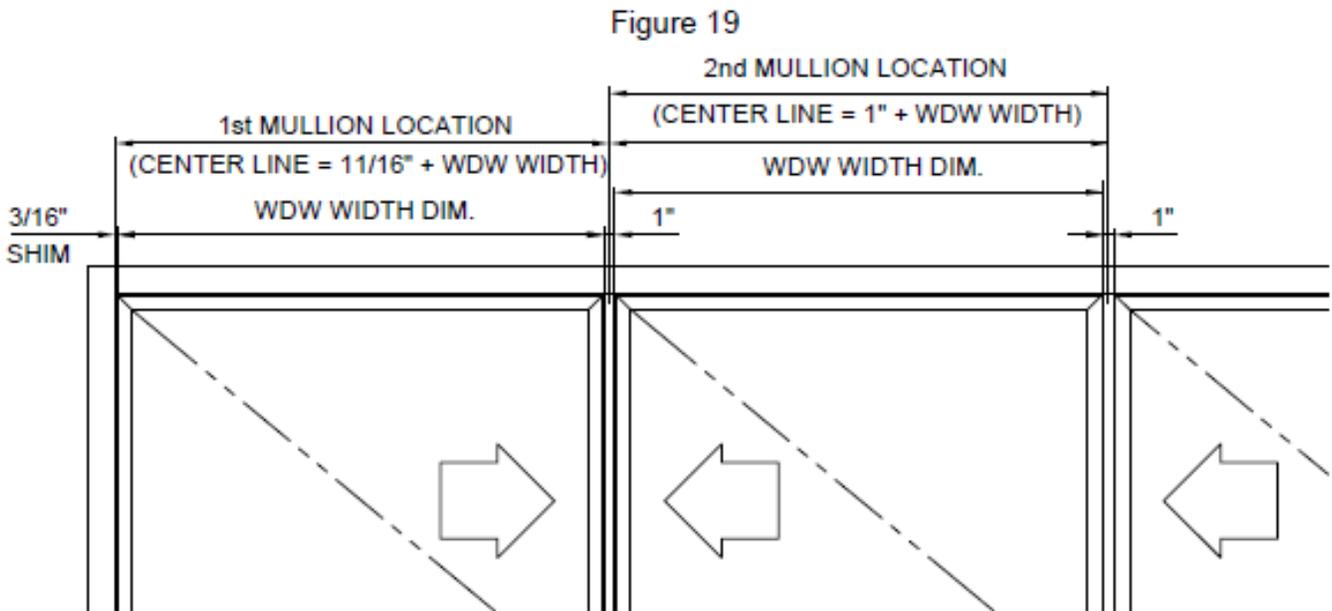
## **Section VIII – Window Installation**

### **C. Ribbon Window Installation**

The legs of the window engage the tracks of the vertical mullions, allowing a positive location situation for the windows. The ribbon run installation is the same as the dual window installation where the first mullion is installed prior to the WV410 frames. After the first mullion is installed, the remaining window and mullions will be sequentially stacked. See Figure 18.



The mullion center lines must be laid out before the first window can be installed. Take into account the 3/16" shim at the extreme jambs and the leg engagement at the vertical mullion. The vertical mullion is designed to be set flush with the interior side of the storefront frame. This is necessary to position the vent glass in the same plane as the storefront glass.



\* Drawings on this page are not to scale.

