

Spandrel Panel Design Guidelines

STARLINE
WINDOWS



Quality, Comfort & Peace of Mind



Foreword

This Design Guide provides specifications on metal panels, glass or Aluminum Composite Metal (ACM) spandrel contained within the Starline's aluminum product series.

This document is intended to provide information on our standard products. Non-standard designs and applications can be reviewed to determine the feasibility on a project-specific basis.

Please email any project specific enquiries to architectural@starlinewindows.com or technical@starlinewindows.com.

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Starline Windows reserves the right to change or discontinue this product without notice.

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Exterior and Interior Material for Opaque Areas

Exterior Material for Opaque Areas – Including the Bypass

The following options are available for the exterior opaque areas – including the bypass, and are available for all of Starline's aluminum product series, unless noted otherwise:

- Flush metal panel.
- Top hat panel.
- Sandwich panel. Sandwich panels are not available at the bypass locations¹.
- 1", 2", and 4" Raised Metal Panel (RMP). Available in all series less the series 9100R.
- Flush to 2" beveled panels. Available in the series 9000, 9200, and 9600.
- Corrugated metal panel options available are as follows:
 - Rectangular 1" x 2" extrusions.
 - Curved sheet. The flutes are 7/8" deep and are spaced 2 5/8" center to center.

These panels can be orientated vertically or horizontally and are available in the series 9000, 9200, and 9600.

- Aluminum Composite Metal (ACM) spandrel.
- Single lite spandrel glass².
- Spandrel Insulated Glass Unit (IGU)^{2, 3}. Available in all series at the opaque areas other than the bypass. At the bypass, the spandrel IGU is available in the series 9000, 9200, and 9600.

Additional information regarding the exterior material options can be found in the [Metal Panel Design Guidelines](#) and in the [Glass or Aluminum Composite Metal \(ACM\) Spandrel Panel Design Guidelines](#) sections of this document.

Note: Additional opaque options may be available and can be reviewed on a project-specific basis.

Interior Material for Opaque Areas

The following options are available for the interior opaque areas, and are available for all of Starline's aluminum product series:

- Aluminum panel – Powder coated to match the interior WW and door frame. Used when the interior panel will be left exposed. Manufactured from 14-gauge aluminum sheet metal.
- Galvanized panel – Used when the interior panel will be covered, by others. I.e., An interior wall. Manufactured from 20-gauge galvanized sheet metal and is recessed ~ 1/8" into the frame.

Note: There is no aluminum or galvanized back pan at the bypass itself.

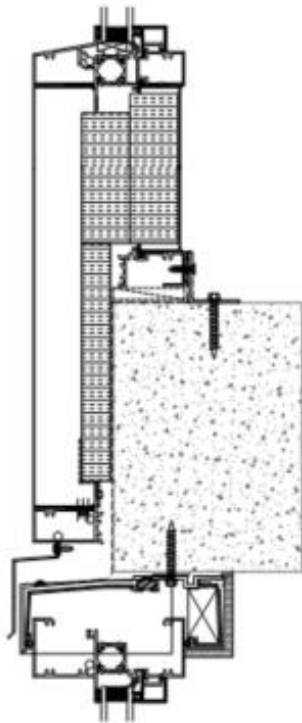
¹ Sandwich panels are the only metal panel option available for Starline's Unitized Curtain Wall system.

² The minimum size for a spandrel glass lite at a bypass condition is 13" x 14", 11 3/4" x 14" for in-slab duct, and that is the glass lite itself, not including framing members. The minimum size for a spandrel glass lite at locations other than the bypass is 9" x 14" and that is the glass lite itself, not including framing members. Tempering is required for spandrel glass. Refer to [Spandrel Glass Minimum Size – Single Lite & Spandrel IGU](#) for details and further clarity.

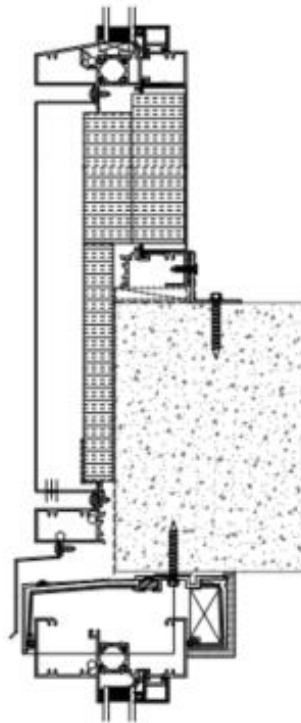
³ When a spandrel IGU is selected for Starline's 4 1/2" deep window wall and door systems, an alternative bypass detail (DC7) is used instead of Starline's standard bypass detail (DC6). Refer to [Spandrel IGU](#) for detail and further clarity.

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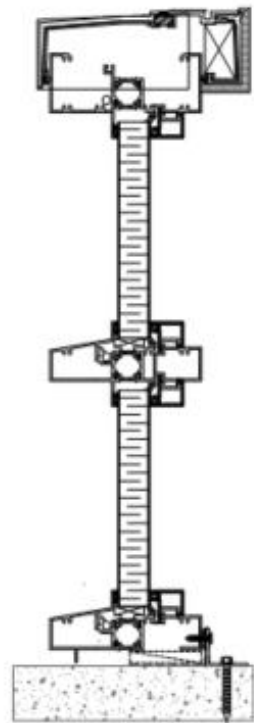
Details – Section Details for Standard Opaque Options



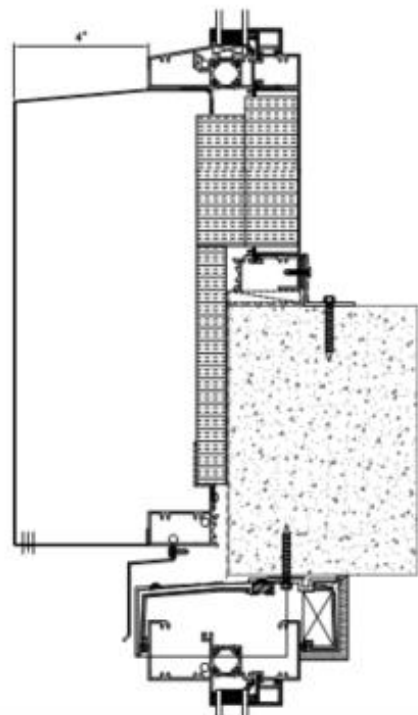
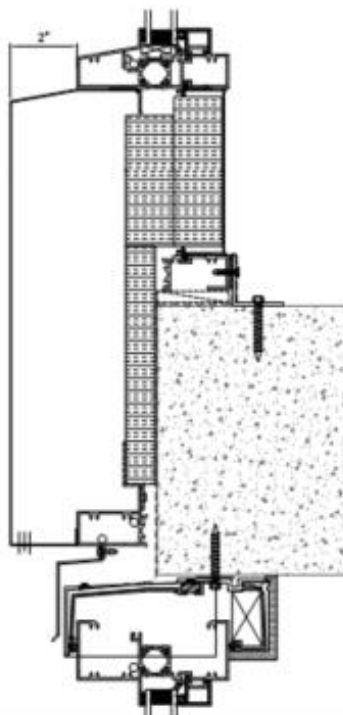
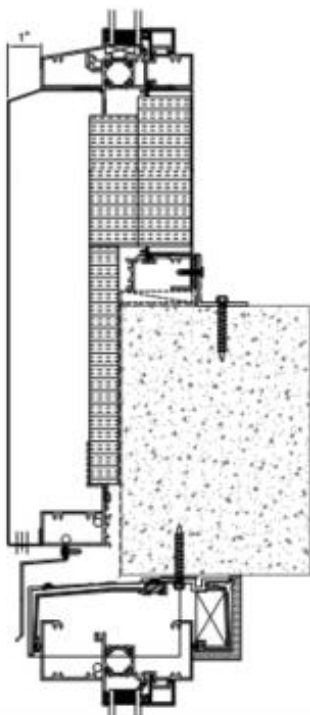
Exterior: Aluminum Panel
Interior: Galvanized Back Pan
Also available with aluminum back pan



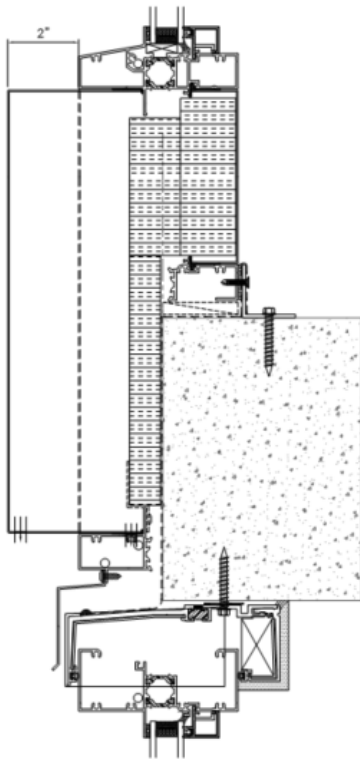
Exterior: Top Hat Panel
Interior: Aluminum Back Pan
Also available with galvanized back pan



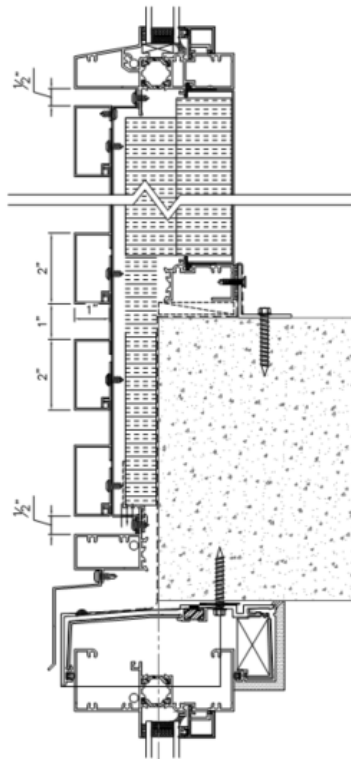
Exterior: 12 Gauge Aluminum
Middle: Polyisocyanurate
Interior: 14 Gauge Aluminum



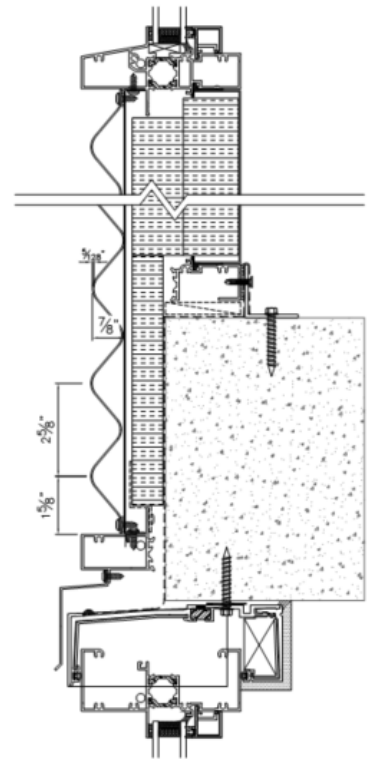
The details provided in this document are showing the series 9000 unless noted otherwise.



