Series 9600 Product Catalogue

STARLINE WINDOWS

Thermally Enhanced Aluminum Window Wall

Available in Double & Triple Glazed

Quality, Comfort & Peace of Mind

Foreword

This Design Guide provides design guidelines, manufacturing capabilities, and specifications on the Series 9600 Thermally Enhanced Aluminum Window Wall available with fixed windows, casements, awnings, and various opaque options. The 9600 is available in double and triple glazing.

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.

Note: This is a newer product series, and all the design options which can be available have not been created at this time. Any design options in the Series 9000 Window Wall product catalogue will be an available option for the series 9600, and we will design this option on a project-specific basis.

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

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Table of Contents

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Recommended Size Guidelines

Starline provides maximum guidelines for window module area and weight for new construction and restoration projects.

Window wall comfortably spans 11’ tall.

Starline will often use the series 9600 system in lieu of CW for limited scopes when the floor spans require it. (I.e., more than 11’ to an 18’ tall maximum span). This is regularly done on projects at amenity locations or feature floors with taller floor to floor heights (I.e., Amenity and Penthouse locations).

Note: Spans taller than 11’ need to be reviewed on a project specific basis to determine the maximum allowable span.

New Construction Project Maximums

FINISHES (POWDER COAT)	MAXIMUM WEIGHT (POUNDS)	MAXIMUM AREA (SQ FT)
Meets AAMA 2603 and 2604 Specification	240	45
Meets AAMA 2605 Specification	220	43

Example: At a 9’-8” floor to floor span, the maximum width for the window wall module can be 4’-6”.

Renovation Project Maximums

FINISHES (POWDER COAT)	MAXIMUM WEIGHT (POUNDS)	MAXIMUM AREA (SQ FT)
Meets AAMA 2603 and 2604 Specification	220	43
Meets AAMA 2605 Specification	200	40

Example: At a 9’-8” floor to floor span, the maximum width for the window wall module can be 4’-2”.

Note:

- Limitations are guidelines and depend on site conditions.
- Horizontal coupling is not available.

For instructions and examples on how to calculate area and weight, refer to **Calculate Fixed, Combination, and Vent Window Size and Weight.**

Diameter for Radius Windows

Starline does not offer radius windows for the Series 9600 Thermally Enhanced Window Wall.

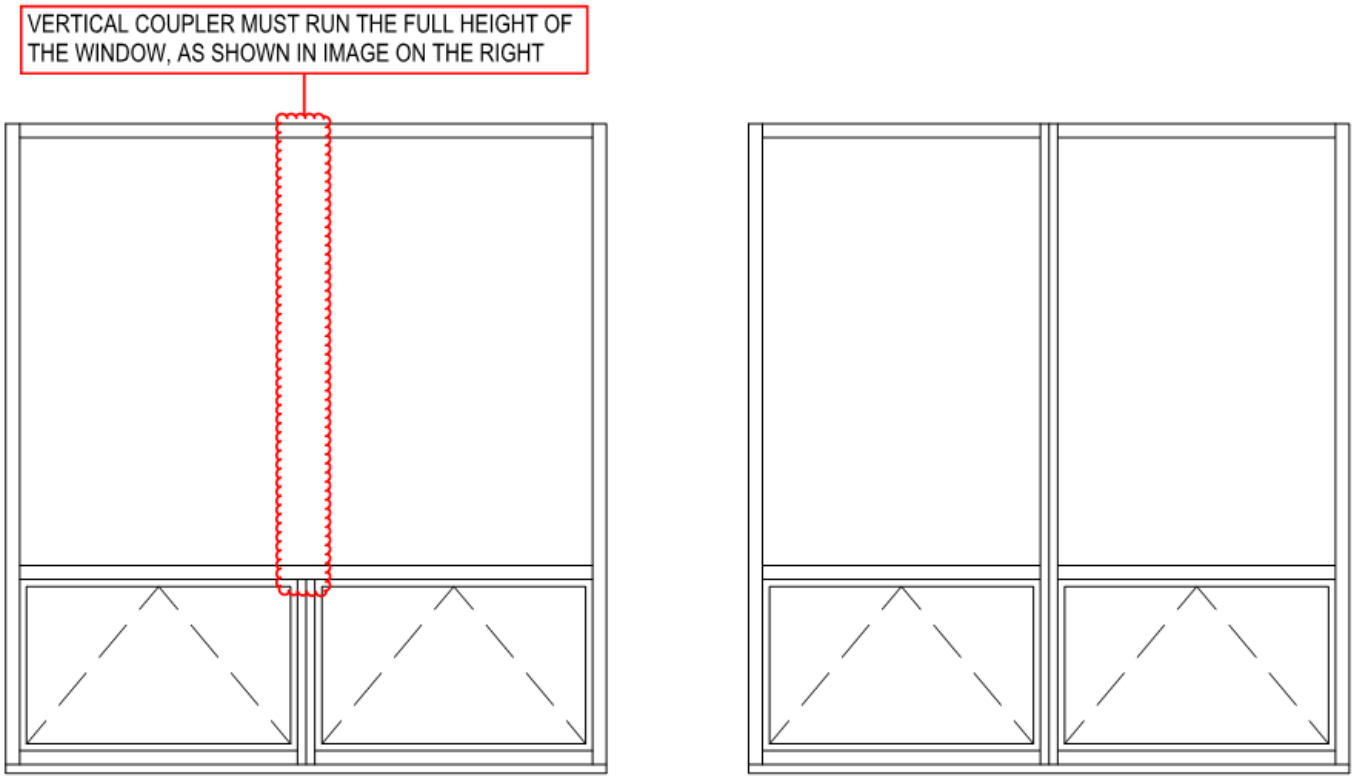
Maximum Length of Vertical Coupler and Horizontal T-bar
Maximum span for a horizontal T-bar without a vertical coupler is 72”.

Maximum span for a vertical coupler without the use of a horizontal T-bar is 84”. This span may be able to increase to 96”, as reviewed on a project specific basis to determine the maximum allowable span.

For an image and further details, refer to **Maximum Area of IGU**.

Crippled Mullions

Starline cannot manufacture windows and doors with crippled mullions/couplers. All vertical mullions/couplers and horizontal mullions within a window or door module must run full height and width of the window or door module.

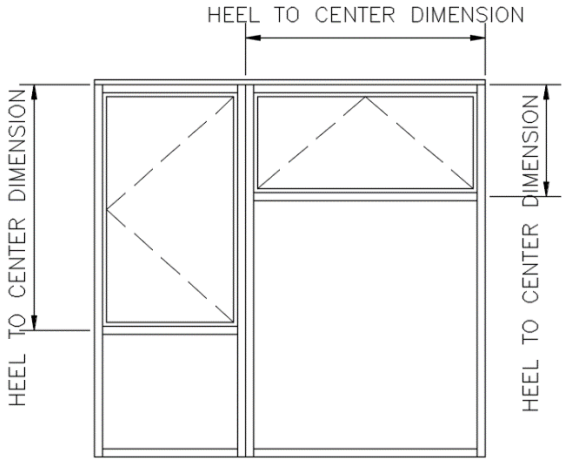


Minimum Vent Size

Sizes are based on heel to center dimensions.

HARDWARE	OPERABLE VENT	WIDTH (In)	HEIGHT (In)
Cam Handle with 60° hinge with 4” restrictor	Awning	15”	15”
	Casement	15”	15”
Cam Handle with 90° egress hinge	Awning	15”	19”
	Casement	24”	15”
Cam Handle with 60° hinge with 4” mechanical restrictor	Awning	15”	22”
	Casement	22”	15”
Multi-point	Awning	22”	15”
	Casement	15”	22”

Note: It is Starline’s standard to restrict all windows to 4” unless a non-restricted window is required for egress purposes.



Maximum Vent Size

To design an operable vent that is within Starline’s recommended maximum vent size, refer to the chart below:

OPERABLE VENT	MAX. WIDTH (In)	MAX. HEIGHT (In)	MAX. AREA (Sq.Ft.)	MAX. WEIGHT (Pounds)
AWNING	48	30	7.50	30
AWNING 4" - RESTRICTED	48	48	16.00	80
CASEMENT - RESTRICTED	30	60	10.00	50

Calculating Fixed, Combination, and Vent Window Sizes

You can calculate window sizes using a calculator provided by Starline Windows or using your own calculations.

Using the Starline Calculator

Starline has a maximum fixed, combination, and vent window size calculator available for use.

The calculator states a PASS or FAIL for each criterion that is required to be met. A vent must pass the maximum width, height, area, and weight guidelines. In the case of a casement, it also considers maximum torque load and width to height ratio. The vent size is to be reduced unless all of the criteria are satisfied.

To obtain a copy of this calculator, contact technical@starlinewindows.com.

Note: This calculator is a tool to assist with the design of basic window configurations. Combination windows can be complicated, and some configurations may need to be reviewed and approved by Starline's Designers and Structural Engineer for feasibility and structural compliance.

For any type of window; fixed, combination, and/or vents, there may be specific design and/or structural requirements, building code requirements, by-law requirements, etc. which require consideration and could dictate the size of the window, glass thickness, etc. Final window sizes and configurations will be confirmed during the shop drawing phase, if applicable, and ordering of the windows.

Using Manual Calculations

Once the window configuration has been selected, along with the frame dimensions (width and height) and the glass thickness, a calculation can be performed to determine the area and weight of the window.

To calculate weight, add the glass weight based on your IGU glass thicknesses + 1 lb/ft^2 for the window wall framing.

Glass thickness can play a significant factor in determining how large the window can be. The thicker the glass, the heavier the IGU. When a thicker glass is selected, typically the maximum weight allowed is reached before the maximum area.

Refer to the **Typical Float Glass Weight per Thickness** chart below for the weight of glass.

Typical Float Glass Weight per Thickness[1]

GLASS LITE THICKNESS	4mm	5mm	6mm	8mm	10mm
Monolithic Glass – Weight (lb/ ft^2)	2.1	2.6	3.1	4.1	5.1
Double Glazed IGU – Weight (lb/ ft^2)	4.1	5.1	6.2	8.2	10.2
Triple Glazed IGU – Weight (lb/ ft^2)	6.2	7.7	9.2	12.3	15.4

Maximum IGU Area Based on Glass Lite Thickness[1,2]

GLASS LITE THICKNESS	MAXIMUM IGU AREA		MAXIMUM WIDTH[3]	MAXIMUM HEIGHT[4]
	DOUBLE GLAZED	TRIPLE GLAZED		
4mm	30 sq. ft.	30 sq. ft.	72”	84”
5mm	40 sq. ft.	35 sq. ft.	72”	84”
6mm	40 sq. ft.	35 sq. ft.	72”	84”

Note: There are minimum and maximum dimensions as well as overall IGU areas to consider for different types of glass, such as annealed, tempered, laminated, spandrel, etc. Maximum dimensions are as laid out in the above chart, regardless of the glass type.

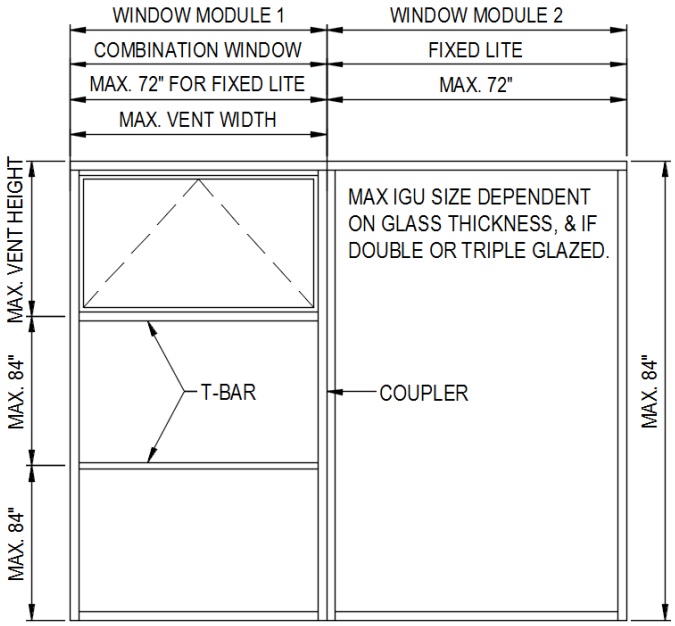
For all other sizing information, please visit the Products tab on the Vitrum Glass Groups website at http://www.vitrum.ca/ for the most up to date information.

Note: The following calculations are intended to provide examples on how to calculate window sizes for basic window configurations.

Combination windows can be complicated, and some configurations may need to be reviewed and approved by Starline’s Designers and Structural Engineer for feasibility and structural compliance. A combination window is a window that has multiple lites; fixed and/or operable vents. These lites and vents are divided by T-Bar(s).

For any type of window; fixed, combination, and vents, there may be specific design and /or structural requirements, building code requirements, by-law requirements, etc. that requires consideration and could dictate the size of the window, glass thickness, etc. Final window sizes and configurations will be confirmed during the shop drawing phase, if applicable, and ordering of the windows.

The following figure provides an example a combination window coupled to a fixed lite.