## **Section VIII – Window Installation**

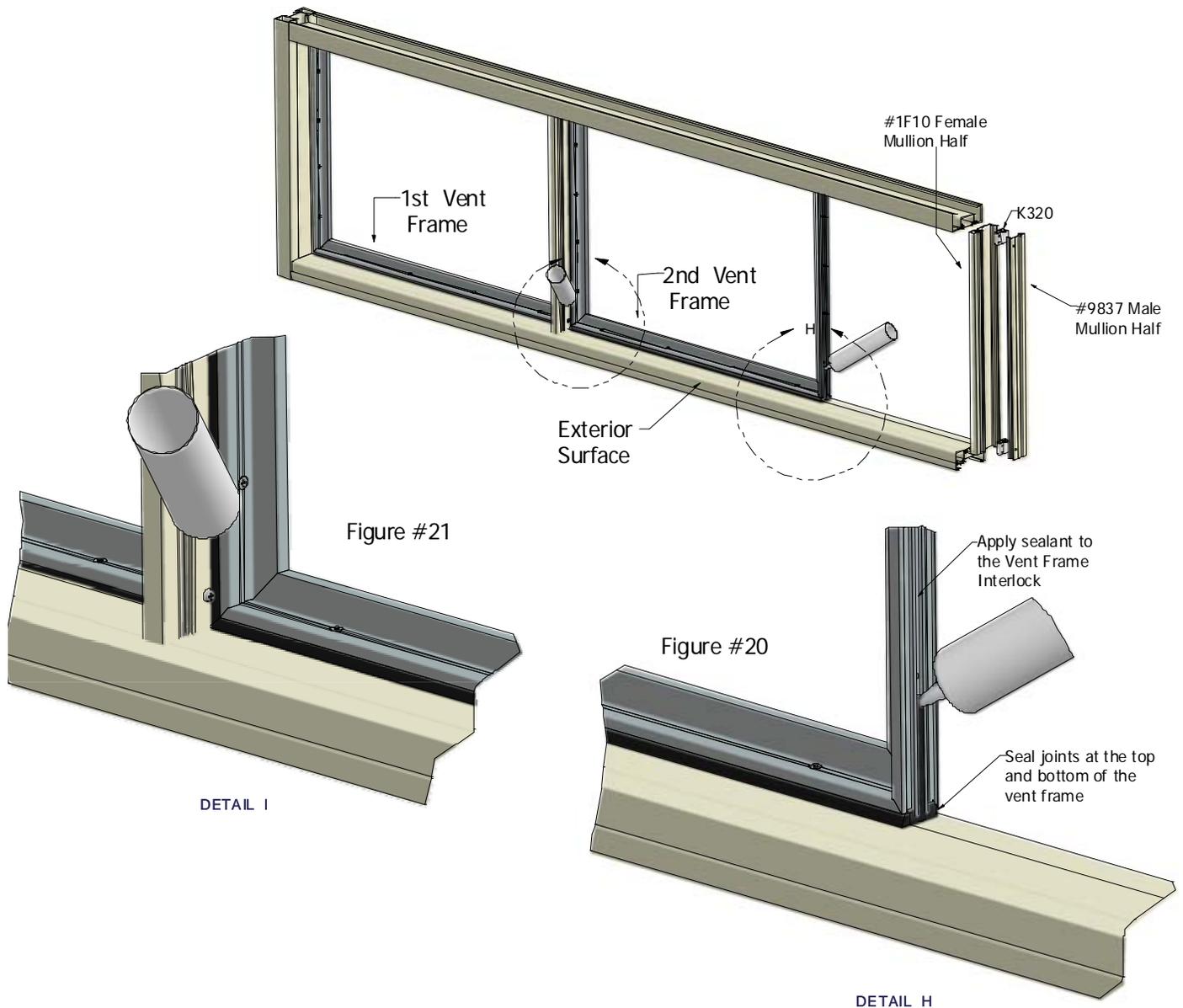
### **C. Ribbon Window Installation**

#### **Step 1**

Follow the procedures detailed in Steps 1 through 10 of pages 12 through 14 for the first mullion and WV410 frame.

#### **Step 2**

After the first and second WV410 frames have been installed, the method of installation will differ from the previous steps. Beginning at the exposed jamb of the second WV410 frame, seal around the top and bottom of the WV410 frame where it meets the storefront horizontals. Run a bead of sealant along the interlock of the vertical frame. See Figure 20.



\* Drawings on this page are not to scale.