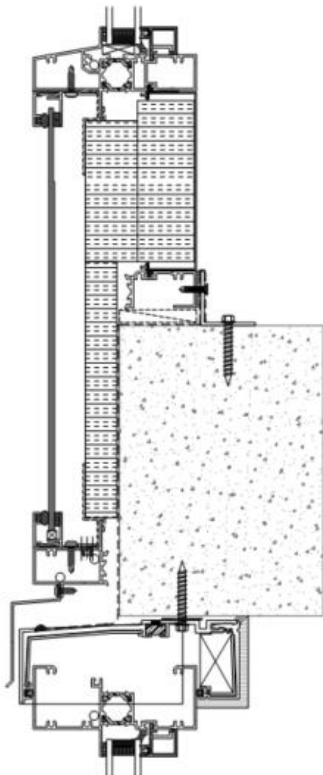
Exterior: Flush to 2" Beveled Panel
Interior: Aluminum Back Pan
Also available with galvanized back pan



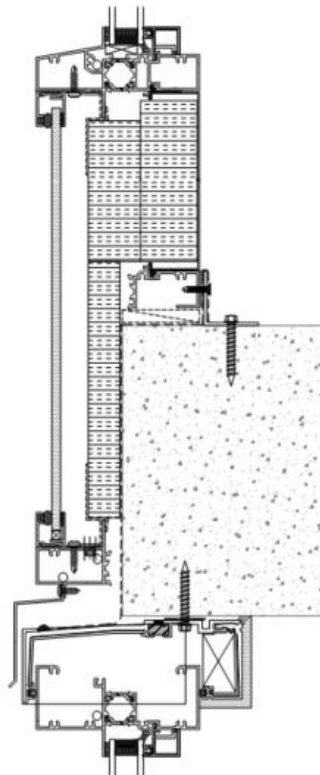
Exterior: 1" x 2" Corrugated Panel
Interior: Aluminum Back Pan
Also available with galvanized back pan



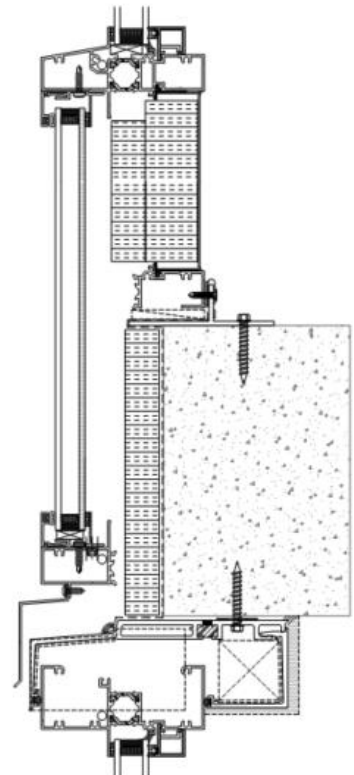
Exterior: Curved Corrugated Panel
Interior: Aluminum Back Pan
Also available with galvanized back pan



Exterior: ACM Panel
Interior: Aluminum Back Pan
Also available with galvanized back pan



Exterior: Spandrel Glass
Interior: Aluminum Back Pan
Also available with galvanized back pan



Exterior: Spandrel IGU
Interior: Galvanized Back Pan
Also available with aluminum back pan

Opaque Energy Values – Including Bypass

The R-Values noted below are based on using any of the opaque options listed in the [Exterior and Interior Material for Opaque Areas](#) section of this document.

SERIES	9000 & 9100R		9200		9600	
Depth of System	4 1/2" Deep				6" Deep	
Slab Nominal Support ¹	2 1/8"	1 1/8"	2 1/8"	1 1/8"	2 1/8"	1 1/8"
Opaque Areas ²	R8	R8	R11	R11	R13 ³	R13 ³
Bypass ²	R3	R7	R4	R8	R8	R12

¹ **Note:** Refer to [Bypass – Insulation at the Slab Edge](#) to review the 2 1/8" and 1 1/8" nominal support details for the series 9000 and 9600. The nominal support details for the 4 1/2" deep systems are the same for all the 4 1/2" deep systems Starline offers.

² **Note:** The exact R-Value will vary slightly depending on the exact opaque matrix – The exterior opaque option and an aluminum or galvanized back pan can result in the overall R-Value to vary by +/- R1.

³ **Note:** Option to reduce the mineral wool from 4 1/2" to 3" to achieve an R8, should R8 meet the project specific energy requirements.

Insulation

Rockwool Fabrock 30 and / or Rockwool Fabrock LT Mineral Wool (MW) fibre insulation, or equivalent. The R-value/inch @ 75°F is 4.1 hr.ft².F/Btu.

R-Matte plus 3 rigid foam plastic insulation, or equivalent is the standard insulation for aluminum and galvanized steel sandwich panel applications. The overall insulation thickness for sandwich panel is 3/4".

Opaque Area

4 1/2" deep systems contain 3" of MW at R4.1 per inch.

6" deep systems contain 3" or 4 1/2" of MW at R4.1 per inch. The project specific energy requirements will determine whether 3" or 4 1/2" of MW is used. The 4 1/2" of MW is available at an extra cost.

Note: Alternate insulation may be available, as well as additional MW can be added to our raised metal panels, at an additional cost, should higher thermal performance be required. These options can be reviewed on a project specific basis.

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Bypass – Insulation at the Slab Edge

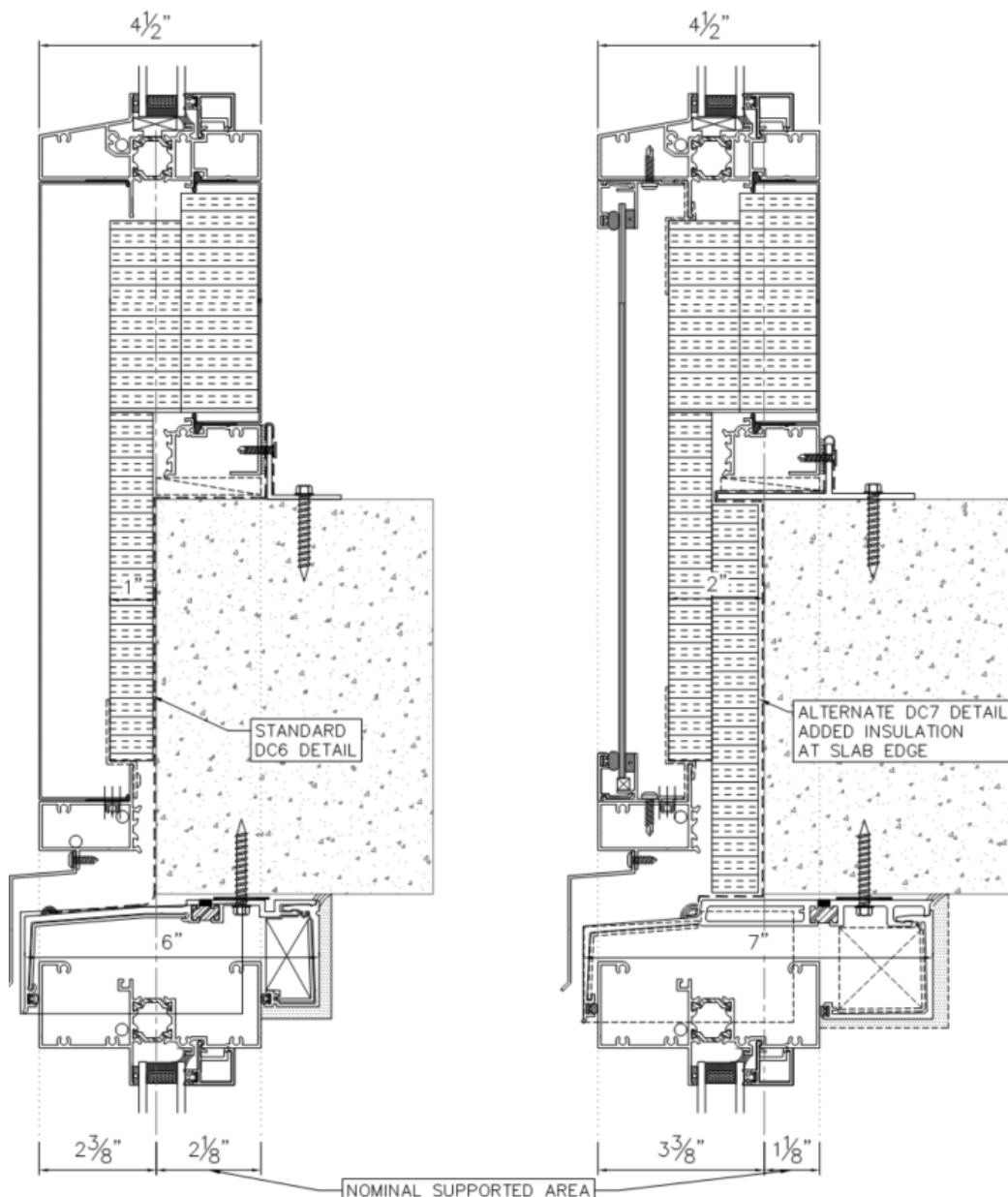
4 1/2" Deep Systems

Using the standard bypass detail (DC6), the system contains 1" of non-continuous MW at the slab edge. The DC6 detail uses a 6" deep deflection header. The 4 1/2" deep systems standard nominal support on the slab edge is 2 1/8".

There is an option to add 1" of continuous MW in addition to the 1" of non-continuous MW, using an alternate bypass detail (DC7).

The DC7 detail involves some specific detailing including, upgrading to a 7" head deflector, using a T-angle for the installation sill angle (standard is an L-angle), and requires the slab edge to be cut back, by others, by 1" to accommodate the additional insulation. This DC7 detail's nominal support on the slab edge is 1 1/8".

The DC7 detail is available at an additional cost.