Note: The max. height of 84” for an IGU may be able to be increased using an I-coupler in lieu of a standard coupler. This can be reviewed on a project-specific basis.

The following examples are intended to provide sample calculations for the following window configurations:

Fixed Window

1.	Determine fixed window size [1,2,3 4]	(60” x 84”) / 144” = 35 ft²	✓
2.	Determine glass weight - Based on area, min. 5mm glass required - Double glazed - 5mm / Air / 5mm	= 5.1 lbs/ft²	✓
3.	Calculate weight per square foot (add window framing 1 lbs/ft²)	5.1 lbs/ft² + 1 lbs/ft²= 6.1 lbs/ft²	✓
4.	Calculate overall weight	35 ft² x 6.1 lbs/ft² = 214 lbs	✓

Awning (no 4” restrictor)

1.	Determine awning size - 30” wide x 24” tall.	(30” x 24”) / 144” = 5 ft²	✓
2.	Determine glass weight - Double glazed - 4mm / Air / 4mm	= 4.1 lbs/ft²	✓
3.	Calculate weight per square foot (add window framing 1 lbs/ft²)	4.1 lbs/ft² + 1 lbs/ft²= 5.1 lbs/ft²	✓
4.	Calculate overall weight	5 ft² x 5.1 lbs/ft² = 26 lbs	✓

Awning (4” restrictor)

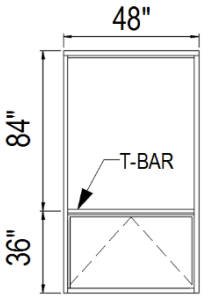
1.	Determine awning size - 42” wide x 36” tall	(42” x 36”) / 144” = 10.5 ft²	✓
2.	Determine glass weight- Double glazed - 6mm / Air / 5mm.	3.1 + 2.6 lbs/ft² = 5.7 lbs/ft²	✓
3.	Calculate weight per square foot (add window framing 1 lbs/ft²)	5.7 lbs/ft² + 1 lbs/ft²= 6.7 lbs/ft²	✓
4.	Calculate overall weight	10.5 ft² x 6.7 lbs/ft² = 70 lbs	✓

Casement

Casement windows require two additional steps. There is a maximum allowable torque load of 50 lbs well as a 2:3, width to height, ratio to consider. Both additional considerations are demonstrated in this example.

1.	Determine casement size – 24” wide x 48” tall	(24” x 48”) / 144” = 8 ft²	✓
2.	Check that size is within 2:3 width to height ratio (2:3 ratio = height/3 x 2= max. width) *width must be ≤ the answer	(48” / 3) x 2 = 32”; 24” ≤ 32”	✓
3.	Determine glass weight - Double glazed unit 4mm / Air / 4mm	= 4.1 lbs/ft²	✓
4.	Calculate weight per square foot (add window framing 1 lbs/ft²)	4.1 lbs/ft² + 1 lbs/ft²= 5.1 lbs/ft²	✓
5.	Calculate overall weight	8 ft² x 5.1 lbs/ft² = 41 lbs	✓
6.	Calculate torque load [5]	8 ft² x 5.1 lb/ft² x (24/12)/2 = 41 lbs	✓

Combination Window



When determining the combination window overall area and weight, first ensure individual fixed lites and vent sizes are within Starline's recommended design guidelines (as demonstrated in Step 1-4).

If the fixed lite width exceeds 72", the addition of a vertical coupler is required, thus creating two separate window modules.

If the fixed lite height exceeds 84", the addition of another horizontal T-Bar is required.

1. Determine combination window size -48" wide x (84" + 36") tall — (48" x 120") / 144" = 40 ft² ✓
2. Determine glass weight - Double glazed - 4mm / Air / 4mm — = 4.10 lbs/ft² ✓

   4mm glass is ok based on the area of each individual IGU, 28 ft² for fixed lite and 12 ft² for vent.
3. Calculate weight per square foot (add window framing 1 lbs/ft²) — 4.10 lbs/ft² + 1 lbs/ft²= 5.10 lbs/ft² ✓
4. Calculate overall weight — 40 ft² x 5.10 lbs/ft² = 204 lbs ✓

[1] The maximum fixed window area for an insulated glass unit (IGU) is dependent on the glass thickness selected. Once the desired IGU area has been determined, refer to the ***Maximum IGU Area Based on Glass Lite Thickness*** to select required glass thickness.

[2] Glass thickness may be required to be thicker than stated on the Maximum IGU Area Based on Glass Lite Thickness chart due to structural requirements, building code requirements, by-law requirements, etc. As an example: A glass thickness of 5mm may be selected based on the charts, and it states 5mm glass can be used up to an IGU area that is 40 sq. ft. maximum for double glazed, however structural requirements due to the buildings wind loading may require 6mm glass thickness to be used. 6mm glass is thicker than 5mm glass and weighs more, so the window size may need to be reduced to keep overall weight within Starline windows recommended maximum weight.

[3] If the width exceeds 72", the addition of a vertical coupler is required, thus creating 2 separate window modules. If the height exceeds 84", the addition of a horizontal T-Bar is required[3], thus creating a combination window. Refer to Example #5 if the window has become a combination window.

[4] If the IGU height exceeds 84", the addition of a horizontal T-Bar is required when using Starline's standard coupler. The max. height of 84" for an IGU may be able to be increased using an I-coupler in lieu of a standard coupler. This can be reviewed on a project specific basis.

[5] Torque Load = Area of Casement (ft²) x Weight of Glass (lb/ ft²) x (Width of Casement (ft) / 2)

Window Hardware

The standard handle for the Series 9600 operable vents are cam handles made from zinc alloy. 1 or 2 handles will be included, depending on the operable vent size (refer to the chart below). These handles lock positively against a PVC mounted keeper. Handles and mounted keeper are available in black and white.

The 60 degree hinge is restricted to 4".

Vent Sizes with 1 or 2 Cam Handles

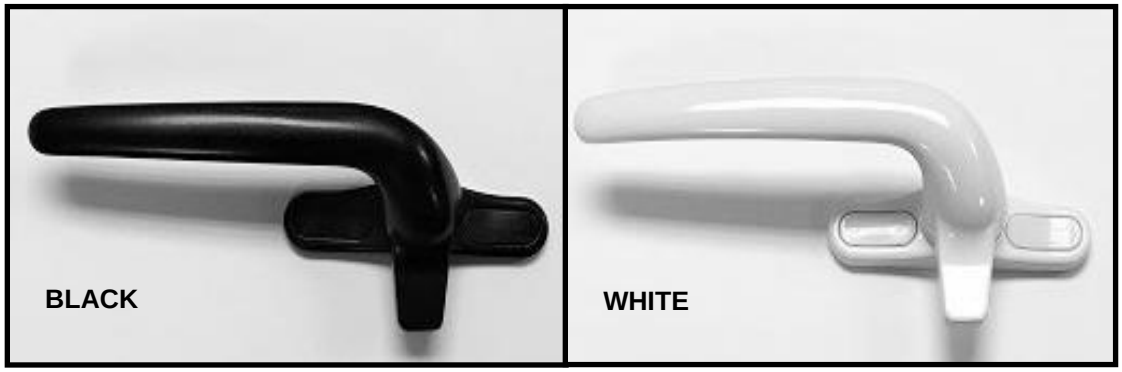
	1 CAM HANDLE	2 CAM HANDLES
AWNING WIDTH	UP TO 30"	30" TO 48"
CASEMENT HEIGHT	UP TO 30"	30" TO 60"

Options

1. Multi-point locking hardware. The multi point handle is available in black and white. The multi points, not visible when window is in closed position, are available in black and white only. When multipoint locks are selected, the minimum vent height for a casement is 22” but shall not exceed 60” in height. The minimum vent width is for an awning is 22” but shall not exceed 48” in width.
2. 90° egress hinge.
3. Custodial restrictors.

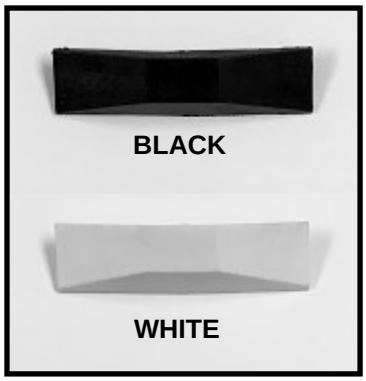
Standard Interior Cam Handle

Interior cam handle, made from zinc alloy, positively locks against a mounted keeper. Available in black and white.



Mounted Keeper for Standard Interior Handle

Interior mounted keeper, made from PVC, enables handle to positively lock against it. Available in black and white.

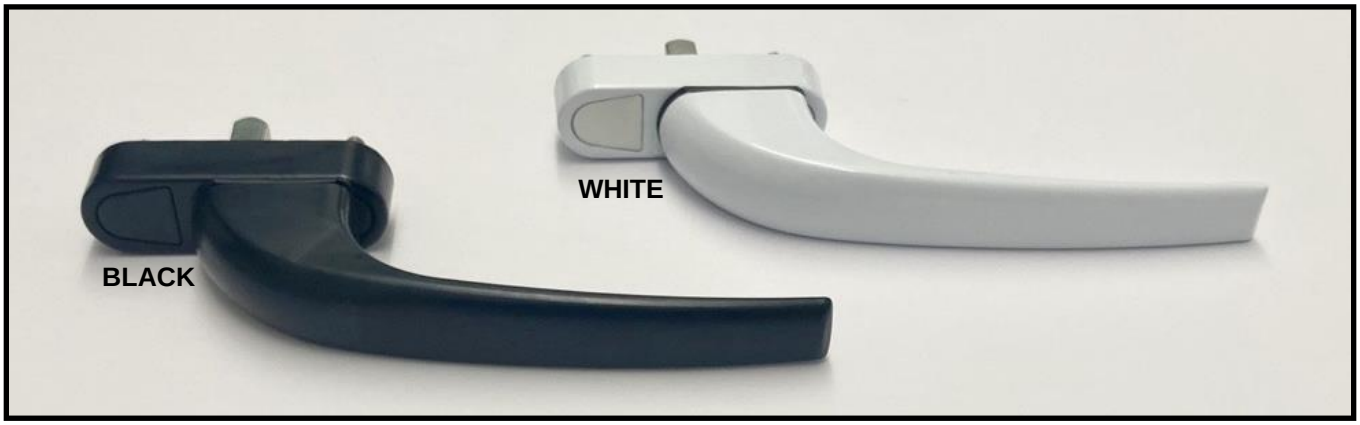



Example of a cam handle with mounted keeper

Email any project-specific enquiries to technical@starlinewindows.com or architectural@starlinewindows.com

Multi-Point Locking Hardware

The multi point handle is available in black and white. The multi points are not visible when the window is closed. They are available in black and white only. When multipoint locks are selected, the minimum vent height for a casement is 22” but shall not exceed 60” in height. The minimum vent width for an awning is 22” but shall not exceed 48” in width.



Insulation

The standard Series 9600 insulation is as follows:

- 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 1”.
- Rockwool Fabrock 30 and / or Rockwool Fabrock LT mineral wool fibre insulation, or equivalent, with an overall thickness of 4 1/2” for spandrel glass, aluminum panel and galvanized panel application. The R-value/inch @ 75°F is 4.1 hr.ft².F/Btu.

The insulation will be installed as follows:

- The corner posts (except seismic pockets), sills, jambs and heads will be insulated in the factory.
- The deflection header clips, seismic jambs, couplers and the seismic pockets of the corner posts will be insulated onsite.

Bypass Guidelines and Options

This section covers the bypass and the various opaque options available at the bypass and opaque areas.