## **Section VIII – Window Installation**

### **C. Ribbon Window Installation**

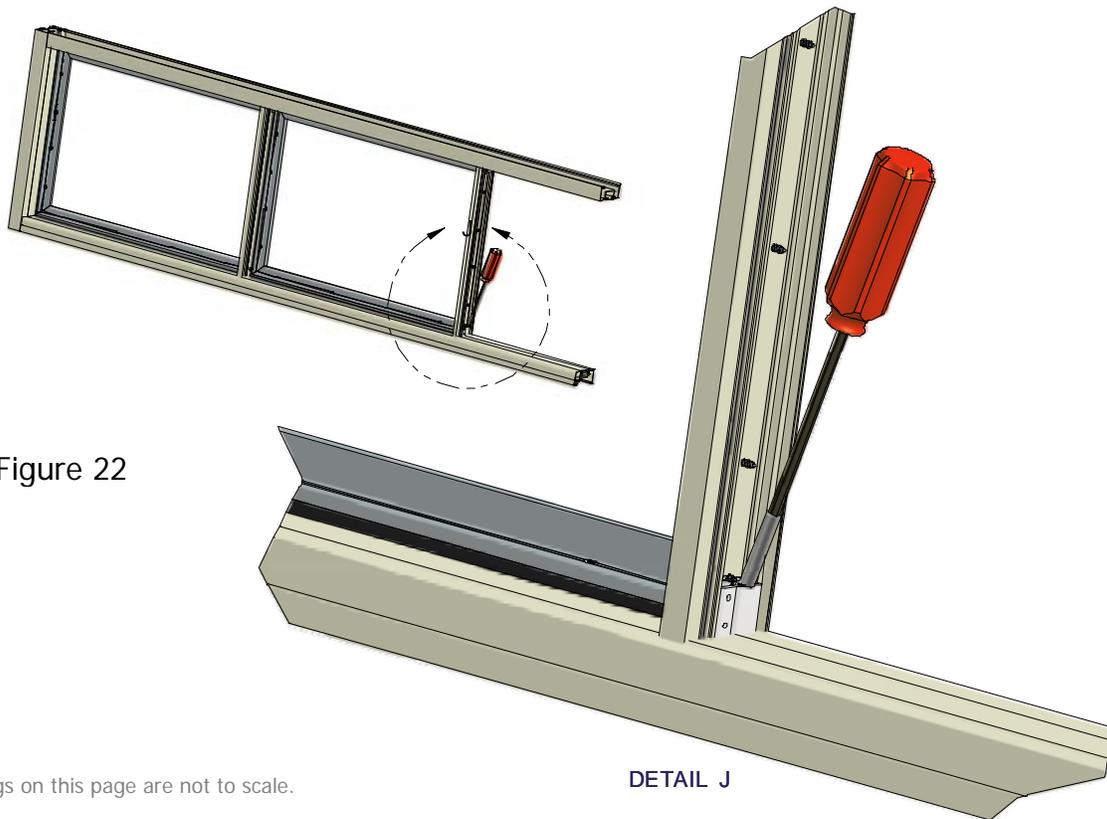
#### **Step 3**

Apply sealant to both ends of the female half of the mullion and apply to the interlock of the WV410 frame. See Figure 20 on page 15.

#### **Step 4**

Install one (1) K320 shear block and two (2) MRF7 screws at the top and bottom horizontal.

NOTE: The screw holes must be predrilled and tapped for screw insertion. Due to the available space within the mullion, a long handled screwdriver is recommended. See Figure 22.



\* Drawings on this page are not to scale.

#### **Step 5**

Insert one (1) SPC6 into the shear block at the top and bottom of the mullion half to secure. See Figure 15 on Page 13.

#### **Step 6**

Apply sealant to both ends of the male half 9837 of the mullion, snap into the female portion, and fasten with (1) SPC6 at each end of the shear block. See Figure 15 on Page 13.

#### **Step 7**

Seal around the top and bottom of the mullion and the window interlock to receive the next window. See Figure 16 on Page 14.

## **Section VIII – Window Installation**

### **C. Ribbon Window Installation**

#### **Step 8**

Install the next WV410 frame by aligning the interlock of the window with the mullion interlock.

#### **Step 9**

Shim the WV410 frame into the correct location and anchor to the opening at the top, bottom, and mullion side at the recommended locations covered in Steps 2 through 3 on Pages 16 and 17.