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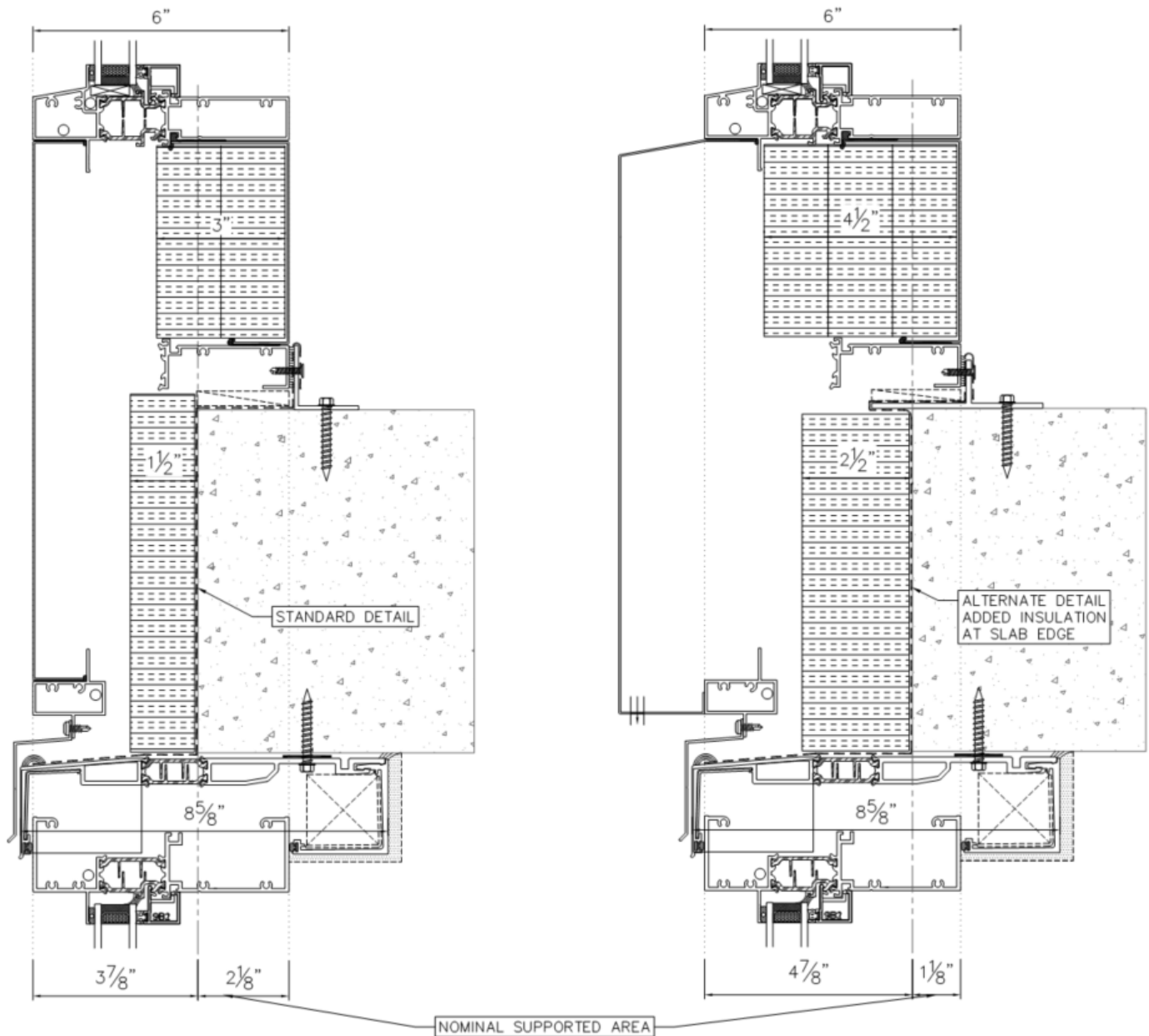
6" Deep Systems

Using the standard bypass detail, the system contains 1 1/2" of continuous MW at the slab edge. The 6" deep systems standard nominal support on the slab edge is 2 1/8".

There is an option to add 1" of continuous MW in addition to the 1 1/2" of continuous MW, using an alternate bypass detail. This alternate detail uses a T-angle for the installation sill angle (standard is an L-angle), and requires the slab edge to be cut back, by others, by 1" to accommodate the additional insulation. This detail's standard nominal support on the slab edge is 1 1/8".

The 1 1/8" nominal support is available at an additional cost.

Note: The deflection header depth is 8 5/8" and is the same depth regardless of which nominal support is used.



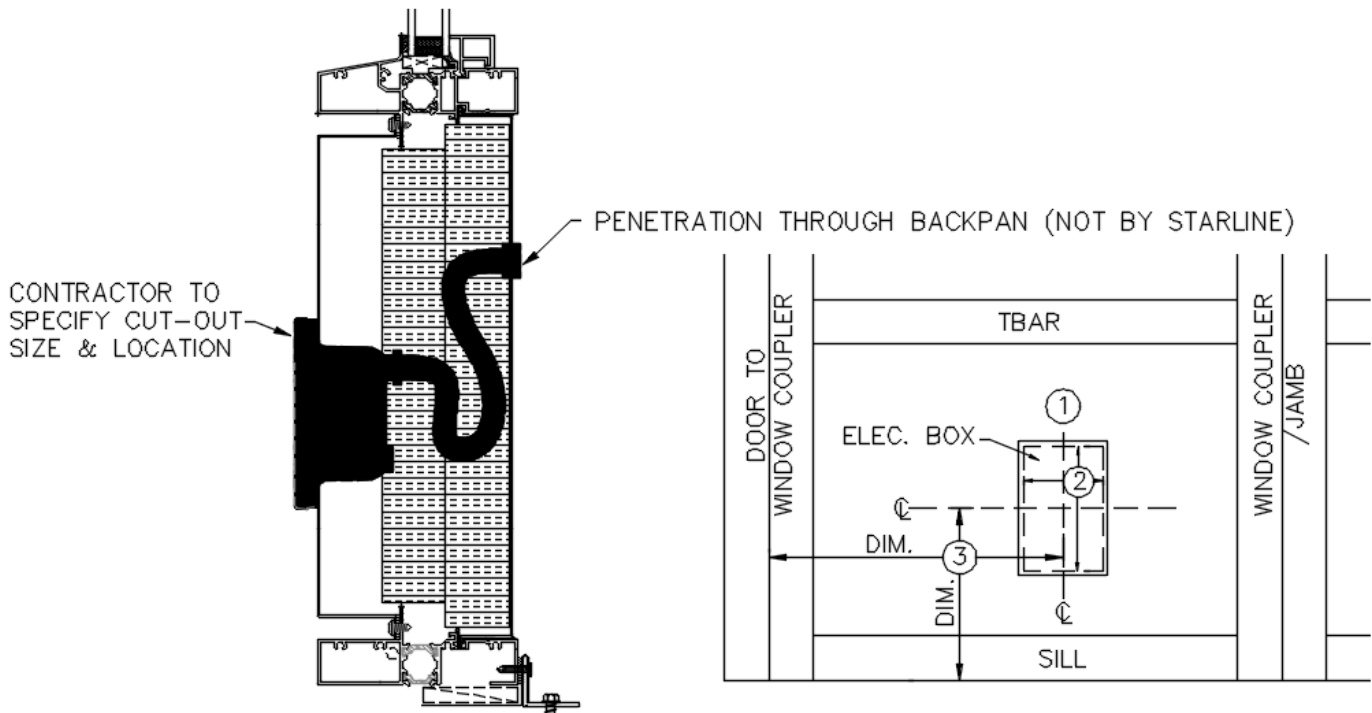
The above details show the series 9600.

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Electrical, Mechanical, and Other Penetrations

Electrical, mechanical and other cut-outs can be made in any of the opaque options noted in the [Exterior and Interior Material for Opaque Areas](#) section of this design guideline with exception to the exterior corrugated panel options and spandrel glass options – These options are unable to accommodate cut-outs. Starline recommends that a top hat panel is used for all penetrations where possible.

If the cut outs are shown on Starline's approved shop drawings, Starline will manufacturer the cut outs in the factory. If the cut outs are not shown on the shop drawings, the specific trade will be required to make the cut-out in the field (on site). The trade which requires the cut out will be responsible for making the cut-out air and water tight (collars, fittings, sealant, etc.) and are to provide a localized warranty at the cut-out.



NOTE TO CONTRACTOR:

PLEASE CONFIRM THE FOLLOWING:

- 1 – ORIENTATION OF ELECTRICAL BOX HORIZONTAL OR VERTICAL)
- 2 – SIZE OF CUT OUT REQUIRED IN METAL PANEL (WIDTH × HEIGHT)
- 3 – CENTER LOCATION OF CUT OUT FROM BOTTOM OF FRAME & VERTICAL COUPLER OR SPECIFY TO BE CENTERED ON PANEL. (HORIZONTAL & VERTICAL)

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Metal Panel Design Guidelines

Starline offers the following metal panel options for the exterior opaque areas – including the bypass. These options are available for all of Starline's aluminum product series, unless noted otherwise:

- Flush metal panel.
- Top hat panel.
- Sandwich panel is available for opaque areas, other than bypass locations.
- 1", 2", and 4" Raised Metal Panel (RMP). Available in all series less the series 9100R.
- Flush to 2" beveled panels. Available in the series 9000, 9200, and 9600.
- Corrugated metal panel options available are as follows, and can orientated to be horizontal or vertical:
 - Rectangular 1" x 2" extrusions.
 - Curved sheet extrusion. The flutes are 7/8" deep and are spaced 2 5/8" center to center.

Available in the series 9000, 9200, and 9600.

The below metal panel options are constructed from the following material:

- Flush metal panels, top hat panels, RMP's and beveled panels are made from 12-gauge aluminum.
- Sandwich panels consist of 12-gauge aluminum on the exterior, polyisocyanurate in the middle, and 14-gauge aluminum on the interior. The thickness of the polyisocyanurate will vary depending on the product series. The 12-gauge and 14-gauge aluminum will be powder coated to match the exterior and interior of the frame.
- The corrugated rectangular 1" x 2" extrusion are extruded from 6063 alloy, T5 tempered with a minimum thickness of 0.063".
- The corrugated curved sheet extrusion is 18-gauge aluminum.

Note:

The metal panels manufactured by Starline are not CNC machined composite material like Alucobond or Reyobond; rather they are monolithic aluminum sheet, sheared, formed to shape and powder coated. Monolithic aluminum panels are typically a lower cost alternate to composite metal panels and they do not provide the same aesthetics. Monolithic aluminum panels typically have more variance in dimension and flatness.

The Starline monolithic metal panels are produced to a tolerance of +/- 0.25% of the required dimension and panel bow is to be a maximum of 0.5% of the panel dimension width and length.

They are installed into the window wall module frame centered. This results in a potential total width variation of 1/4" in contiguous 50" wide panels which would create a maximum vertical plane variance of 1/8". Further, the horizontal reveals on contiguous 25" tall panels could potentially vary by up to 1/8" over the width of the panels.