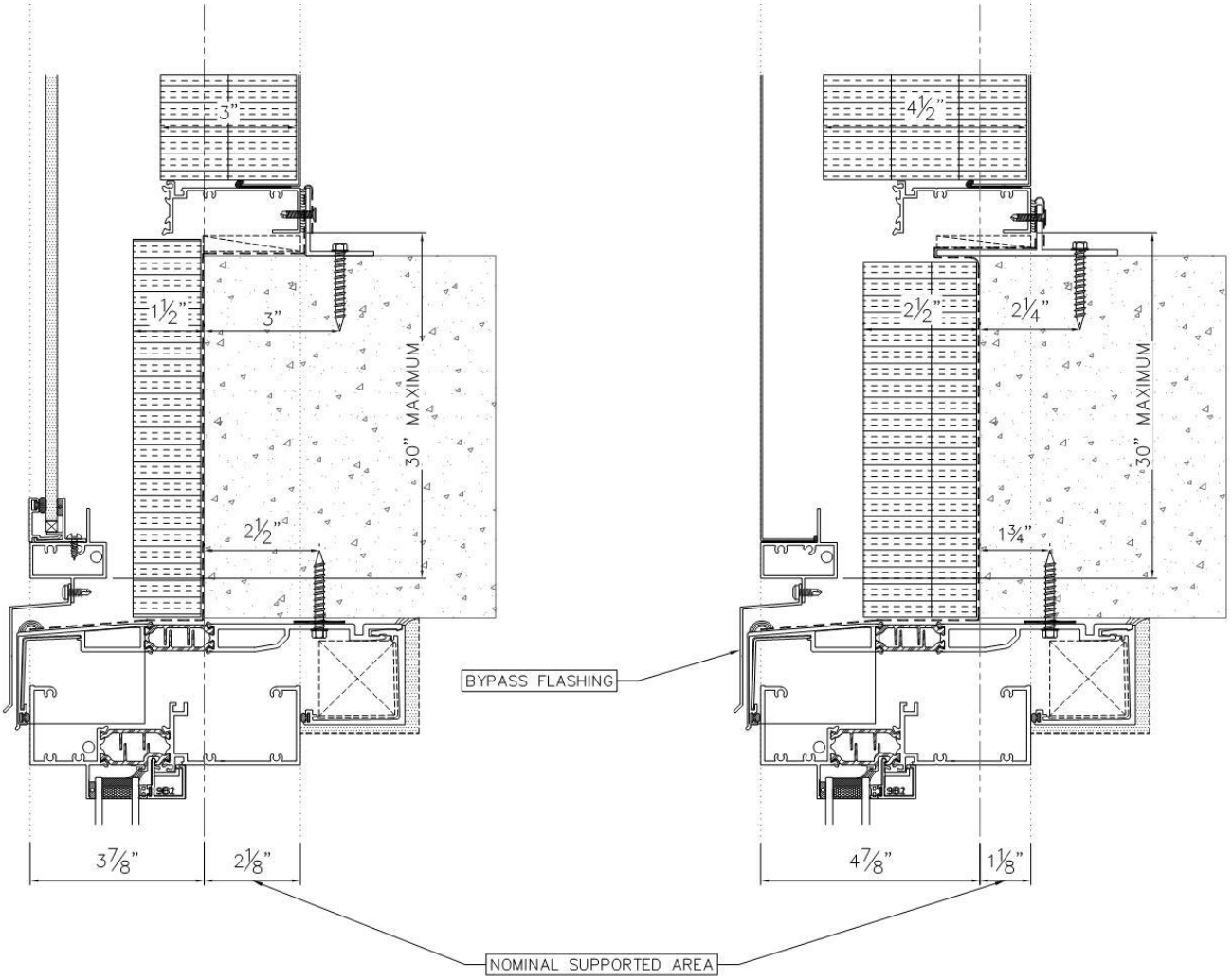
Maximum Bypass Height, Weight, and required Nominal Supported Area

The maximum bypass height is 30” when there is a run of windows (two or more).

The maximum bypass height at a single window module (punched opening) cannot exceed 12”. If the bypass height is 12 1/8” to 30”, reversed seismic jambs can be used, given the window module weight does not exceed 100 pounds.

The standard bypass detail comes with a bypass flashing, not with rod and caulk. Starline does not prefer the rod and caulk detail due to insufficient overlapping of the membrane at the deflection header.

There are two options for the nominal support. The detail to be selected will depend on the energy value required. See below details for reference.



Option 1 – Standard Design at bypass = ~R8

Option 2 – Enhanced Thermal at Bypass = ~R12

Nominal Supported Area

Option 1 – Standard Design

The recommended nominal supported area is 2 1/8”.

The maximum supported area at the bypass is 2 5/16”.

The minimum supported area at the bypass is 1 3/4”; however, the minimum support of 1 3/4” may not exceed 30% of the opening without Starline’s structural engineer approval.

There may be the option to decrease the minimum supported area up to 1 5/8”; however, Starline’s structural engineer must be consulted and approve this project-specific request.

Option 2 Enhanced Thermal[1]

The recommended and absolute minimum nominal supported area is 1 1/8”.

The maximum supported area at the bypass is 1 5/8”.

[1] The details shown in the remainder of this product catalogue will reflect Option 2.

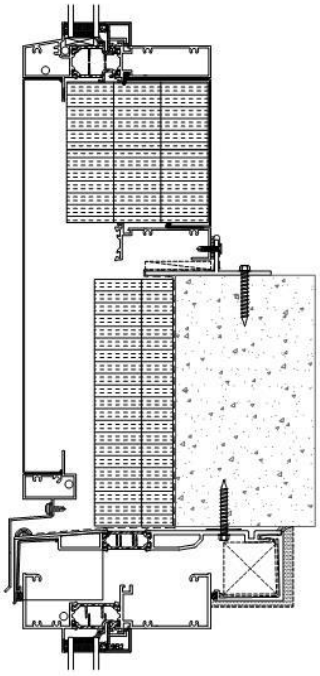
Exterior and Interior Material for Bypass and Other Opaque Areas

The following exterior and interior material combinations are available for the bypass[1] and other opaque areas:

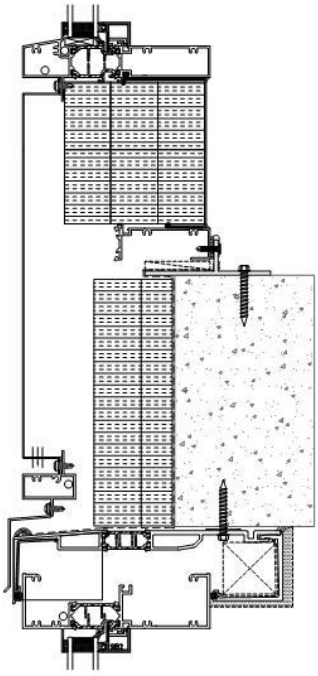
- Flush metal panel on the exterior with either an aluminum or galvanized panel on the interior.
- Top hat metal panel on the exterior with either an aluminum or galvanized panel on the interior.
- Sandwich panel is available for opaque areas, other than bypass locations.
- 1”, 2”, and 4” raised metal panel on the exterior with either an aluminum or galvanized panel on the interior.
- Flush to 2” beveled panels on the exterior with either an aluminum or galvanized panel on the interior.
- 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.
- ACM Spandrel Panel on the exterior with either an aluminum or galvanized panel on the interior.
- Spandrel glass lite on the exterior with either an aluminum or galvanized panel on the interior.
- Spandrel IGU on the exterior with either an aluminum or galvanized panel on interior.[1]

More options may be available and can be reviewed on a project-specific basis.

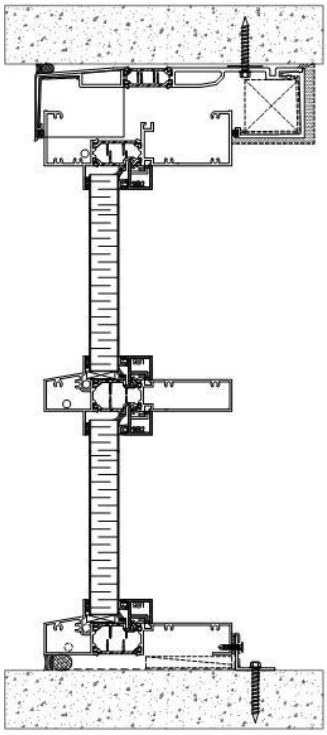
[1] There is no aluminum or galvanized panel used on the interior at the bypass.



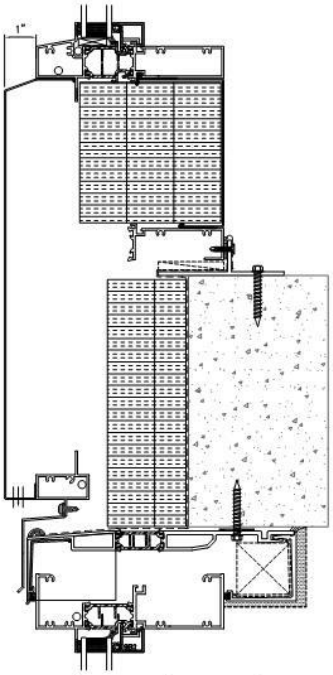
Exterior: Aluminum Panel
Interior: Aluminum Back Pan
Also available with galvanized back pan



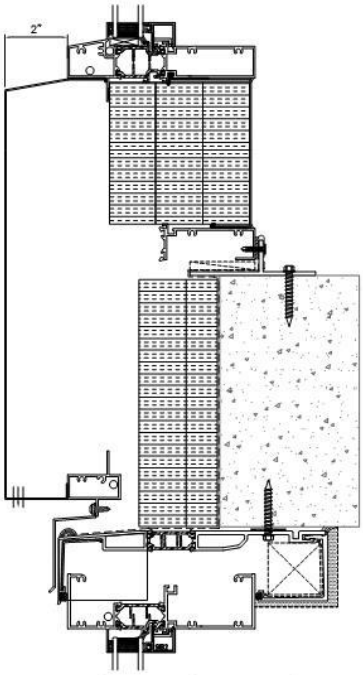
Exterior: Top Hat Panel
Interior: Galvanized Back Pan
Also available with aluminum back pan



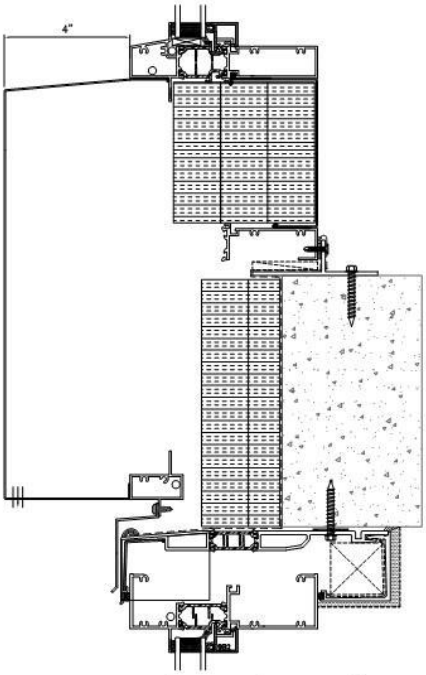
Exterior: 14 Gauge Aluminum
Middle: Polyisocyanurate
Interior: 14 Gauge Aluminum



Exterior: 1" Raised Aluminum Panel
Interior: Aluminum Back Pan
Also available with galvanized back pan



Exterior: 2" Raised Aluminum Panel
Interior: Galvanized Back Pan
Also available with aluminum back pan



Exterior: 4" Raised Aluminum Panel
Interior: Aluminum Back Pan
Also available with galvanized back pan

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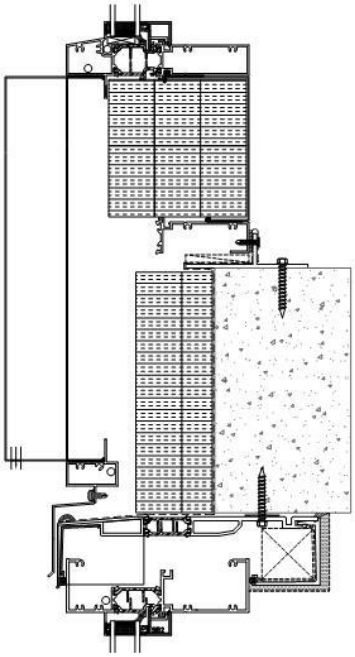
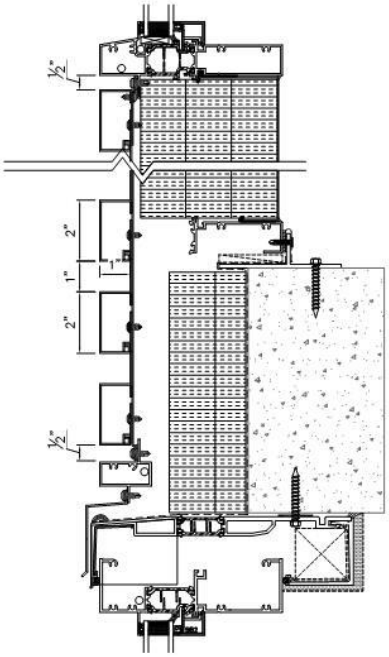
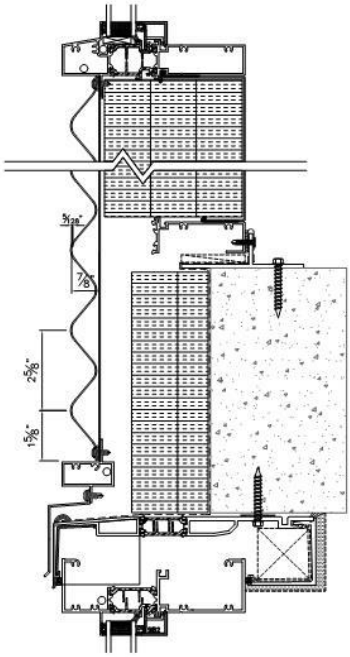


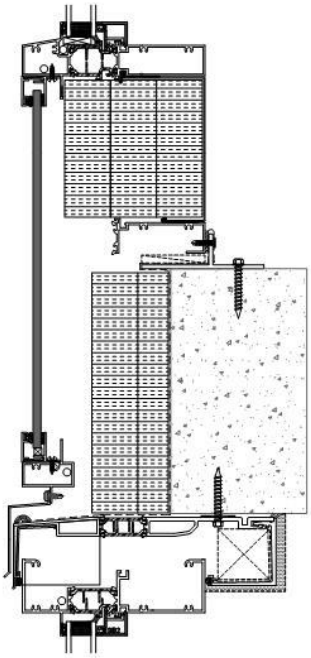
Exterior: Flush to 2" Beveled Panel
Interior: Aluminum Back Pan
Also available with galvanized back pan