#### **Step 11**

After the WV410 frames and intermediate mullions have been installed, the interior and exterior perimeter seals are to be applied. Seal the interior joint between the vertical frame and the storefront opening at the top, bottom, and end jambs of the ribbon run. The vertical mullion required no additional sealant at the interior surface. The exterior joint between the WV410 frame, storefront opening, and the intermediate vertical requires a continuous seal at all four (4) sides of the WV410 frames. See Figure 21 on Page 16 and Figure 23 below.

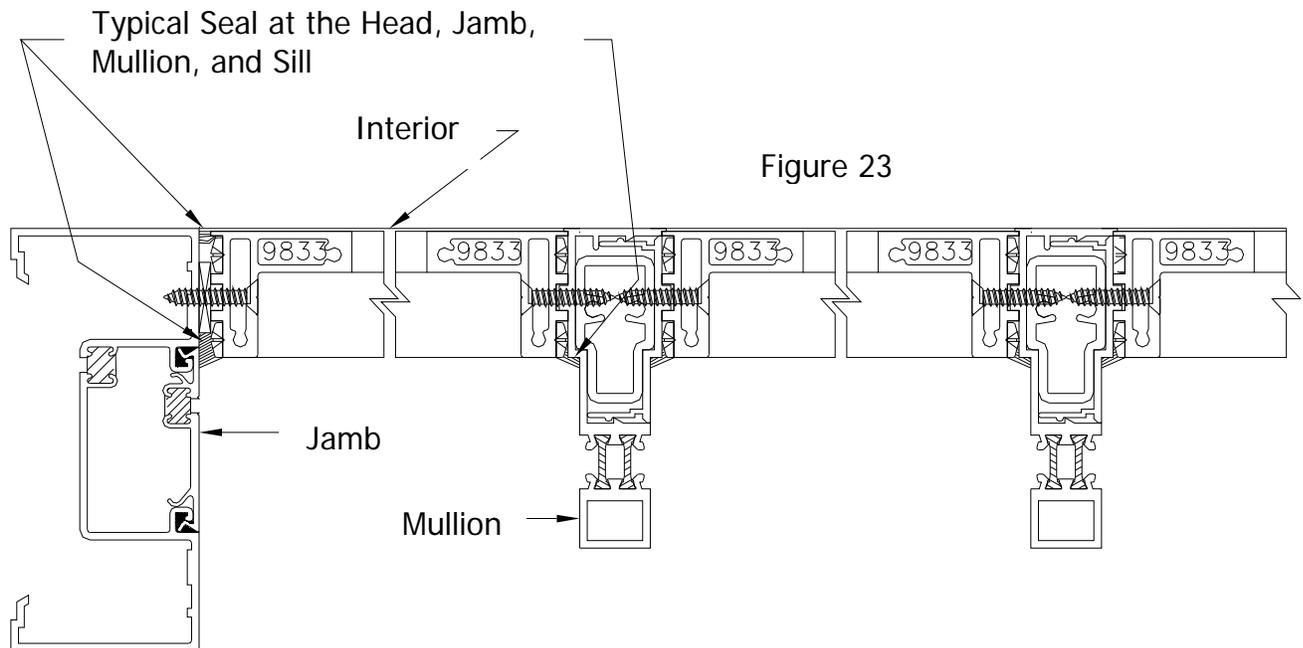


Figure 23

\* Drawings on this page are not to scale.

#### **Step 12**

If your application includes projected vents only, the operable vent may now be installed. See section IX on page 20. Casement vents must first have the lift blocks installed. See Section VIII on Page 19 for installation. Reinstall the operable vent to the WV410 frame. Be sure to mount the vent and hinges in the same locations preinstalled by EFCO.

## **Section IX – Casement Lift Block Installation**

Due to the weight of the vent, lift blocks are used to elevate the vent upon closing. Elevating the vent aligns the gaskets and cam locks to the proper location. All WV410 casement vents receive one (1) or two (2) pairs of lift blocks, depending on the vent size. Casement vents over 30" wide will receive two (2) pairs and vents under 30" will receive one (1) pair. The blocks are designed to be located directly over each other. The vent portion of the lift block pair will be preinstalled by EFCO.