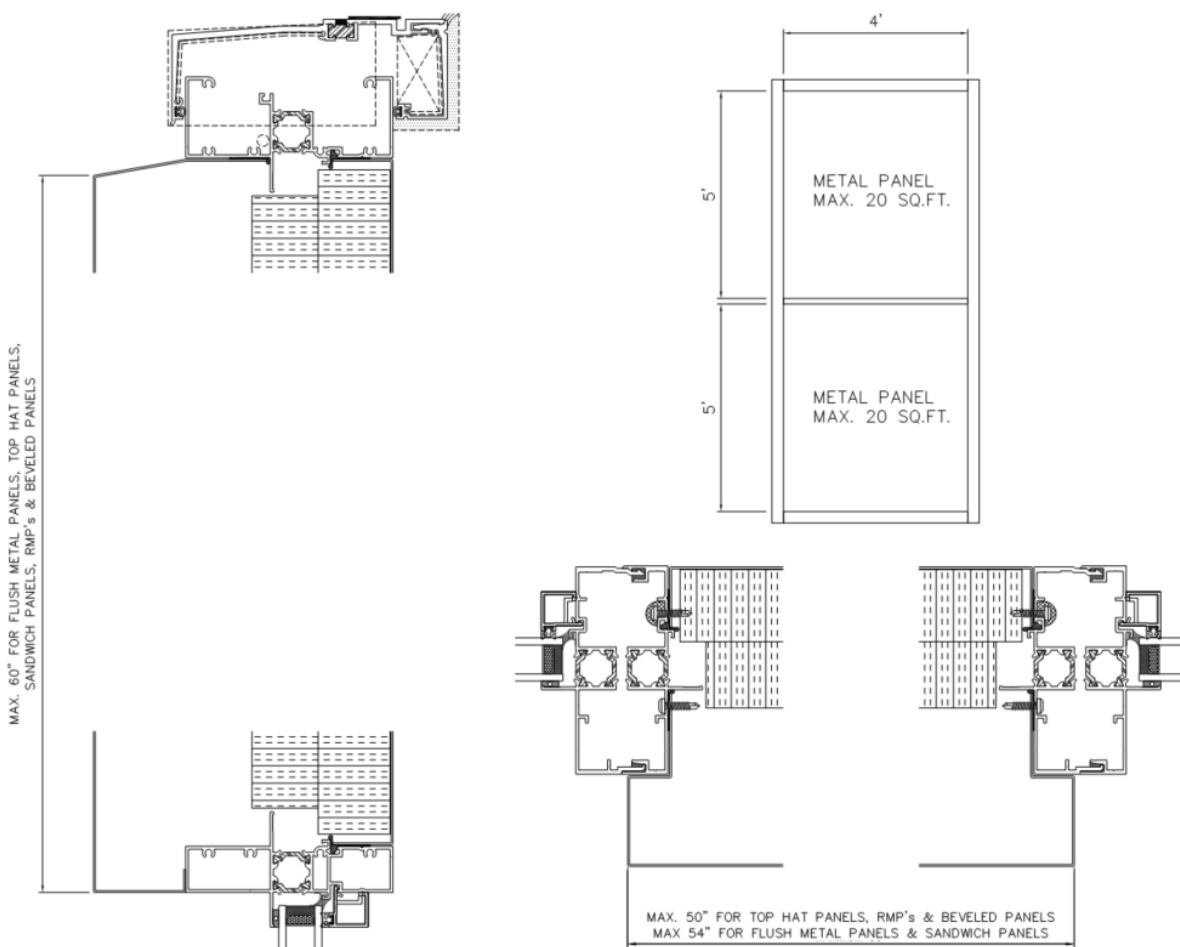
The window wall modules are installed at site with a maximum variance to plumb of +/- 0.25%. (+/- 1/4" / 96"). This can result in adjacent panel reveals varying by up to 1/2" over a 96" height.

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Metal Panel Sizing Guidelines

PANEL TYPE	MAXIMUM SURFACE AREA	WIDTH		HEIGHT	
		MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
Flush Metal Panel	20 sq. ft.	15 1/2"	54"	6 3/8"	60"
Top Hat Panel	20 sq. ft.	16 1/2"	50"	7 1/2"	60"
Sandwich Panel	20 sq. ft.	10"	54"	5"	60"
1", 2", & 4" RMP	20 sq. ft.	14 1/2"	50"	8"	60"
Flush to 2" Beveled Panel	20 sq. ft.	15 1/2"	50"	5 3/4"	60"
Corrugated Panels	45 sq. ft.	Follows WW sizing parameters as these are extrusions.			

The minimum and maximum sizes noted above are nominal.

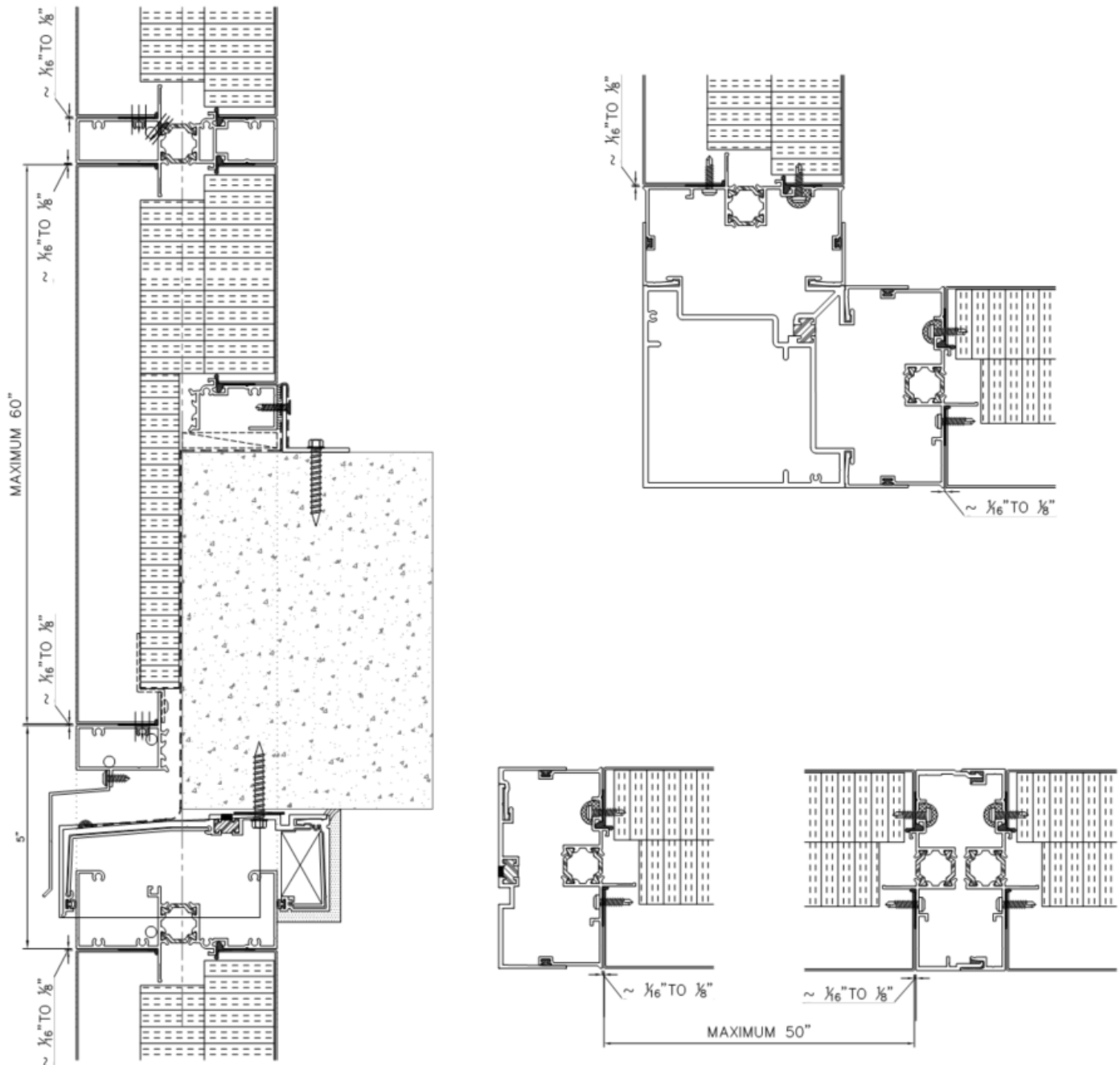


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Flush Metal Panels

Flush metal panels are available for all of Starline's aluminum product series. There is a 1/16" to 1/8" reveal between the framing members and the flush panel.

Refer to [Metal Panel Sizing Guidelines](#) for the minimum and maximum dimensions of a flush metal panel.

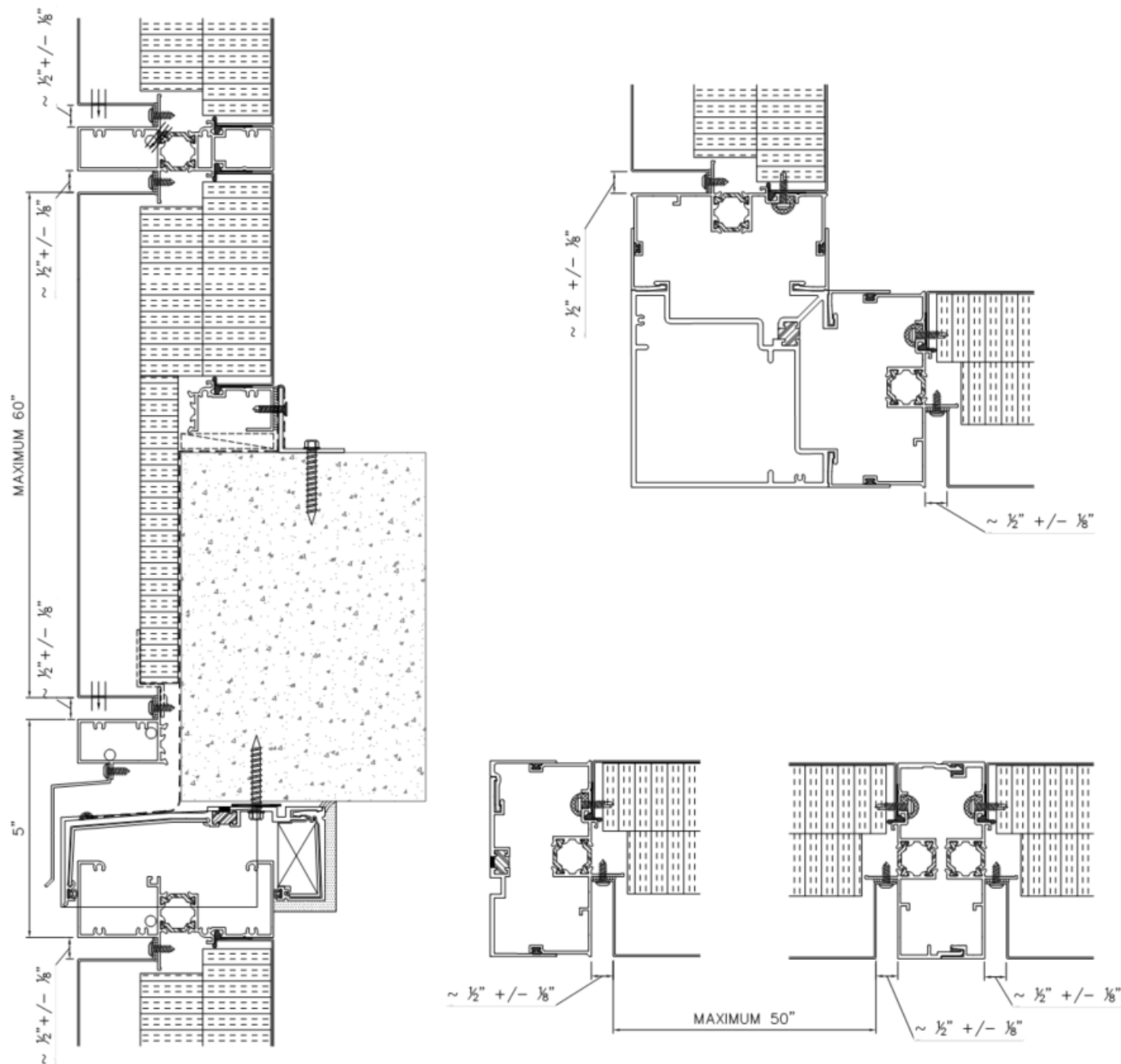


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Top Hat Panels

Top hat panels are available for all of Starline's aluminum product series. The reveal between the framing member and the top hat panel is $\sim 1/2'' \pm 1/8''$.