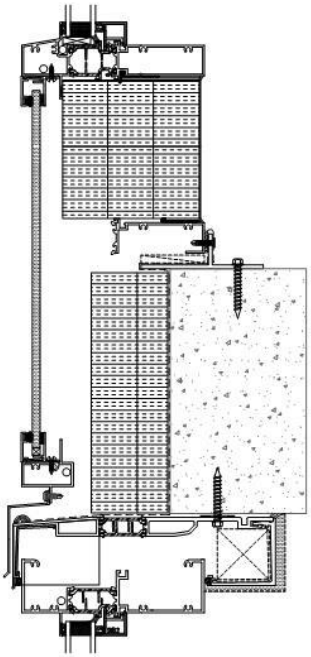
Exterior: 1" x 2" Corrugated Panel
Interior: Galvanized Back Pan
Also available with Aluminum back pan



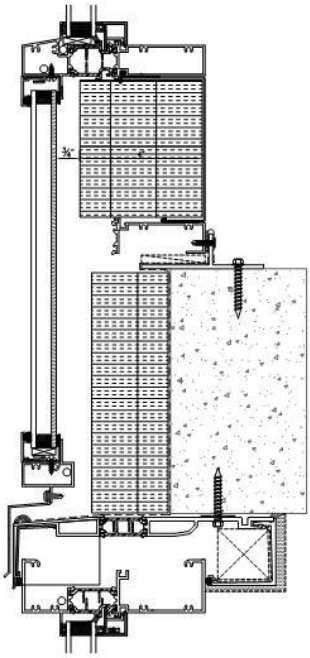
Exterior: Curved Corrugated Panel
Interior: Aluminum Back Pan
Also available with galvanized back pan



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



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



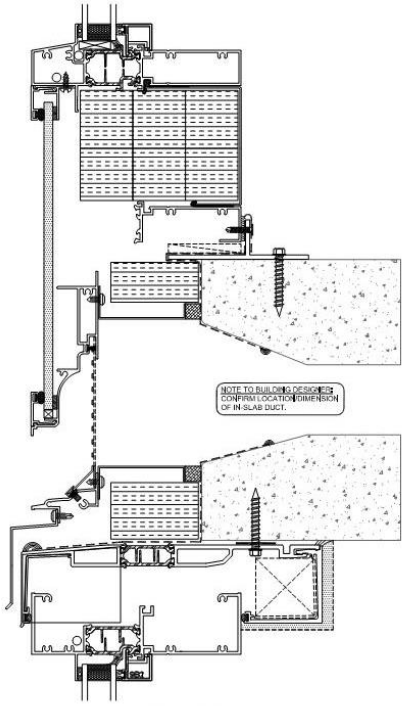
Exterior: Spandrel IGU
Interior: Aluminum Back Pan
Also available with galvanized back pan

In-Slab Ducts

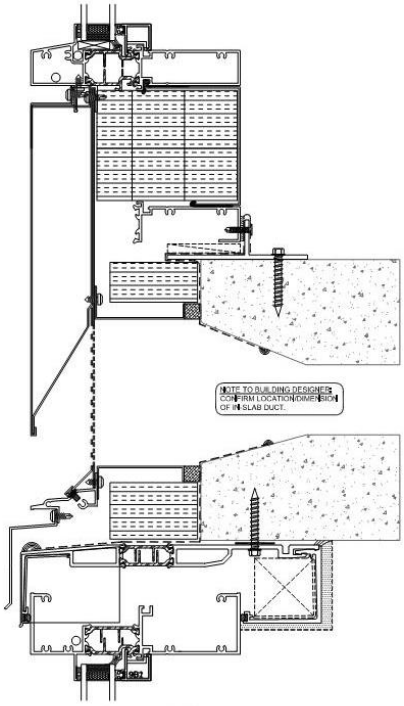
There are bypass options to accommodate in-slab ducts. Spandrel glass or aluminum panels are available for the exterior material.

When using a top hat metal panel or spandrel glass, there is a 2” opening left near the bottom of the bypass to provide an opening for the duct to vent out.

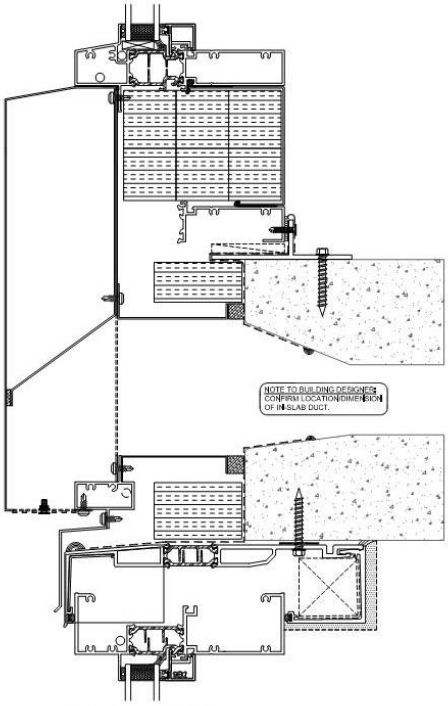
When using a 2” or 4” raised metal panel, there is a 1 3/4" vent at the bottom of the panel for the duct to vent out. A 1” raised metal panel cannot vent out the bottom as it does not allow enough air flow.



Spandrel Glass



Top Hat Panel

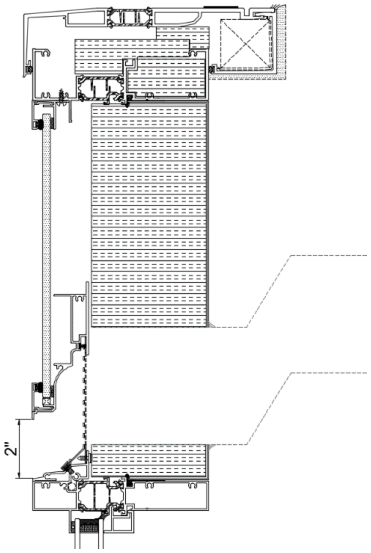


2" Raised Metal Panel
Also available in 4" Raised Metal Panel

Transom Ducts

If the project is not ducting out the slab, Starline has transom ducts available. The same options as noted above in the ***In-Slab Duct*** section are available for the transom duct.

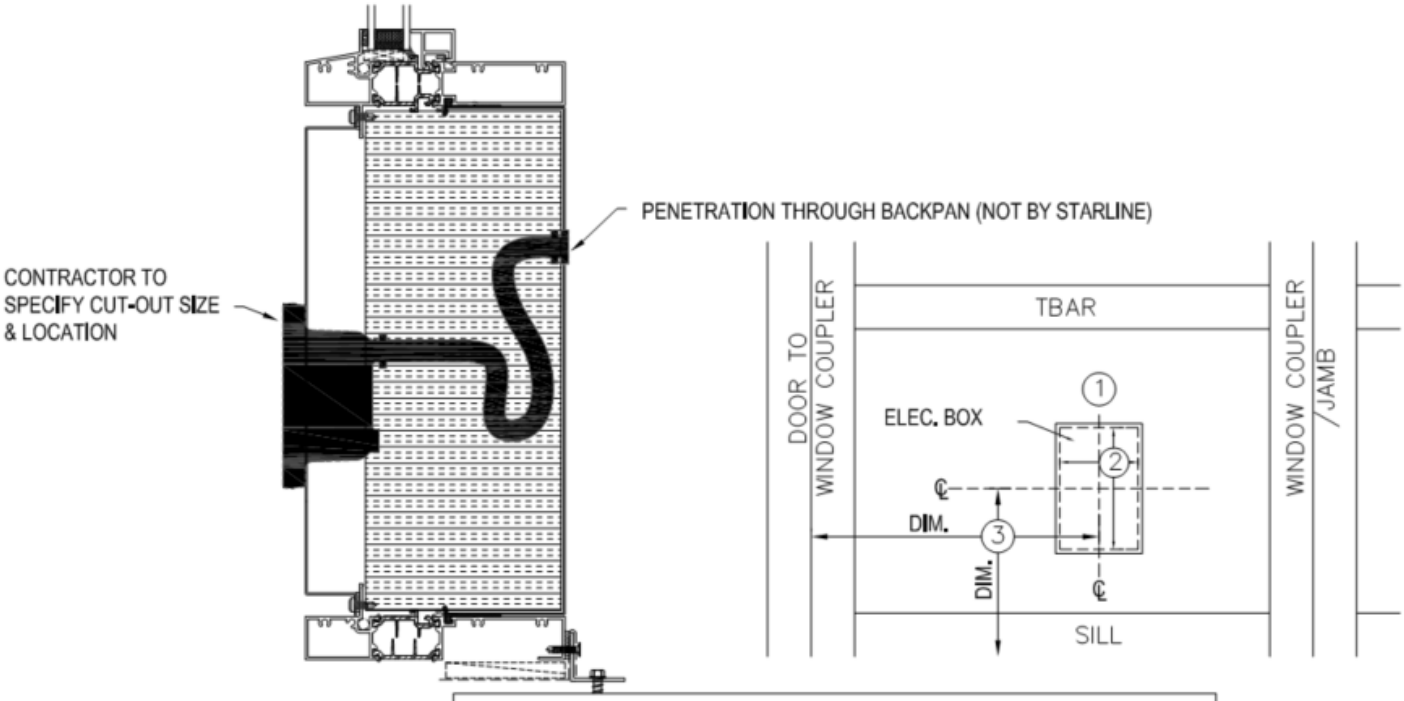
The image on the right shows a transom duct using spandrel glass.



Electrical, Mechanical, and Other Penetrations

Electrical, mechanical, and other cut-outs can be made in top hat, aluminum, or sandwich panels. Cut-outs cannot be made into spandrel glass. 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 watertight (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 x HEIGHT)

3 - CENTER LOCATION OF CUT OUT FROM BOTTOM OF FRAME & VERTICAL COUPLER OR SPECIFY TO BE CENTERED ON PANEL. (HORIZONTAL & VERTICAL).

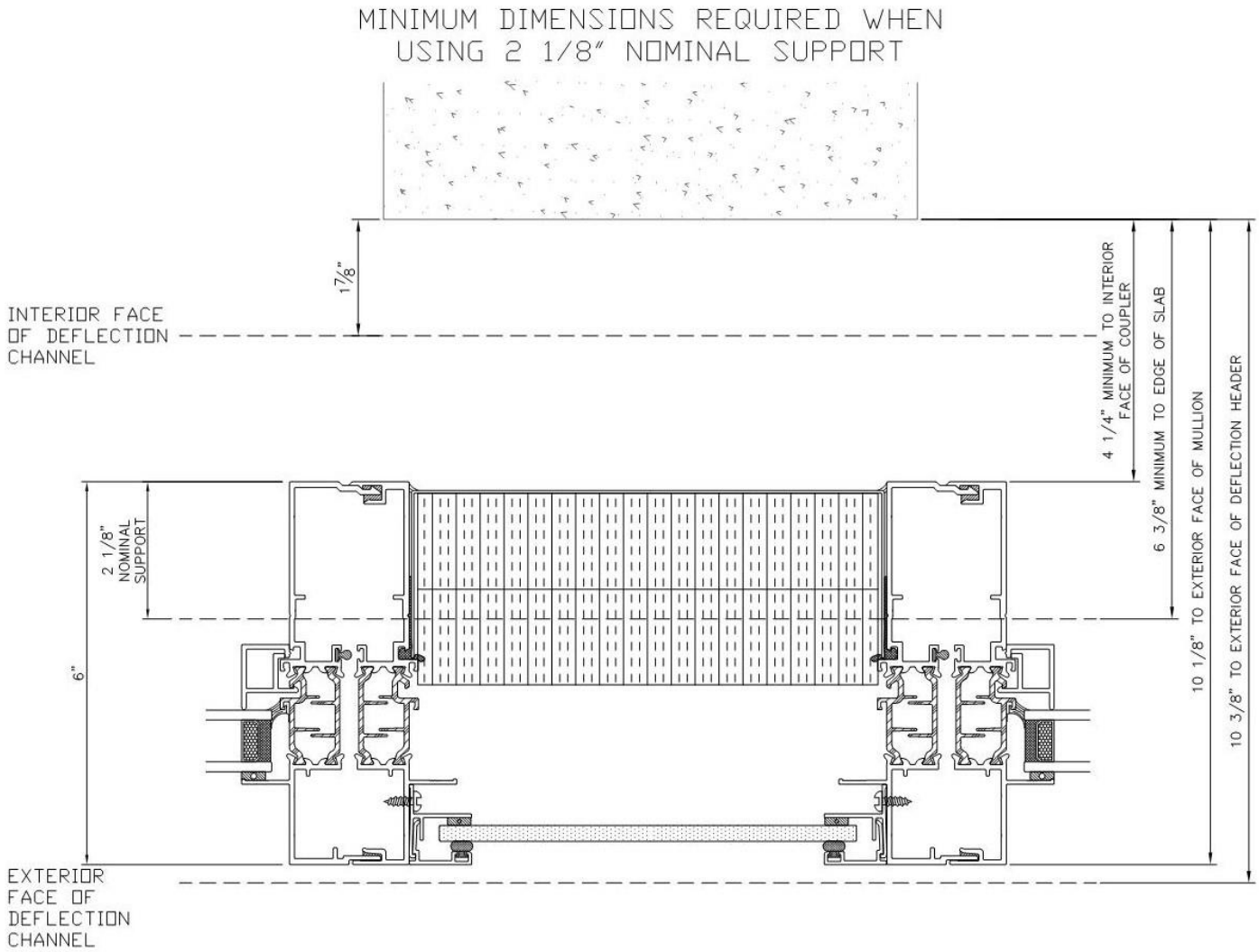
Setbacks Required for Columns and Shear walls

There are minimum requirements from the face of a column/shear wall to the interior face of the window wall coupler.