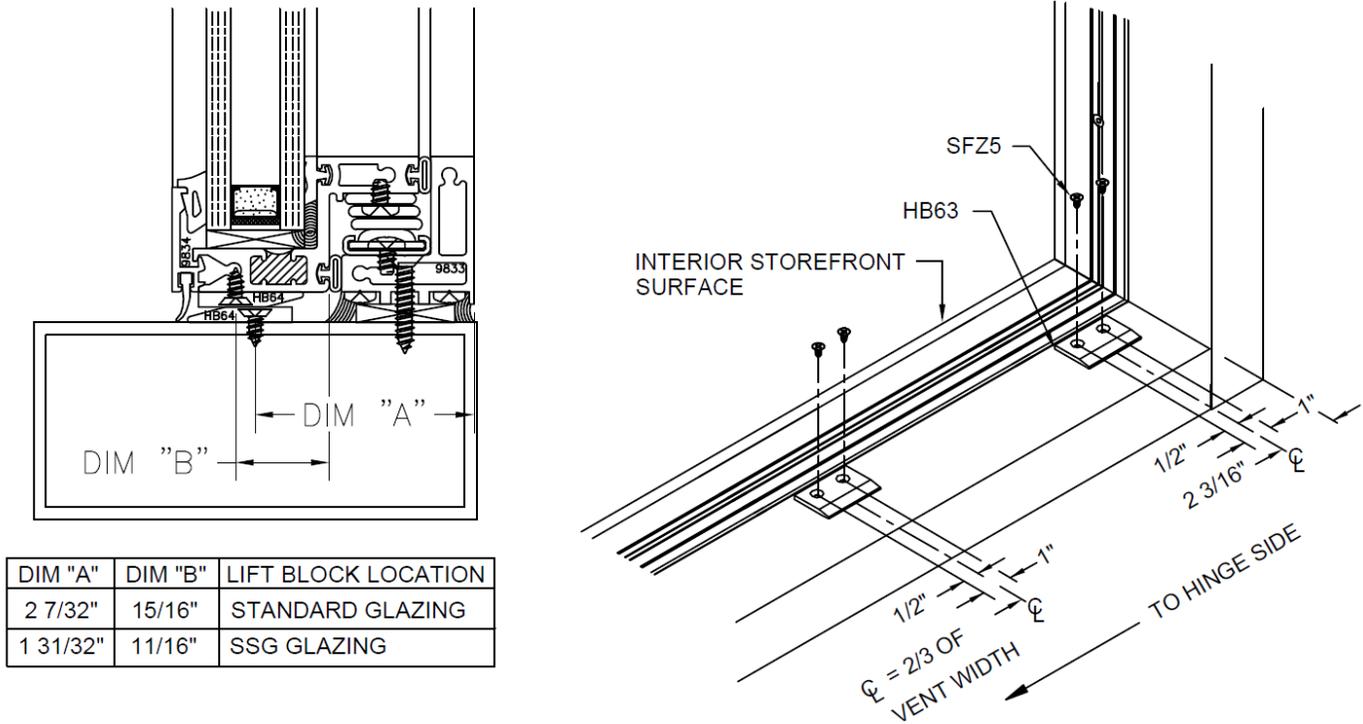


Figure 24

\* Drawings on this page are not to scale.

### **Step 1**

Locate the center line of the lift block HB64 as required per the vent size. See Figure 24. Check the lift block location mounted on the vent for correct center line.

### **Step 2**

Drill (2) .136" diameter (No. 29 drill) holes per block through the storefront framing shown in Figure 24, and install with (2) SFZ5 fasteners per lift block.