Refer to [Metal Panel Sizing Guidelines](#) for the minimum and maximum dimensions of a top hat panel.

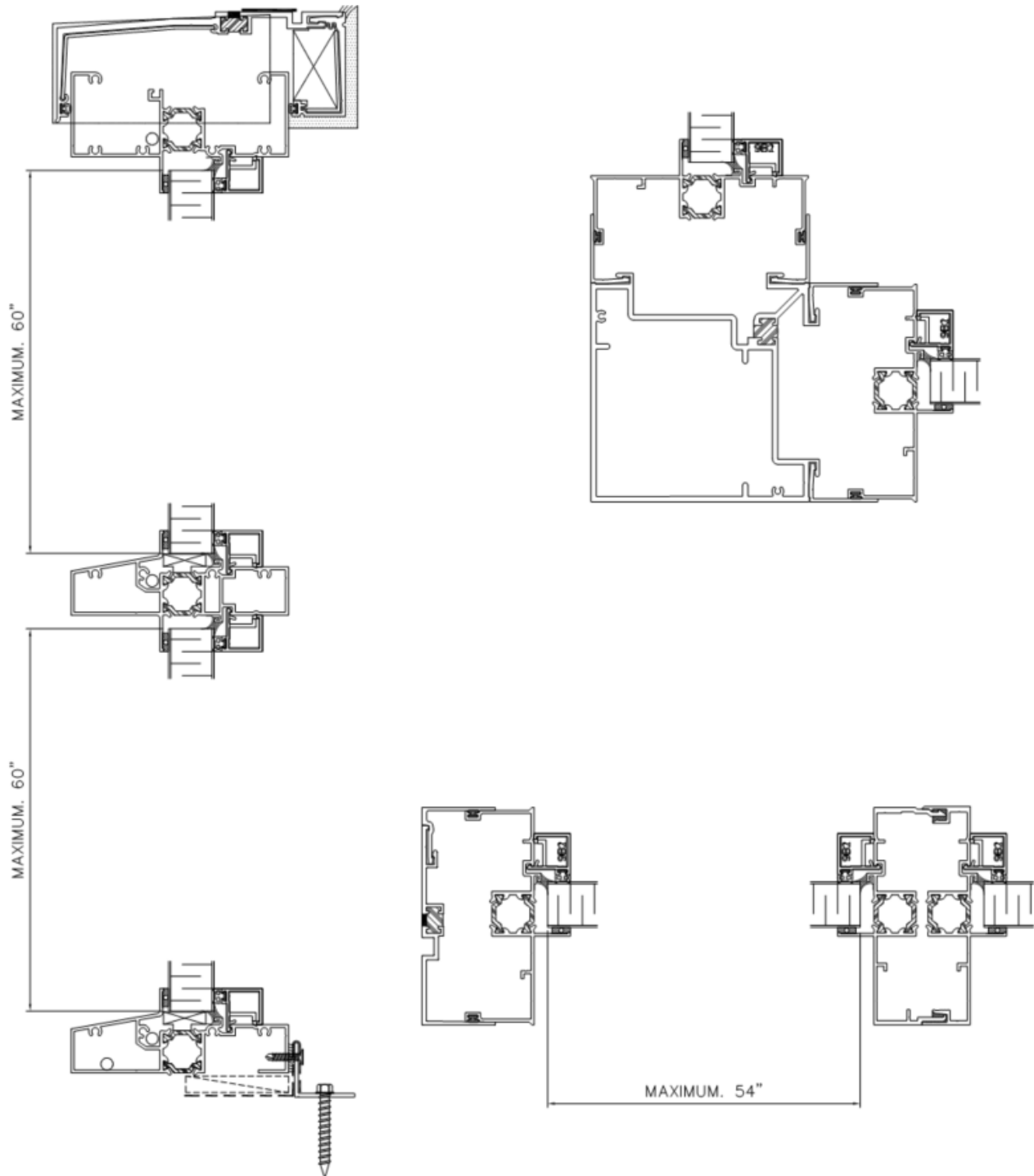


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Sandwich Panels

Sandwich panels are available for all of Starline's aluminum product series and are glazed into the glazing pocket. The thickness of the polyisocyanurate varies depending on the aluminum product series.

Refer to [Metal Panel Sizing Guidelines](#) for the minimum and maximum dimensions for the sandwich panel.



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Raised Metal Panel's (RMP's)

The RMP's are available in 1", 2" and 4" projections, and are available for all of Starline's aluminum product series, less the series 9100R.

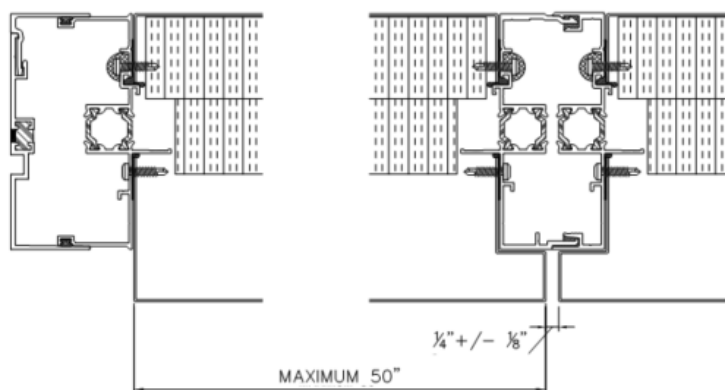
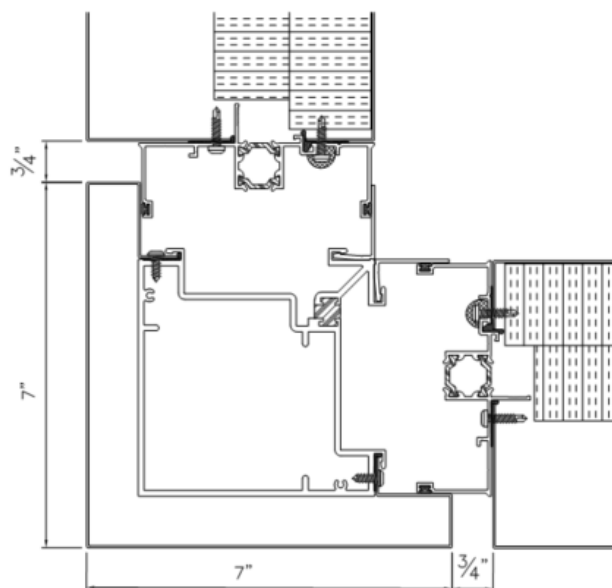
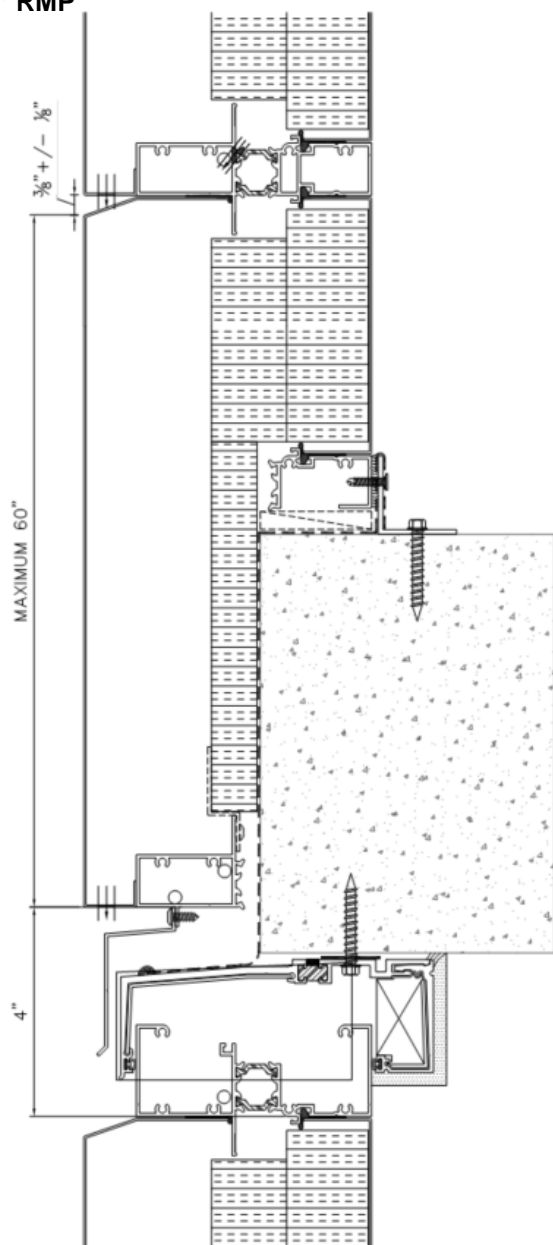
The horizontal reveal between RMP's within same window frame is $\sim 3/8"$ $\pm 1/8"$.

The vertical reveal between RMP's between 2 different window modules coupled together is $\sim 1/4"$ $\pm 1/8"$.