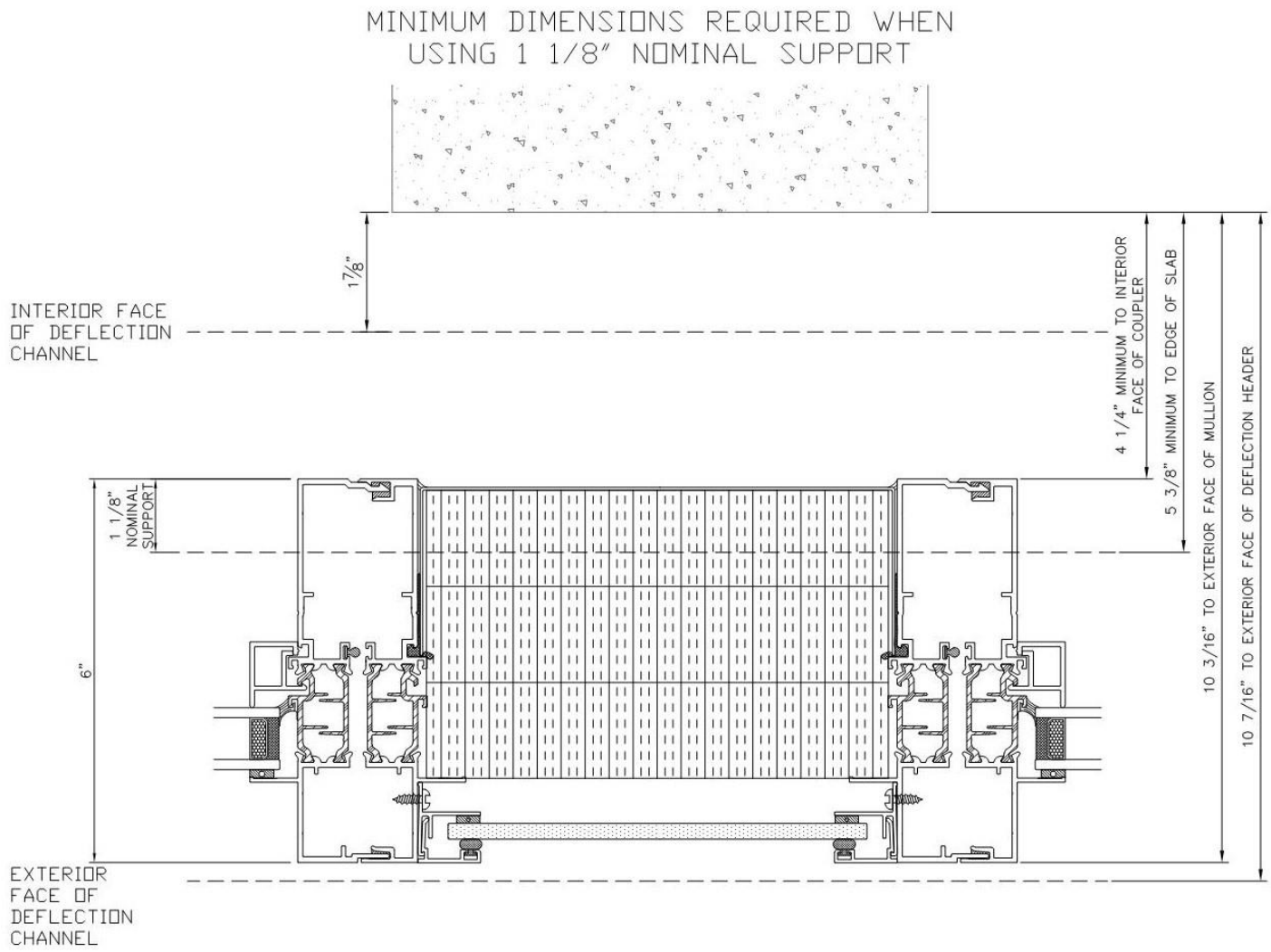
The minimums noted below for the standard and enhanced thermal designs may need to increase depending on the size of the column/shear wall. These minimums are in place so the installers can fit a caulking gun between the deflection header and column/shear wall and caulk the deflection header. The caulking provides the air barrier for the window system and is critical for a sound building envelope tie-in.

For example, a column which is 2'0" wide running along the face of window wall would be ok using the minimum distances stated above. As the column or shear wall length increase so will the minimums. For example, a 4'-0" long shear wall requires at least 7 3/8" of clearance using the standard design and 6 3/8" using the enhanced thermal design.

Standard Design



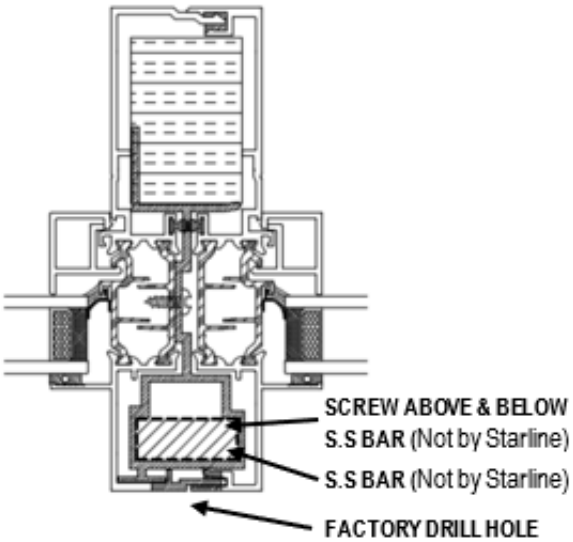
Enhanced Thermal



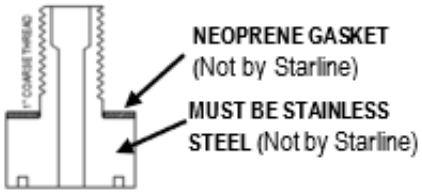
Stage Anchors

Stage anchors, by others, can be incorporated into Starline's window wall system. These stage anchor inserts are inserted into the window wall vertical coupler, ~6" up from the sill, and is engineered to withstand 600 pounds in any direction. These anchors can provide a permanent anchorage solution for window washing, building and façade maintenance, etc.

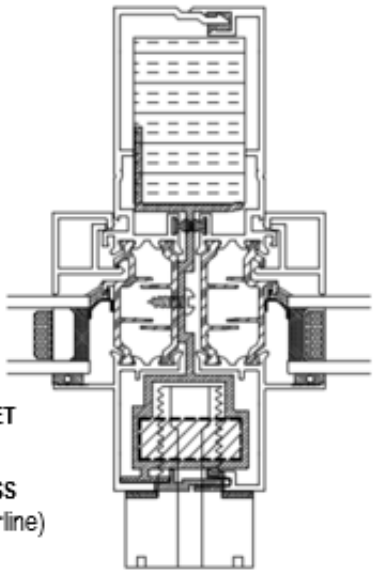
Starline preps the window wall to receive a stage anchor, however, the stage anchors and required accessories are by others. Not all stage anchors work with the window wall series – Details can be reviewed on a project specific basis.



COUPLER PREPPED FOR STAGE ANCHOR

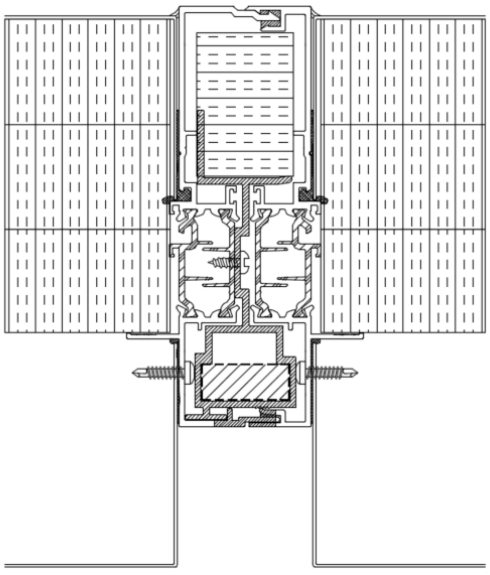


STAGE ANCHOR



COUPLER WITH STAGE ANCHOR INSERTED

Note: Raised metal panels cover the couplers, therefore, they are not able to be used in locations where stage anchors are required, per the standard raised metal panel design. If a stage anchor is required where a raised metal panel is located, the panel would project straight out from the coupler and not cover the couplers, as shown in the image below.



Grilles

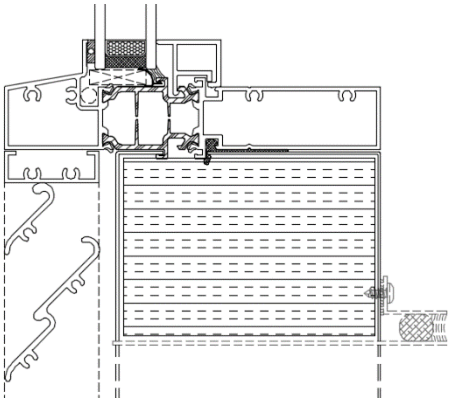
Grilles stay in a stationary position and are manufactured by Starline Windows.

Starline does not provide the flappers (which move), these are typically done by the mechanical trade. Starline Windows does not control, nor take responsibility for how well the flappers seal.

The grille can be placed above or below the slab and can be used in conjunction with any of the various bypass panel options at the slab

Starline does not offer a rated grille with respects to air infiltration and exfiltration or water penetration resistance.

Maximum width of 36” and maximum area of 10 sq. ft. overall are the recommended size guidelines for grilles.

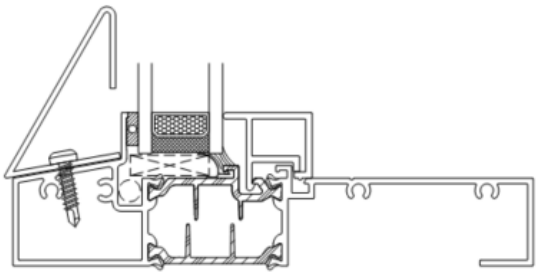


Climb Deterrents

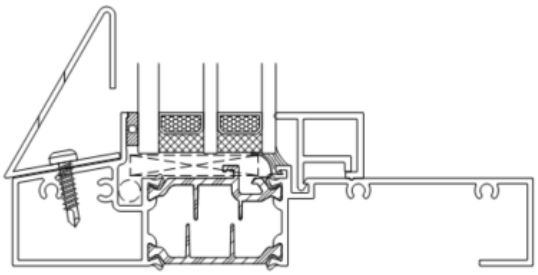
A project may have a requirement for a climb deterrent.

A climb deterrent will prevent the facilitation of climbing.

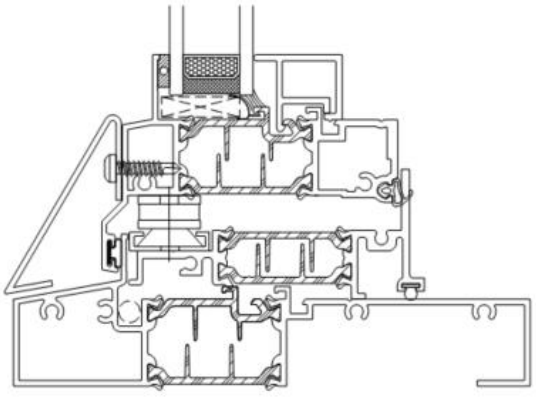
Starline Windows offers a climb deterrent that is fastened on the exterior sill of a fixed window and fastened to the exterior sill of the sash on an operable venting window.

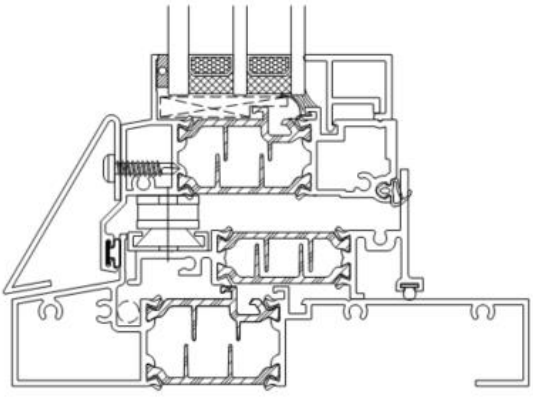


Fixed Window – Double Glazed



Fixed Window – Triple Glazed





Operable Vent – Double Glazed

Operable Vent – Triple Glazed

Finishes (Powder Coating)

Starline uses a thermoset coating specifically designed for architectural systems. This coating complies with the American Architectural Manufacturers Association (AAMA) 2603 specification standard which covers pigmented organic coatings on aluminum extrusions.