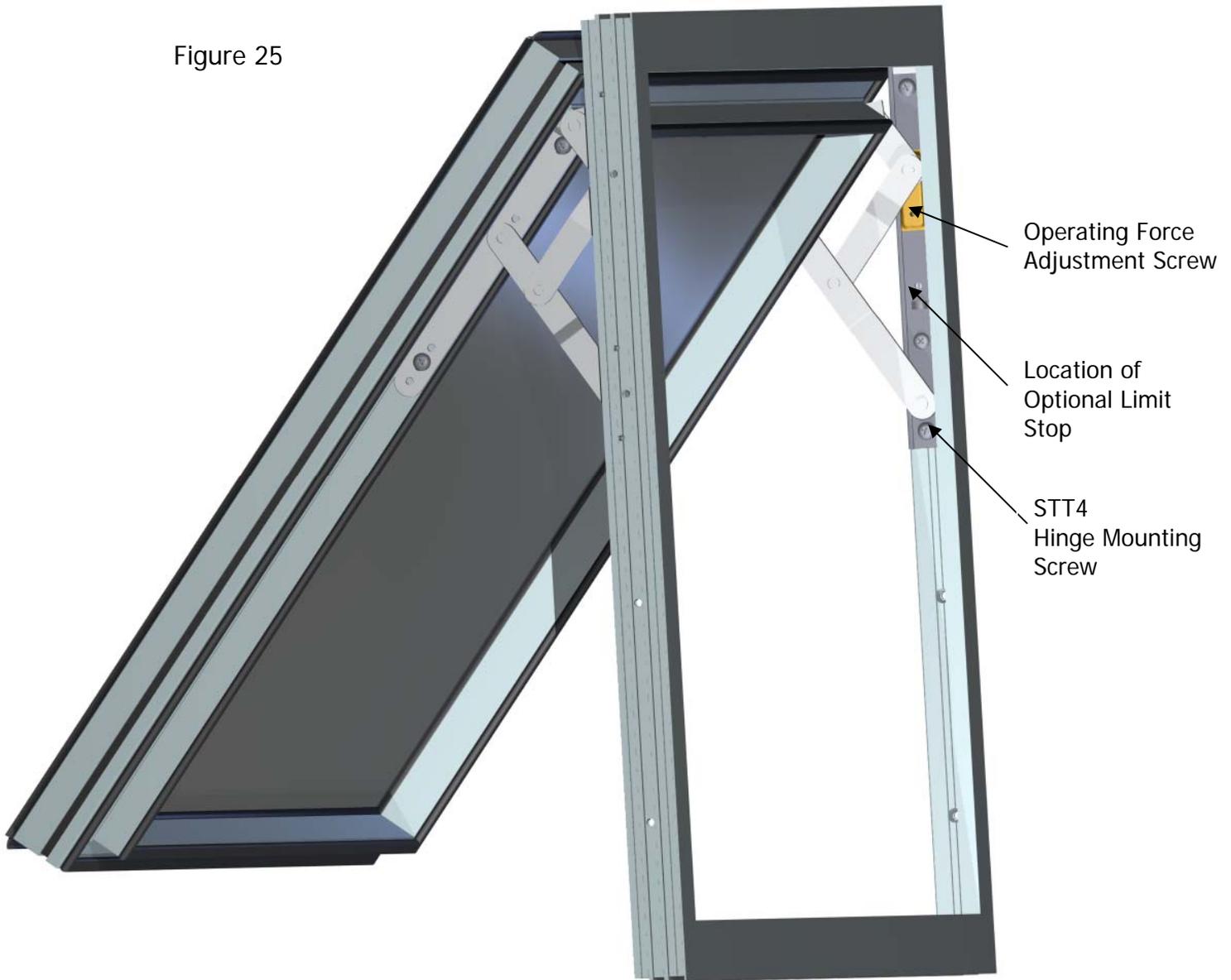
### **Step 3**

The operable vent may now be installed. Reinstall the operable vent to the WV410 frame. Be sure to mount the vent and hinges in the same locations preinstalled by EFCO. See section IX on Page 20.

## **Section X- Vent Removal and Adjustment**

Unlock the vent and open the operable vent far enough to expose the hinge attachment screws STT5 at the WV410 frame. See Figure 25. Support the vent and remove the six (6) hinge attachment screws from the WV410 frame. Note: If the vent is equipped with an optional limit stop, this will need to be removed before the vent will open far enough to expose the mounting screws. The vent can now be removed from the exterior. Reinstall the vent in the reverse order.

Figure 25



\* Drawings on this page are not to scale.

The hold open force for the vent can be adjusted by a set screw located in the hinge friction shoe. See Figure 25. Open the vent far enough to access the set screw. Turn the screw clockwise to increase the friction, counterclockwise will decrease the friction. Adjust both hinges equally, make small adjustments, and check operation.