The vertical reveal between an RMP Corner Post (CP) and the window wall module on either side of the CP is $3/4"$

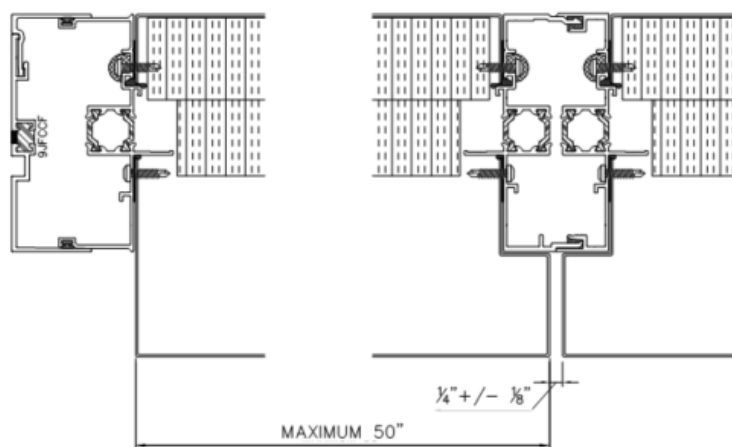
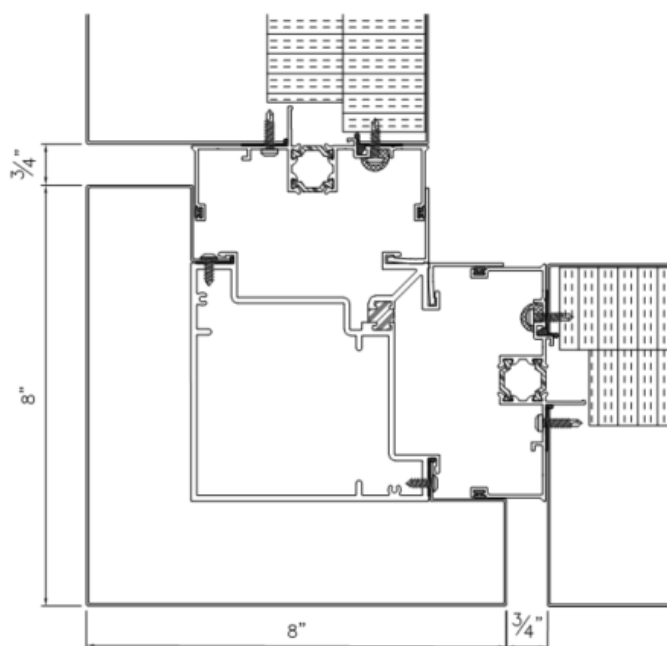
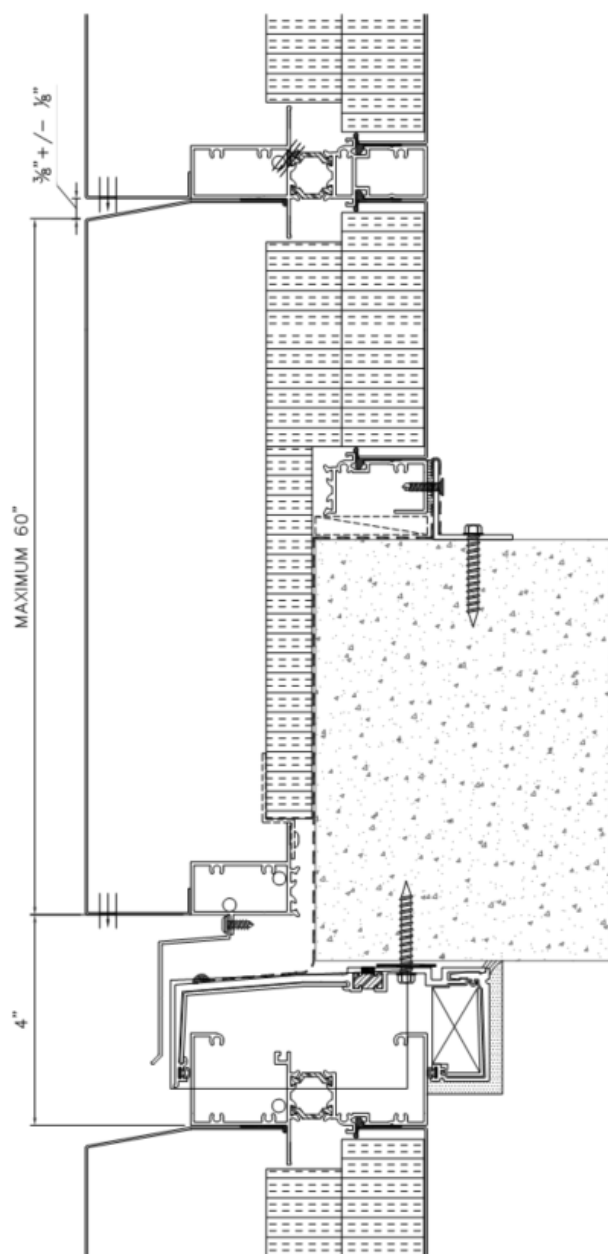
Refer to [Metal Panel Sizing Guidelines](#) for the minimum and maximum dimensions for the RMP's.

1" RMP



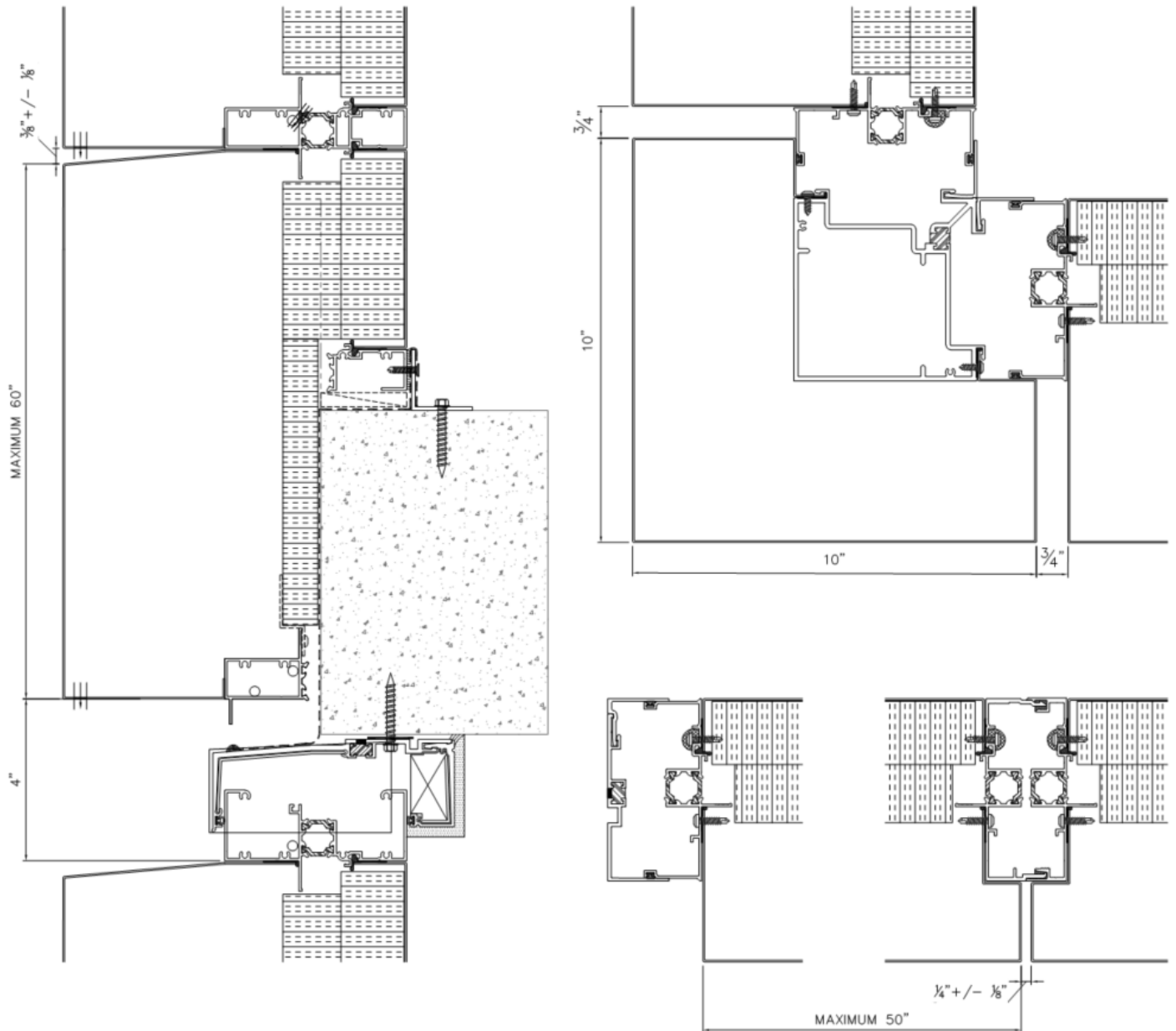
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2" Raised Metal Panel