There are options to upgrade the powder to meet the AAMA 2604 or AAMA 2605 specification on the exterior which is noted in the **Options** section below.

Options

There is an option to upgrade the powder coating to meet the following AAMA standards:

- A thermoset super durable coating which complies with the AAMA 2604 specification standards. The AAMA 2604 standard demands advanced levels of weather resistance, gloss and colour retention, and corrosion resistance, among other increased standards when compared to the AAMA 2603 specification standard.
- A thermoset fluorocarbon coating which is a superior coating that complies with the AAMA 2605 specification standard. The AAMA 2605 standard demands advanced levels of weather resistance, gloss and colour retention, and corrosion resistance, among other increased standards when compared to the AAMA 2603 and AAMA 2604 specification standards.

Note: AAMA 2604 or AAMA 2605 specification standard on exterior of frames may be required in some building codes, bylaws, jurisdictions, etc**.**

Custom colours may be available on a project-specific basis.

Dual frame colour is available.

Items listed in this ***Options*** section are available at an additional cost.

Colour Options

The following **standard colours** are available in AAMA 2603, AAMA 2604 and AAMA 2605 specification standards:

White	Black	Brown	Silver	Charcoal Grey

Custom colours are also available. Virtually any colour can be matched or very closely matched. The scope of work and overall custom colour quantity will be reviewed by Starline on a project specific basis to determine the feasibility of the custom colour request.

Note: Custom colours are available for an additional cost premium. An approximate 12-week lead time is required to procure custom colour requests.

Refer to the ***Aluminum Finishes (Powder Coating)*** document in the Miscellaneous section of the catalogue for images of the standard colours available, a comparison of some attributes which are tested for in the AAMA 2603, AAMA 2604 and AAMA 2605 specification standards, information on colour retention, and details to consider when selecting colours.

Glazing

Starline Windows standard insulated glass unit (IGU) will be comprised of the following glass make-up:

- Double glazed, double sealed IGU with an overall nominal thickness of 1” (25 mm).
- Standard high performance soft coat (sputtered) Low E which is applied to surface #2.
- Black warm edge spacer with argon fill.
- Minimum glass thickness is 4mm.

OPTION - There is an option to upgrade to a triple glazed IGU, which will provided enhanced energy performance. The triple glazed IGU will be comprised of the following glass make-up:

- Triple glazing, double seal insulated glass unit with an overall thickness of 1 9/16” (40 mm).
- Standard high performance soft coat (sputtered) Low E which is applied to surface #2.
- Black warm edge spacer with argon fill.
- Minimum glass thickness is 4mm.

Additional options are available for an additional cost.

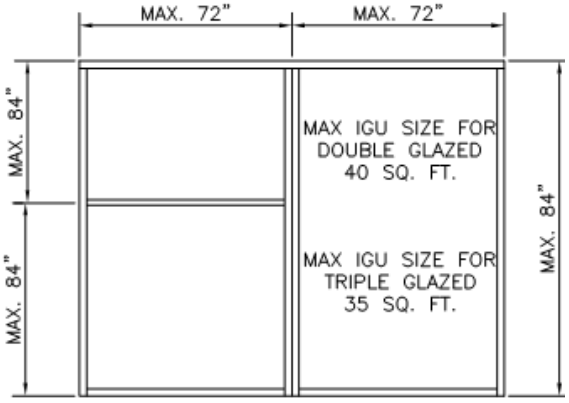
Maximum Area of IGU

GLASS TYPE	SINGLE LITE	DOUBLE GLAZED			TRIPLE GLAZED		
	6mm	4mm	5mm	6mm & THICKER	4mm	5mm	6mm & THICKER
Annealed	–	30 sq.ft.	40 sq.ft.	40 sq.ft.	30 sq.ft.	35 sq.ft.	35 sq.ft.
Tempered	–	30 sq.ft.	40 sq.ft.	40 sq.ft.	30 sq.ft.	35 sq.ft.	35 sq.ft.
Laminated	–	–	–	28 sq.ft. [1]	–	–	28 sq.ft. [1]
Spandrel	40 sq.ft.	–	–	–	–	–	–
Spandrel IGU [2]	–	30 sq.ft.	40 sq.ft.	40 sq.ft.	–	–	–

When determining the size of the IGU, it is important to keep in mind the maximum span for the horizontal T-Bar and vertical coupler, as these spans can drive the overall dimensions and size of the IGU.

Maximum span for a horizontal T-bar without a vertical coupler is 72”.

Maximum span for a vertical coupler without the use of a horizontal T-bar is 84”. This span may be able to increase to 96”, as reviewed on a project specific basis to determine the maximum allowable span.



[1] Note:

- 6mm laminated glass can be to a max area of 28 sq.ft,
- 6mm tempered laminated glass can be to a max area of 19.5 sq.ft.**;** max united inches <105”.

- 8mm laminated can be to a max area of 35 sq.ft.
- 8mm tempered laminated glass can be to a max area of 30 sq.ft.; max united inches <150".
- 10mm laminated can be to a max area of 40 sq.ft.
- 10mm tempered laminated glass can be to a max area of 41 sq.ft.; max united inches <175".

United inches = One width + one height.

[2] The Spandrel glass lite is always minimum 6mm thick. For a spandrel IGU the spandrel lite must be the inboard lite and ceramic frit is required to be used.

Aspect Ratio of Glass

The maximum width to height ratio is 5:1 for any type of glass selected, less single lite spandrel glass, which is 8:1.

Refer to the ***Aluminum Glass & IGU Design Guidelines*** document for more detailed information regarding size limitations, available configurations, defects, and definitions.

Acoustical Ratings

Double Glazed – Based on a 25mm IGU

GLASS EXT.	GAP	GLASS INT.	TEST NUMBER	STC	OITC
6mm Ann.	12mm AIR	6mm Ann.	TL8236	35	29
6mm Ann.	14mm AIR	4mm Ann.	TL8227	37	30
6mm Ann.	15mm AIR	4mm Ann.	TL8582	37	30
6mm Ann.	14mm AIR	5mm Ann.	TL8229	37	30
6mm Ann.	12mm AIR	6mm Lam. (PVB 0.8mm)	TL8234	37	30
6mm Ann.	11mm AIR	8mm Ann.	TL9521	37	32
6mm Ann.	8mm AIR	10mm Lam. (PVB 0.8mm)	TL8235	38	33

Triple Glazed – Based on a 40mm IGU

GLASS EXT.	GAP	GLASS CENTRE	GAP	GLASS INT.	TEST NUMBER	STC	OITC
4mm Ann.	11mm	4mm Ann.	16mm	4mm Ann.	TL8222	35	26
5mm Ann.	10mm	4mm Ann.	16mm	4mm Ann.	TL8221	38	28
6mm Ann.	10mm	4mm Temp.	14mm	6mm Ann.	TL8223	30	30
6mm Ann.	10mm	4mm Temp.	14mm	6mm Lam. (PVB 0.8mm)	TL8581	39	31
6mm Ann.	10mm	4mm Ann.	16mm	4mm Ann.	TL8220A	40	32
6mm Ann.	10mm	4mm Ann.	12mm	8mm Lam. (PVB 0.8mm)	TL8224	41	34
6mm Ann.	8mm	4mm Ann.	12mm	10mm Lam. (PVB 0.8mm)	TL8580	42	35
6mm Ann.	8mm	4mm Ann.	11mm	12mm Lam. (PVB 0.8mm)	TL8579	42	36

Performance Test Results

Canada

PRODUCT DESIGNATOR	AIR TIGHTNESS	WATER PENETRATION RESISTANCE		UNIFORM LOAD DEFLECTION
		LAB TESTED	FIELD TEST[1, 2]	
AW-PG50	A3	720Pa	500Pa	2400Pa

Series 9600 mulled assembly window has been tested to AAMA/WDMA/CSA 101 I.S.2/A440-11, AAMA/WDMA/CSA 101 I.S.2/A440-17, CSA A440SI-17, and CSA A440SI-19

USA

PRODUCT DESIGNATOR	AIR TIGHTNESS	WATER PENETRATION RESISTANCE		UNIFORM LOAD STUCTURAL
		LAB TESTED	FIELD TEST[1, 2]	
AW-PG50	0.06 CFM/ft2 @ 6.24 psf	15.0 psf	10.4 psf	75.2 psf

Series 9600 mulled assembly window has been tested to AAMA/WDMA/CSA 101 I.S.2/A440-11, AAMA/WDMA/CSA 101 I.S.2/A440-17, CSA A440SI-17, and CSA A440SI-19

[1] Water penetration resistance field tests follow the criteria and testing procedures as outlined in the AAMA 502-08 specification standard.

[2] 500Pa / 10.4 psf is the maximum field test result that can be achieved. If the Project Specifications state a water penetration resistance field test pressure of a lesser value, the project specified values shall govern.

Product Specification 08 46 13 – Glazed Aluminum Window Wall

Note: Bolded text in this specification are options that are highlighted for the specifier to select or to list requirements.

Part 1 - General

A high-quality thermally enhanced 6” aluminum window wall designed for residential high-rise construction.

1.1 Summary

A. Section Includes: Glazed Aluminum Window Wall:

1. Aluminum Window Wall system shall be Starline’s Series 9600 Thermally Enhanced Window Wall manufactured by Starline Windows with seismic jambs, deflection header, **integral slab bypass** and **casement and/or awning operable vents**.
2. Work included: Furnish labor, material and other services to complete the fabrication and installation of the windows, including all materials and fitments required for the operation of the units in the manner, direction and performance shown on the shop drawings and specified herein.

   Work not included: Structural support of window framing, interior trims. (**Specifier list others**).

   Related work specified elsewhere: (**Specifier to list**).

B. Related Sections: (**Specifier to select the following related sections**)

1. 07 27 00 – Air Barriers
2. 07 60 00 – Flashing and Trim
3. 07 92 00 – Joint Sealants
4. 08 13 16 – Aluminum Doors (Outswing Aluminum Framed Glass Door)
5. 08 32 13 – Sliding Aluminum-Framed Glass Door
6. 08 44 13 – Glazed Aluminum Curtain Wall
7. 08 51 13 – Aluminum Windows
8. 08 80 00 – Glazing

1.2 Quality Assurance

A. Drawings and specifications for Work of this Section are based upon the Series 9600 Window Wall manufactured by Starline Windows. Whenever alternative products are offered, submit supporting technical literature, samples, drawings and performance data for comparison 10 days prior to closing date. Test reports must be made available on request.

B. Windows shall be tested and conform to the AAMA/WDMA/CSA 101 I.S.2/A440-11, AAMA/WDMA/CSA 101 I.S.2/A440-17, CSA A440SI-17, and CSA A440SI-19.

C. Manufacturer Qualifications:

1. Manufacturer to have a minimum 10 years of documented experience.
2. Manufacturer capable of providing an aluminum window system that meet or exceed the performance requirements indicated.
3. Manufacturer capable of providing field representation during window installation.

D. Installer Qualifications: Installer performing the Work in this Section to have a minimum of 3 years documented experience and approved by the manufacturer.

E. Mock-Up: If requested by Consultant, a mock up is to be provided and installed at project site. Mock-up to include acceptable products and manufacturer approved installation methods. Obtain Owner's and Consultant's acceptance of finish colour, and workmanship standard.

1.3 Structural requirements

A. Structural performance shall be based on CSA Standard CSA S157-17 "Strength Design in Aluminum".

B. Limit mullion deflection to L/175.

C. Allow for deflection of building structure. Aluminum window frames with a head deflection channel and seismic compensation channel shall be designed, fabricated and installed to withstand slab edge vertical differential deflections of maximum 3/4"[1] and seismic inter-story lateral drift movements of elastic +/- 3/4"[1] without significant damage to the fenestration system or in-elastic +/- 2 1/2" [1] with significant damage expected but framing to be designed to remain anchored to the structure.

[1] Note to specifier: Values may change based on the configuration of the windows. Values to be specified by a Professional Engineer.

1.4 Test and Performance Requirements

Specifier to select from the following performance requirements.

A. Fixed window wall shall meet performance class **AW-PG50[1]** when tested to AAMA/WDMA/CSA 101 I.S.2/A440-11, AAMA/WDMA/CSA 101 I.S.2/A440-17, CSA A440SI-17, and CSA A440SI-19:

1. Air Infiltration: Fixed window air infiltration shall not exceed 0.06 cfm/ft^2 (A3) when tested in accordance with ASTM E 283 with a pressure difference of 6.24 psf / 300 Pa.
2. Water Penetration Resistance:
   i. There shall be no water infiltration for fixed windows when tested in accordance with ASTM E547 with a pressure difference of 15.0 psf / 720 Pa (Laboratory Test).
   ii. There shall be no water infiltration for fixed windows when tested in accordance with AAMA 502-08 with a pressure difference up to a maximum of 10.4 psf / 500 Pa (Field Test) [2]

3. Uniform Load Deflection Test: The deflection of fixed window shall not exceed L/175 and there shall be no permanent set when tested in accordance with ASTM E330 with a design pressure of 60 psf / 2880 Pa, positive and negative.