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4" Raised Metal Panel

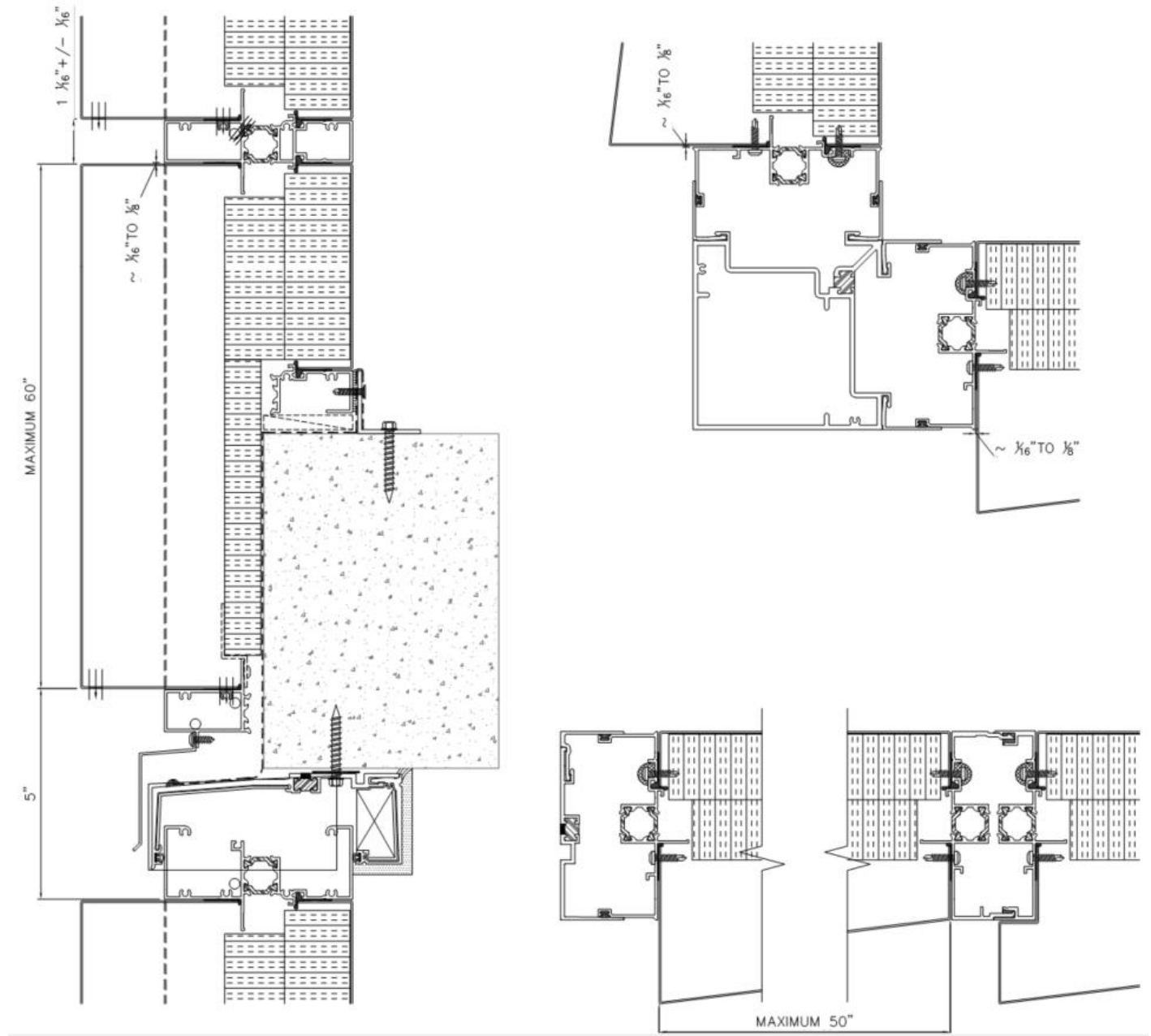


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Flush to 2" Beveled Panel

Flush to 2" beveled panels are available for the series 9000, 9200, and 9600.

Refer to [Metal Panel Sizing Guidelines](#) for the minimum and maximum dimensions for the flush to 2" beveled panel.

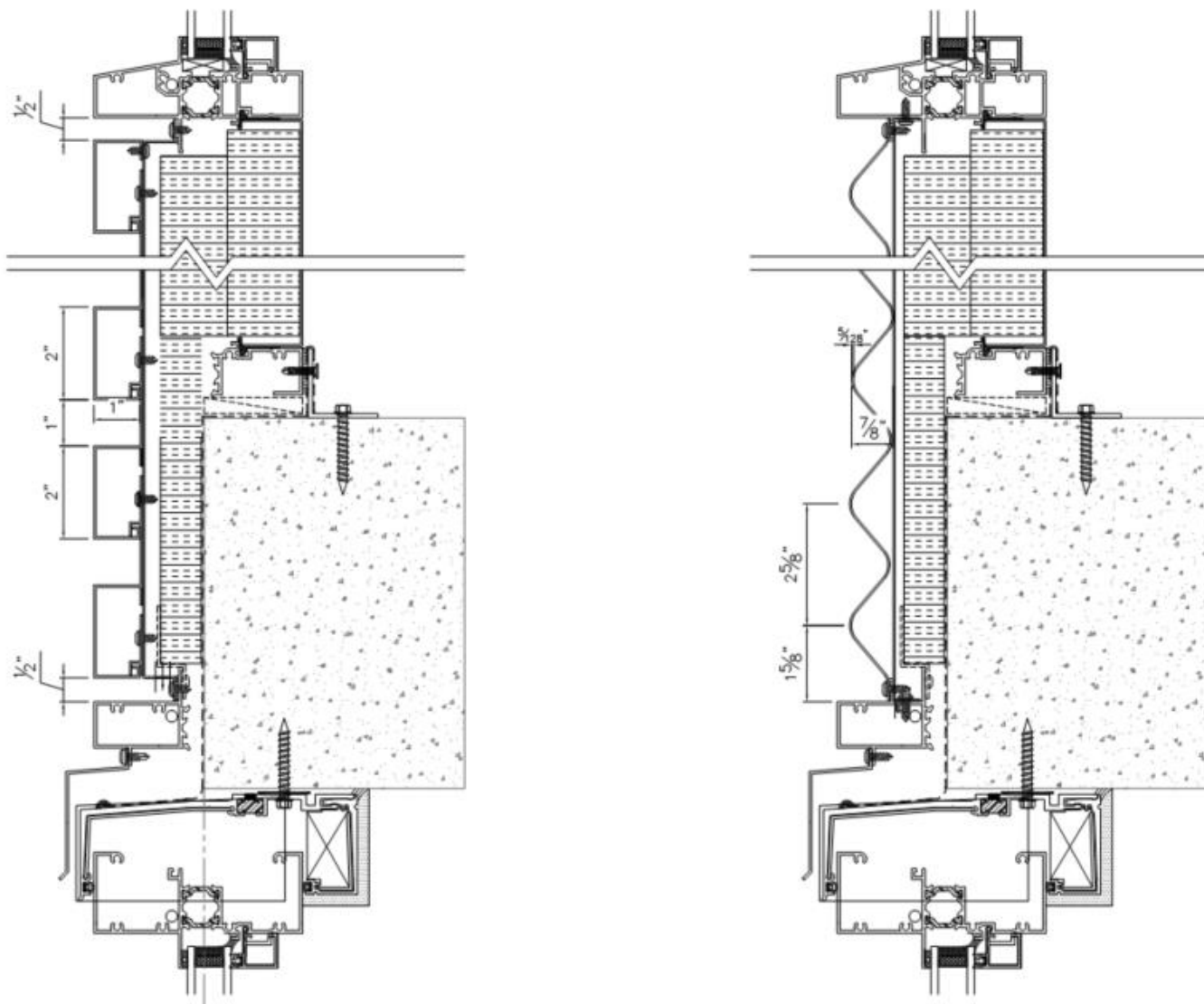


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Corrugated Metal Panels

Corrugated metal panels are available for the series 9000, 9200, and 9600.

Refer to [Metal Panel Sizing Guidelines](#) for the minimum and maximum dimensions for the corrugated metal panels.



The details below show the panels orientated horizontally. These panels can be orientated vertically or horizontally.

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Glass or Aluminum Composite Metal Spandrel Design Guidelines

Starline offers the following glass or Aluminum Composite Metal (ACM) spandrel options for the exterior opaque areas – including the bypass. These options are available for all of Starline’s aluminum product series, unless noted otherwise:

- ACM spandrel panel.
- Single lite spandrel glass¹.
- Spandrel Insulated Glass Unit (IGU)^{1, 2}. Available in all series at the opaque areas other than the bypass. At the bypass the spandrel IGU is available in the series 9000, 9200, and 9600.

Note: Electrical, mechanical, and other cut-outs cannot be made in spandrel glass, however, cut-outs can be made into the ACM spandrel panels. If cut-outs are required refer to [Electrical, Mechanical & Other Penetrations](#) for details and further clarity.

Glass or ACM Spandrel Panel Sizing Guidelines

PANEL TYPE	MAXIMUM AREA	WIDTH		HEIGHT ¹			
		MINIMUM	MAXIMUM	MINIMUM	MINIMUM AT BYPASS	MINIMUM AT IN-SLAB DUCT	MAXIMUM
ACM	40 sq. ft.	5"	72"	9"	9"	9"	84"
6mm Single Lite Spandrel Glass	40 sq. ft.	14"	72"	9"	13"	11 3/4"	84"
Spandrel IGU ² 6mm/4mm	30 sq. ft.	14"	72"	9"	13"	11 3/4"	84"
Spandrel IGU ² 6mm/5mm or thicker	40 sq. ft.	14"	72"	9"	13"	11 3/4"	84"

¹ The minimum size for a spandrel glass lite at a bypass condition is 13" x 14", 11 3/4" x 14" for in-slab duct, and that is the glass lite itself, not including framing members. The minimum size for a spandrel glass lite at locations other than the bypass is 9" x 14" and that is the glass lite itself, not including framing members. Tempering is required for spandrel glass. Refer to the section titled Spandrel Glass Minimum Size for images and further clarity.

² When a spandrel IGU is selected for Starline’s 4 1/2" deep window wall and door systems, an alternative bypass detail (DC7) is used instead of Starline’s standard bypass detail (DC6). Refer to the section titled Spandrel IGU for image and further clarity.

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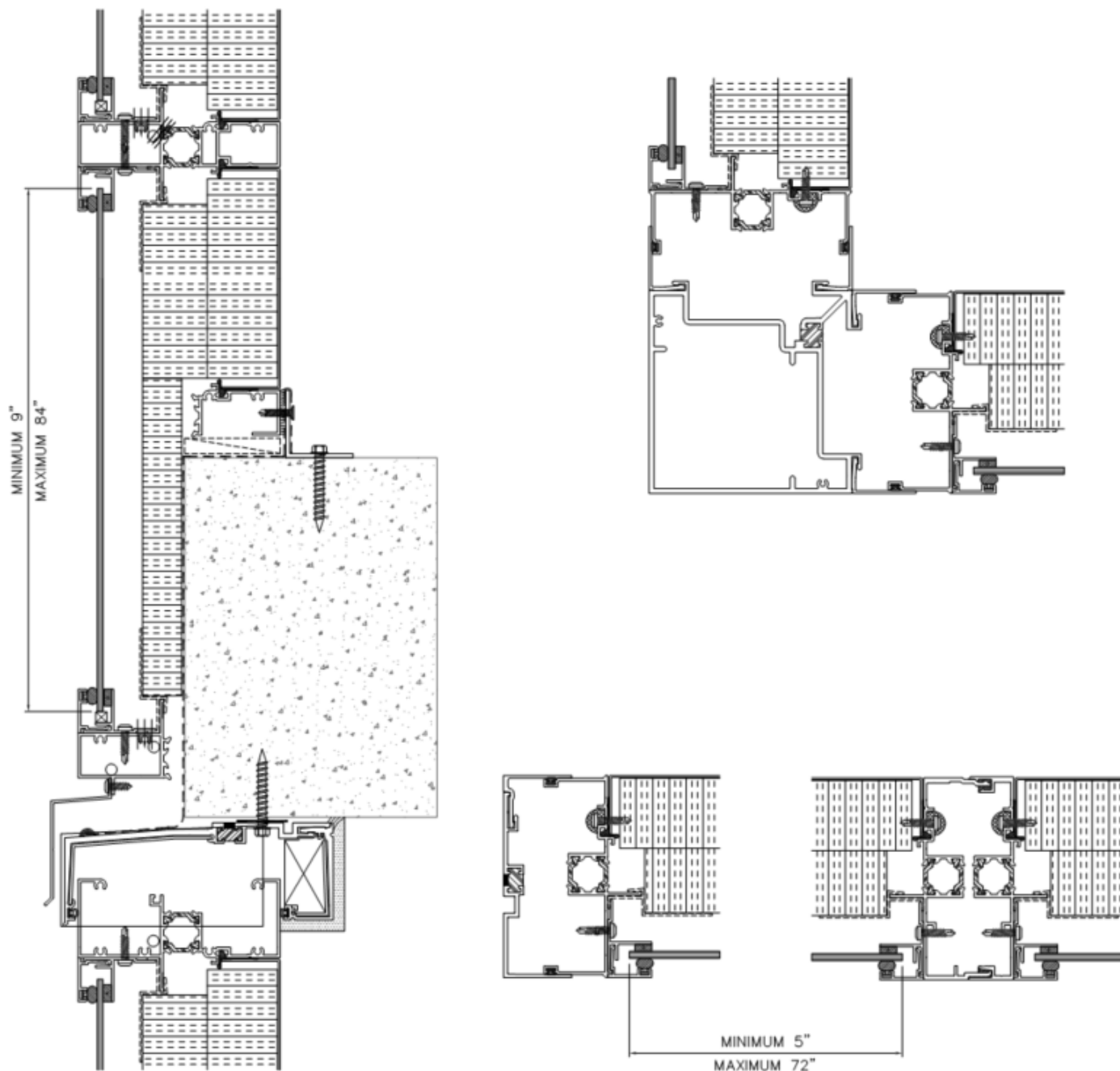
ACM Spandrel Panels

ACM spandrel panels are available for all of Starline's aluminum product series.