4. Uniform Load Structural Test: There shall be no damage to hardware, accessories, fasteners, or any other damage that would render the window in operable when tested in accordance with ASTM E330 with a structural test pressure of 75.2 psf / 3600 Pa, positive and negative.

5. Thermal Performance[3]

   i. U-value: The maximum fixed window thermal transmittance U-value shall be **0.30 BTU/ hr*ft²*°F (1.68 W/m²*k) for double glazed and / or 0.24 BTU/ hr*ft²*°F (1.36 W/m²*k) for triple glazed** when tested in accordance with AAMA 1503.1 and CAN/CSA-A440.2. Window shall be tested and labeled to N.F.R.C. standard 100 & 200.

   ii. Solar Heat Gain Coefficient: A (**maximum or minimum**) of **0.33 for double glazed and /or 0.30 for triple glazed**.

   iii. Visible Light Transmittance: A (**maximum or minimum**) of **0.59 for double glazed and /or 0.53 for triple glazed**.

B. Operable windows (ventilator) shall meet performance class **AW-PG50[1]** when tested to AAMA/WDMA/CSA 101 I.S.2/A440-11, AAMA/WDMA/CSA 101 I.S.2/A440-17, CSA A440SI-17, and CSA A440SI-19:

1. Air Infiltration: Operable window air infiltration shall not exceed 0.06 cfm/ft² (A3) when tested in accordance with ASTM E 283 with a pressure difference of 6.24 psf / 300 Pa.

2. Water Penetration Resistance:

   iii. There shall be no water infiltration for operable windows when tested in accordance with ASTM E547 with a pressure difference of 15.0 psf / 720 Pa (Laboratory Test).

   iv. There shall be no water infiltration for operable windows when tested in accordance with AAMA 502-08 with a pressure difference up to a maximum of 10.4 psf / 500 Pa (Field Test) [2]

3. Uniform Load Deflection Test: The deflection of operable window shall not exceed L/175 and there shall be no permanent set when tested in accordance with ASTM E330 with a design pressure of 60 psf / 2880 Pa, positive and negative.

4. Uniform Load Structural Test: There shall be no damage to hardware, accessories, fasteners, or any other damage that would render the window in operable when tested in accordance with ASTM E330 with a structural test pressure of 75.2 psf / 3600 Pa, positive and negative.

5. Thermal Performance[3]

   i. U-value:

      a. **Awning**: The maximum awning window thermal transmittance U-value shall be **0.34 BTU/ hr*ft²*°F (1.91 W/m²*k) for double glazed and / or 0.28 BTU/ hr*ft²*°F (1.58 W/m²*k) for triple glazed** when tested in accordance with AAMA 1503.1 and CAN/CSA-A440.2. Windows shall be tested and labeled to N.F.R.C. standard 100 & 200.

      b. **Casement**: The maximum casement window thermal transmittance U-value shall be **0.34 BTU/ hr*ft²*°F (1.92 W/m²*k) for double glazed and / or 0.29 BTU/ hr*ft²*°F (1.63 W/m²*k) for triple glazed** when tested in accordance with AAMA 1503.1 and CAN/CSA-A440.2.Windows shall be tested and labeled to N.F.R.C. standard 100 & 200.

   ii. Solar Heat Gain Coefficient:

a. **Awning**: A **maximum or minimum** of **0.26 for double glazed and /or 0.24 for triple glazed**.

b. **Casement**: A **maximum or minimum** of **0.27 for double glazed and /or 0.24 for triple glazed**.

iii. Visible Light Transmittance:

a. **Awning**: A **maximum or minimum** of **0.47 for double glazed and /or 0.42 for triple glazed**.

b. **Casement**: A **maximum or minimum** of **0.47 for double glazed and /or 0.42 for triple glazed**.

[1] Note to specifier: Performance class result is based on lab testing and will vary by configuration and glass type. Contact Starline Windows for information on how the product can be engineered to achieve higher performance class than specified above.

[2] Note to specifier: 500Pa / 10.4 psf is the maximum field test result that can be achieved. Should the Project Specifications state a water penetration resistance field test pressure of a lesser value, the project specified values shall govern. The water penetration resistance field tests follow the criteria and testing procedures as outlined in the AAMA 502-21 specification standard.

[3] Note to specifier: Thermal performance depends on glass specified. For double glazed values the above test was preformed using 25mm double glazed insulated glass unit (6mm/Argon/4mm) with Standard high-performance soft coat (sputtered) Low E which is applied to surface #2, 90% argon + 10% air fill with warm edge spacer bar. For triple glazed values the above test was performed using 40mm triple glazed insulated glass unit (6mm/Argon/4mm/Argon/4mm) with standard high-performance soft coat (sputtered) Low E which is applied to surface #2, 90% argon + 10% air fill with warm edge spacer bar. Please note: A second low E coating can be applied to surface #4 for the double glazed unit and surface #4 & #6 for the triple glazed unit to further increase the thermal performance. The NFRC test sizes were 79” x 79” (2000mm x 2000mm) for a fixed window wall, 24” x 59” (600mm x 1500mm) for a casement window and 59” x 24” (1500mm x 600mm) for an awning window.

1.5 Submittals

A. Product Data: Submit complete product data on system being used.

B. Shop Drawings: Submit complete shop drawings which include floor plans, elevations, window schedule, and product components including anchorage, fasteners, accessories and finish colour.

C. Samples: Submit glass and frame colour(s) samples.

D. Close-out Submittals:

1. Warranty: Submit executed Manufacturer’s warranty which provides a guarantee for the complete installation provided under this section against defective material and workmanship which appears within a period of two years from the date of substantial completion.

2. Project Record Documents: Submit operation and maintenance data for installed product in accordance with General Conditions

1.6 Project Conditions

A. Field Measurements: Verify actual measurements / openings by field measurements prior to fabrication, until it is agreed upon in writing between the Window Manufacturer and the General Contractor that floors become “typical”. Once typical the windows can be ordered off the previous field measurements.

B. Indicate field measurements on shop drawings.

Part 2 – Products

2.1 Manufacturers

A. Acceptable Manufacturers: Starline Windows

   1. Glazed Aluminum Thermally Enhanced Window Wall: Series 9600

B. Substitutions: Approved alternates

2.2 Material

A. Aluminum Extrusion: **2”** wide & **6"** deep perimeter frame member. Frame member and intermediate bars are extruded from aluminum sections of 6063 alloy, T5 temper with a minimum thickness of 0.064”.

B. Fasteners: Stainless steel and of sufficient size and quantity to perform their intended function.

C. Glazing Gaskets: Extruded Santoprene.

D. Exterior Glazing Tape: Tremco Polyshim II

E. Heel Bead: DOWSIL 1199

F. Glass Setting Blocks & Edge Blocks: FPVC, Neoprene, EPDM, Santoprene or silicone with an 80 to 90 ± Shore A durometer hardness. Block material shall be compatible with sealed unit edge sealant. Setting blocks for sealed units with silicone edge seals must be silicone.

G. Glazing bead: Extruded PVC and glazed from the interior.

H. Thermal break: Polyamide, multi chamber, 39mm.

2.3 Fabrication

A. Fabricate framing from extrusions of size and shape shown on shop drawings.

B. Interior and exterior extruded aluminum framing sections shall be integrated with a Polyamide thermal break to form a rigid composite assembly without the use of fasteners or other thermal bridging elements. Dry shrinkage of polyamide thermal break shall not exceed 0.10% of the framing member length.

C. Main framing extrusions shall be butt corner construction.

D. Operable sash (ventilator) extrusions shall be mitre corner construction.

E. All framing profiles shall be straight and free of deformations and defects.

F. Joints shall be accurately machined, fitted and sealed.

G. Coupling mullions shall be designed to provide a functional split to permit modular construction and allow for thermal expansion.

H. Perimeter frame shall be 6” deep with a minimum wall thickness of .064" (1.60mm) and be thermally broken.

I. Operable window (ventilator) shall be 3 3/8" deep with a minimum wall thickness of .064" (1.60mm) and be thermally broken.

J. All frame corners are mechanically joined by stainless steel screws.

K. All interior joints and interior screw heads shall be sealed with a non-hardening sealant.

L. Operable sash (ventilator) shall be double weather stripped with black santoprene bulb seal weather-stripping for the full perimeter at the interior and exterior of the ventilator.

M. All glazing pockets shall be vented, pressure equalized, and drained to the outside.

N. Glass bead shall be PVC and a snap-in screw less type.

O. Silicone heel bead shall be applied at perimeter of insulated glass units.

2.4 Glazing[1]

A. Double glazed, double seal insulated glass unit with an overall thickness of 1” (25 mm). Triple glazed available (See **2.7.A.1** of this specification).

B. Standard high performance soft coat (sputtered) Low E applied to surface #2.

C. Black warm edge spacer with argon fill.

D. Minimum glass thickness shall be 4mm. Glass thickness and quality shall conform to the requirements of the U.S.A. and Canadian Code for commercial construction, current edition.

E. Where practical, glazing shall be installed at the factory before shipping to site.

[1] Note to specifier: Glazing noted above is based on Starline Windows standard product offering. There are various other options available. See **2.7.A.** of this specification.

2.5 Hardware[1]

A. Hardware for the aluminum operable sash (ventilator) and window frames shall be furnished by the window manufacturer.

B. Where practical, all hardware fittings shall be installed at the factory before shipping to site.

C. Hardware shall be as follows:

1. Push out Operable sash (ventilator) shall be hung on concealed heavy duty stainless steel four bar friction hinges with adjustable friction shoe. Hinges are completely concealed when operable sash (ventilator) is in its closed position.
2. Zinc-alloy cam handle shall lock positively against the mounted keeper. Handles are available in black and white.
3. Mounted keeper is PVC and is available in black and white.
4. 60° hinge restricted to 4”.

[1] Note to specifier: Hardware noted above is based on Starline Windows standard product offering. There are various other options available. Refer to **2.7.L**of this specification.

2.6 Finishes (Powder Coating)

A. All exposed surfaces of aluminum door and framing members shall be free of scratches and other serious surface blemishes.

B. Finishes[1].

1. **Thermoset coating specifically designed for architectural systems. Coating to comply with AAMA 2603 specification** and / or

2. **Upgrade to a thermoset super durable coating which complies with the AAMA 2604 specification standards. The AAMA 2604 standard demands advanced levels of weather resistance, gloss and colour retention, and corrosion resistance, among other increased standards when compared to the AAMA 2603 specification standard.**

3. **Upgrade to a thermoset fluorocarbon coating which is a superior coating that complies with the AAMA 2605 specification standard. The AAMA 2605 standard demands advanced levels of weather resistance, gloss and colour retention, and corrosion resistance, among other increased standards when compared to the AAMA 2603 and AAMA 2604 specification standards.**

C. Colour Options[2].

1. Standard colours are as follows. (**Specifier to select from the standard colour(s) listed below)**. These standard colours are **available in the AAMA 2603, AAMA 2604 and AAMA 2605 specification**.

White	**Black**	**Brown**	**Silver**	**Charcoal Grey**

[1] Note to Specifier: Select 2.6.B.1 and/or 2.6.B.2 and/or 2.6.B.3. Option to have dual frame colour and / or AAMA 2603 coating on interior and AAMA 2604 or AAMA 2605 coating on exterior is available, if standard and / or custom colour is selected. Refer to **2.7.K.1** of this specification. AAMA 2604 or AAMA 2605 specification standard on exterior of frames may be required in some building codes, bylaws, jurisdictions, etc**.**

[2] Note to Specifier: Refer to **2.7.K.2** of this specification for Custom Colours.

2.7 Optional Items

(**Specifier to select from the following options**)

A. Glazing
   1. Triple glazed, double seal insulated glass unit with an overall thickness of 1 9/16” (40 mm).
   2. Varying glass thickness available in 4mm or greater (**Specifier to select glass thickness required**).
   3. Tinted, obscured & reflective glass
   4. Spandrel glass
   5. Laminated glass

B. Sandwich panels

C. Coupling mullions – Wide range of couplers are available (all thermally broken) to suite a variety of configurations i.e.: 90°, 135°, 180°, etc.