ACM panel is glazed into Starline's Window Wall system the same as single lite spandrel glass.

The finish is a liquid applied paint AAMA 2605 finish having an 80% gloss to mimic spandrel glass.

The minimum and maximum width and height ACM spandrel panel dimensions are interchangeable. Refer to [Glass or ACM Spandrel Panel Sizing Guidelines](#) for the minimum and maximum dimensions of the ACM spandrel panels.



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Spandrel Glass – Single Lite & Spandrel IGU

Spandrel glass is available in opaci-coat and ceramic frit.

Starline's spandrel glass manufacturer, Vitrum, offers 2 different opaci-coat options with respects to pricing – Standard, and custom opaci-coat spandrel glass. Choosing from the standard line is most cost effective. Custom colours are subject to a cost premium.

To view Vitrum's standard and select opaci-coat colour options refer to the following link:

<https://www.vitrum.ca/glass-products/spandrel-glass/color-selection/>

Note:

- Metallic spandrel glass is not available as there are occasions where a characteristic of metallic spandrel will create dark spots in the glazing. There are options available which provides a similar look to metallic spandrel glass (ex. Reflective glass with solid spandrel).
- When spandrel glass is used in any SSG application the use of ceramic frit is required. SSG applications do not allow the use of opaci-coated spandrel glass. Note: Starline's Unitized Curtain Wall is available in two sided SSG.
- Electrical, mechanical and other cut-outs cannot be made in spandrel glass; however, cut-outs can be made into the ACM spandrel panel and other opaque metal panel options. If cut-outs are required refer to [Electrical, Mechanical & Other Penetrations](#) for detail and further clarity.
- Starline's spandrel glass products are intended to be glazed against a uniform, opaque background. We do not recommend that spandrel glass be used in any application where glass can be viewed with daylight or artificial light on the opposite side. There are options for vision applications that allow varying degrees of color, light transmission and pattern to be used. These options include silkscreen ceramic frit, digital printing, colored or diffused laminated PVB, or acid etched glass.

The minimum and maximum width and height spandrel glass dimensions are interchangeable, with exception to the bypass and in-slab duct bypass heights – those are fixed values. Refer to [Glass or ACM Spandrel Panel Sizing Guidelines](#) for the minimum and maximum dimensions for spandrel glass.

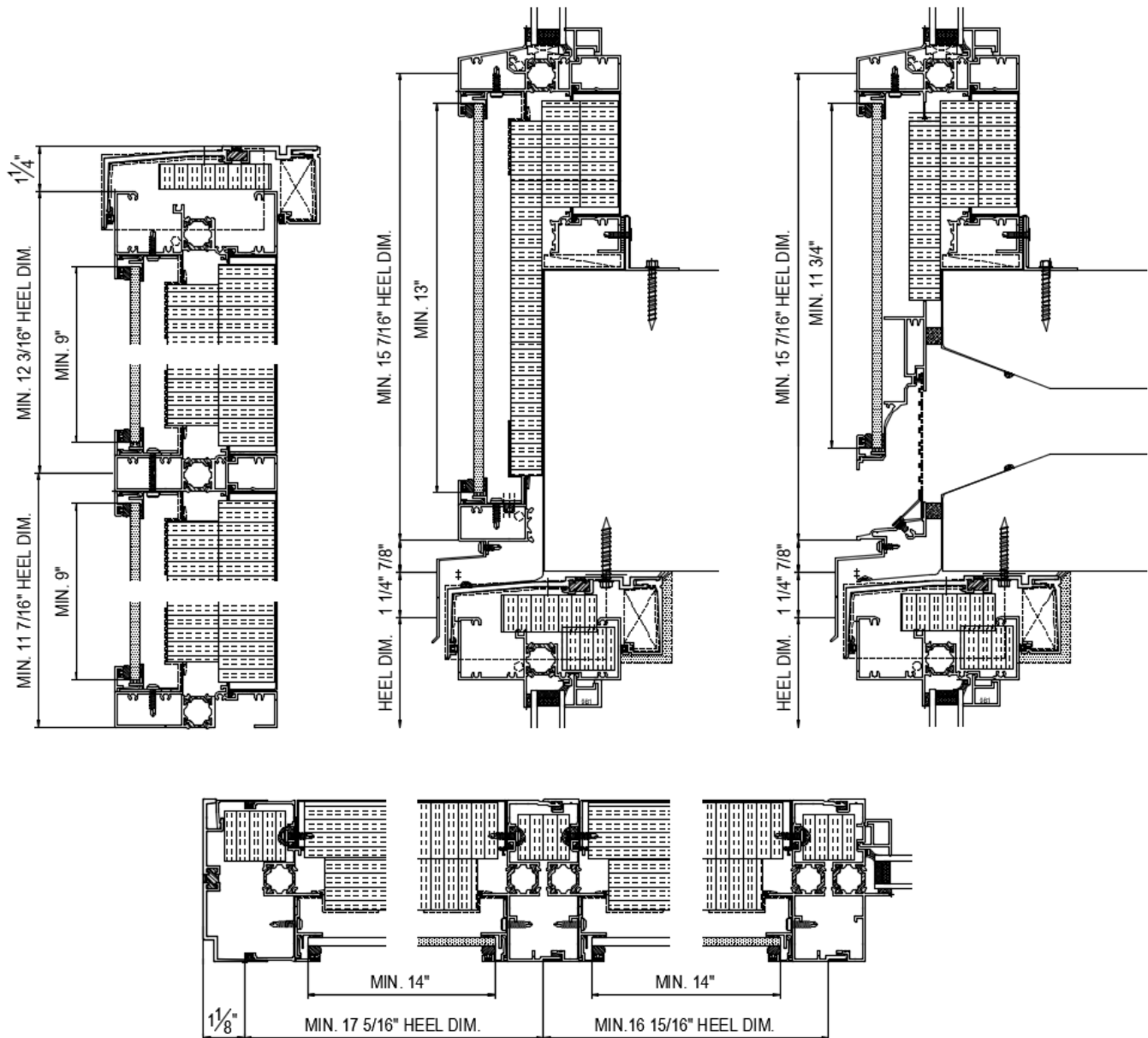
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Spandrel Glass Minimum Size – Single Lite & Spandrel IGU's

The minimum size for a spandrel glass is 14" wide x 9" tall, and that is for the spandrel glass itself, not including framing members.

Series 9000 details below provide the minimum heel dimension required when utilizing spandrel glass with dimensions of 14" wide x 13" tall at the bypass, 11 3/4" wide x 14" tall for in-slab ducts, and 14" wide x 9" tall at locations other than the bypass. Other series minimum heel dimensions will vary slightly. Please contact technical@starlinewindows.com if you require assistance determining the minimum heel dimensions for our other product series.

Note: The minimum spandrel glass width and height dimensions are interchangeable, with the exception to the minimum height at the bypass and in-slab ducts – those are fixed values.



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Spandrel IGU

Spandrel IGUs are available for all series at opaque areas other than the bypass.

Spandrel IGUs at the bypass are available in series 9000, 9200, and 9600.

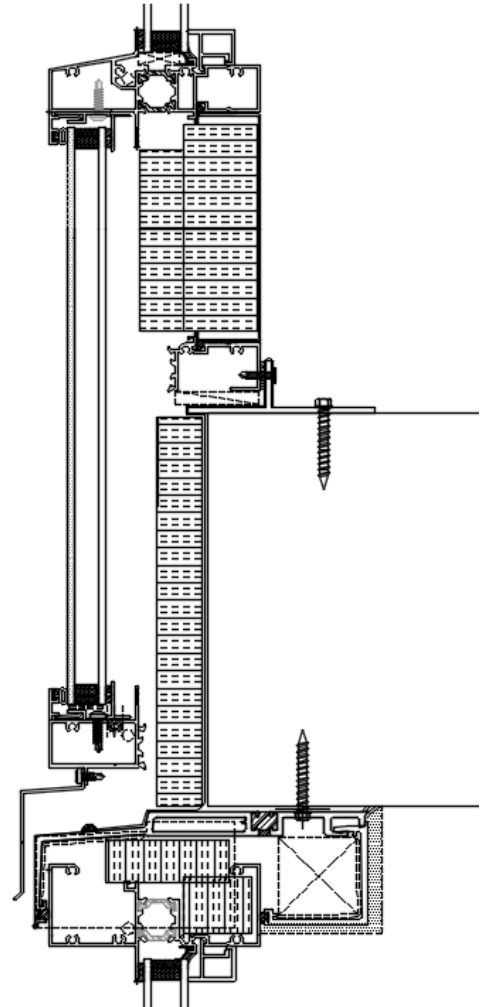
When using a Spandrel IGU at bypass locations, for the 4 1/2" deep window wall series 9000 and 9200, the DC7 detail is required. Using the DC7 detail involves some specific detailing including:

- upgrading to a 7" head deflector (standard is 6")
- using a T-angle for the installation sill angle (standard is an L-angle)
- changing the standard nominal support on the slab edge from 2 1/8" to 1 1/8".

This DC7 detail is required to provide an adequate airspace between the IGU and the insulation. This detail will provide 1" of continuous insulation at the slab edge.

Using the 6" deep window wall series 9600 at the bypass, either the standard nominal support on the slab edge of 2 1/8" or the optional nominal support of 1 1/8" can be used.

Note: Refer to the [Bypass – Insulation at the Slab Edge](#) to review the 2 1/8" and 1 1/8" nominal support details for the series 9000 and 9600. The nominal support details for the 4 1/2" deep systems are the same for all the 4 1/2" deep systems Starline offers.



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