D. Bypass[1]
   1. Flush metal panel on the exterior / **Aluminum or galvanized** panel on interior.
      i. ~R8 insulation at slab edge (standard detail)
      ii. ~R12 insulation at slab edge (thermally enhanced)
   2. Top hat metal panel on exterior / **Aluminum or galvanized** panel on interior.
      i. ~R8 insulation at slab edge (standard detail)
      ii. ~R12 insulation at slab edge (thermally enhanced)
      iii. In-slab ducts
   3. 1”, 2” and/or 4” raised metal panel on exterior / **Aluminum or galvanized** panel on interior.
      i. ~R8 insulation at slab edge (standard detail)
      ii. ~R12 insulation at slab edge (thermally enhanced)
      iii. In-slab ducts (in-slab duct not available for the 1” raised metal panel).
   4. Flush to 2” beveled panel on exterior / **Aluminum or galvanized** panel on interior.
      i. ~R8 insulation at slab edge (standard detail)
      ii. ~R12 insulation at slab edge (thermally enhanced)
   5. Corrugated panel on exterior / **Aluminum or galvanized** panel on interior.
      i. ~R8 insulation at slab edge (standard detail)
      ii. ~R12 insulation at slab edge (thermally enhanced)
   6. ACM spandrel panel on exterior / **Aluminum or galvanized** panel on interior.
      i. ~R8 insulation at slab edge (standard detail)
      ii. ~R12 insulation at slab edge (thermally enhanced)
      iii. In-slab ducts
   7. Spandrel glass on exterior / **Aluminum or galvanized** panel on interior.
      i. ~R8 insulation at slab edge (standard detail)

ii. ~R12 insulation at slab edge (thermally enhanced)

iii. In-slab Ducts

8. Spandrel glass IGU on exterior / **Aluminum or galvanized** panel on interior.

i. ~R8 insulation at slab edge (standard detail)

ii. ~R12 insulation at slab edge (thermally enhanced)

E. Opaque areas other than Bypass - ~R13

1. Flush metal panel on the exterior / **Aluminum or galvanized** panel on interior.
2. Top hat metal panel on exterior / **Aluminum or galvanized** panel on interior.
3. Sandwich panel on exterior / **Aluminum or galvanized** panel on interior.
4. 1", 2" and/or 4" raised aluminum panel on the exterior / **Aluminum or galvanized** panel on interior.
5. Flush to 2" beveled panel on exterior / **Aluminum or galvanized** panel on interior.
6. Corrugated panel on exterior / **Aluminum or galvanized** panel on interior.
7. ACM spandrel panel on exterior / **Aluminum or galvanized** panel on interior.
8. Spandrel glass on exterior / **Aluminum or galvanized** panel on interior.
9. Spandrel glass IGU on exterior / **Aluminum or galvanized** panel on interior.

F. Transom Ducts

G. Grille

H. Climb deterrent

1. Fixed window climb deterrent
2. Operable window climb deterrent

I. Head trickle vent

J. Stage anchor

K. Finishes (Powder Coating)

1. Dual frame colour – 1 colour on exterior and 1 colour on interior (refer to **2.6.C** for colour options)

i. Finish to comply with AAMA 2603 standard on both interior and exterior.

ii. Finish to comply with AAMA 2604 standard on both interior and exterior.

iii. Finish to comply with AAMA 2605 standard on both interior and exterior.

iv. Finishes to comply with AAMA 2603 standard on interior and AAMA 2604 standard on exterior.

v. Finishes to comply with AAMA 2603 standard on interior and AAMA 2605 standard on exterior.

2. **Custom colours**[2]. Virtually any colour can be matched or very closely matched. The scope of work and overall custom colour quantity will be reviewed by Starline on a project specific basis to determine the feasibility of the custom colour request.

L. Hardware:

1. Multi point locking hardware. The multi point handle is available in black and white. The multi points, not visible when window is in closed position, are available in black and white. When

multipoint locks are selected, the minimum vent height for a casement is 22” but shall not exceed 60” in height. The minimum vent width is for an awning is 22” but shall not exceed 48” in width.

2. Restrictor: Custodial
3. 90° egress hinge.

M. Extruded aluminum glazing bead (powder coated to match interior window colour).

[1] Note to Specifier: At the concrete bypass itself, there is no interior aluminum or galvanized panel.

[2] Note to Specifier: Custom colours are available for an additional cost premium. An approximate 12-week lead time is required to procure custom colour requests.

Part 3 - Execution

3.1 Examination

A. Installer to examine openings, structural support, substrates and any other conditions that would affect the installation, for compliance with manufacturer’s instructions.

B. Verify rough opening dimensions.

C. Verify sill is within tolerance of levelness to ensure adequate shimming to obtain proper drainage.

3.2 Installation

A. Install manufacturer’s system in accordance with manufacturer’s approved shop drawings.

B. Windows shall be installed and adjusted by experienced personnel in accordance with the manufacturer instructions and approved shop drawings.

C. All items in this section shall be set in their correct location and shall be set level, square, plumb and at proper elevations and in alignment with other work.

D. The windows are installed at site with a maximum variance to plumb of +/- 0.25%. (+/- 1/4" / 96”).

3.3 Field Quality and Control

A. Manufacturer’s Field Services: Upon Owner and/or Consultants written request, provide manufacturer’s field service representative for site visit to inspect installation and to ensure accordance with manufacturer’s instruction and approved shop drawings.

B. Field Tests: Owner and/or Consultant may choose to conduct tests for water penetration and air infiltration.

1. Testing Standard per AAMA 502.
2. Field testing shall be performed by a qualified independent testing agency.
3. Field testing should not occur until the window has been installed and the caulking is cured. Ensure the products used to complete building envelope tie in (membrane, caulking, flashing, cladding, etc.) are installed complete and have cured.

3.4 Protection and Cleaning

A. Protection:

1. Windows shall be protected with blue poly during and after installation until acceptance by the General Contractor. Thereafter, it shall be the responsibility of the General Contractor to protect the installed product from construction damage.

2. Windows shall be isolated from concrete, mortar, plaster and dissimilar metals with bituminous paint or other isolation coatings.

B. Cleaning: It shall be the responsibility of the General Contractor to maintain protection and provide final cleaning.

Note: This specification is intended to be used by a qualified Specifier and will require modifications for the project specific requirements. This specification is not intended to be use verbatim as the project specific specification.

Laws, building and safety codes governing the design and use of this product vary widely. Starline Windows does not control the selection and use of this product and assumes no responsibility therefor.

Series 9600 NFRC Product Energy Chart

DOUBLE / TRIPLE (24.6mm / 40mm IGU)	GLAZING (Ext/Gap/Int)	U VALUE (W/M^2k)	U VALUE (Btu/hft^2F)	Shading Coefficient	Solar Heat Gain Coefficient	Visible Light Transmittance	CPD (Certified Product Directory)
Center of Glass (COG)	6mm SB60 (#2) / 4mm Clear	1.43	0.25	0.44	0.39	0.71	
	6mm SB67* (#2) / 4mm Clear	1.43	0.25	0.33	0.29	0.54	
	6mm SN68 (#2) / 4mm Clear	1.44	0.25	0.43	0.37	0.68	
	6mm SN68 (#2) / 4mm IS20* (#4)	1.19	0.21	0.42	0.36	0.66	
	6mm SNR50* (#2) / 4mm Clear	1.42	0.25	0.28	0.24	0.48	
	6mm SNX51/23* (#2) / 4mm Clear	1.40	0.25	0.26	0.22	0.51	
	6mm SNX62/27* (#2) / 4mm Clear	1.40	0.25	0.30	0.26	0.62	
	6mm SB60 (#2) / 4mm Clear / 4mm Clear	1.04	0.18	0.41	0.35	0.64	
	6mm SB60 (#2) / 4mm SB60 (#4) / 4mm Clear	0.69	0.12	0.36	0.31	0.57	
	6mm SB67* (#2) / 4mm Clear / 4mm Clear	1.04	0.18	0.30	0.26	0.49	
	6mm SN68 (#2) / 4mm Clear / 4mm Clear	1.05	0.19	0.39	0.34	0.62	
	6mm SN68 (#2) / 4mm RLE70/36 (#4) / 4mm Clear	0.69	0.12	0.34	0.29	0.53	
	6mm SNR50* (#2) / 4mm Clear / 4mm Clear	1.04	0.18	0.26	0.23	0.44	
	6mm SNX51/23* (#2) / 4mm Clear / 4mm Clear	1.03	0.18	0.24	0.21	0.46	
	6mm SNX62/27* (#2) / 4mm Clear / 4mm Clear	1.03	0.18	0.27	0.24	0.56	
Fixed Window	6mm SB60 (#2) / 4mm Clear	1.67	0.29	0.39	0.34	0.61	STL-A-53-00027-00001
	6mm SB67* (#2) / 4mm Clear	1.68	0.30	0.29	0.25	0.47	-
	6mm SN68 (#2) / 4mm Clear	1.68	0.30	0.37	0.33	0.59	STL-A-53-00025-00001
	6mm SN68 (#2) / 4mm IS20* (#4)	1.44	0.25	0.37	0.32	0.57	STL-A-53-00026-00001
	6mm SNR50* (#2) / 4mm Clear	1.66	0.29	0.25	0.21	0.42	-
	6mm SNX51/23* (#2) / 4mm Clear	1.65	0.29	0.23	0.20	0.44	STL-A-53-00033-00001
	6mm SNX62/27* (#2) / 4mm Clear	1.65	0.29	0.26	0.23	0.53	STL-A-53-00031-00001
	6mm SB60 (#2) / 4mm Clear / 4mm Clear	1.36	0.24	0.36	0.31	0.56	STL-A-53-00061-00001
	6mm SB60 (#2) / 4mm SB60 (#4) / 4mm Clear	1.06	0.19	0.31	0.27	0.49	STL-A-53-00062-00001
	6mm SB67* (#2) / 4mm Clear / 4mm Clear	1.36	0.24	0.26	0.23	0.43	-
	6mm SN68 (#2) / 4mm Clear / 4mm Clear	1.36	0.24	0.34	0.30	0.53	STL-A-53-00059-00001
	6mm SN68 (#2) / 4mm RLE70/36 (#4) / 4mm Clear	1.06	0.19	0.30	0.26	0.46	STL-A-53-00060-00001
	6mm SNR50* (#2) / 4mm Clear / 4mm Clear	1.35	0.24	0.23	0.20	0.38	-
	6mm SNX51/23* (#2) / 4mm Clear / 4mm Clear	1.34	0.24	0.21	0.18	0.40	STL-A-53-00067-00001
	6mm SNX62/27* (#2) / 4mm Clear / 4mm Clear	1.34	0.24	0.24	0.21	0.48	STL-A-53-00065-00001
Awning	6mm SB60 (#2) / 4mm Clear	1.90	0.34	0.32	0.27	0.49	STL-A-51-00027-00001
	6mm SB67* (#2) / 4mm Clear	1.90	0.34	0.24	0.21	0.37	-
	6mm SN68 (#2) / 4mm Clear	1.91	0.34	0.30	0.26	0.47	STL-A-51-00025-00001
	6mm SN68 (#2) / 4mm IS20* (#4)	1.74	0.31	0.30	0.26	0.46	STL-A-51-00026-00001
	6mm SNR50* (#2) / 4mm Clear	1.90	0.33	0.20	0.18	0.33	-
	6mm SNX51/23* (#2) / 4mm Clear	1.89	0.33	0.19	0.16	0.35	STL-A-51-00033-00001
	6mm SNX62/27* (#2) / 4mm Clear	1.88	0.33	0.22	0.19	0.43	STL-A-51-00031-00001
	6mm SB60 (#2) / 4mm Clear / 4mm Clear	1.58	0.28	0.29	0.25	0.44	STL-A-51-00061-00001
	6mm SB60 (#2) / 4mm SB60 (#4) / 4mm Clear	1.33	0.24	0.26	0.22	0.39	STL-A-51-00062-00001
	6mm SB67* (#2) / 4mm Clear / 4mm Clear	1.58	0.28	0.22	0.19	0.34	-
	6mm SN68 (#2) / 4mm Clear / 4mm Clear	1.58	0.28	0.28	0.24	0.42	STL-A-51-00059-00001
	6mm SN68 (#2) / 4mm RLE70/36 (#4) / 4mm Clear	1.34	0.24	0.24	0.21	0.36	STL-A-51-00060-00001
	6mm SNR50* (#2) / 4mm Clear / 4mm Clear	1.57	0.28	0.19	0.16	0.30	-
	6mm SNX51/23* (#2) / 4mm Clear / 4mm Clear	1.57	0.28	0.17	0.15	0.32	STL-A-51-00067-00001
	6mm SNX62/27* (#2) / 4mm Clear / 4mm Clear	1.57	0.28	0.20	0.17	0.39	STL-A-51-00065-00001

Casement	6mm SB60 (#2) / 4mm Clear	1.94	0.34	0.32	0.27	0.49	STL-A-50-00027-00001
	6mm SB67* (#2) / 4mm Clear	1.94	0.34	0.24	0.21	0.37	-
	6mm SN68 (#2) / 4mm Clear	1.92	0.34	0.31	0.27	0.47	STL-A-50-00025-00001
	6mm SN68 (#2) / 4mm IS20* (#4)	1.75	0.31	0.30	0.26	0.46	STL-A-50-00026-00001
	6mm SNR50* (#2) / 4mm Clear	1.93	0.34	0.21	0.18	0.33	-
	6mm SNX51/23* (#2) / 4mm Clear	1.92	0.34	0.19	0.16	0.35	STL-A-50-00033-00001
	6mm SNX62/27* (#2) / 4mm Clear	1.92	0.34	0.22	0.19	0.43	STL-A-50-00031-00001
	6mm SB60 (#2) / 4mm Clear / 4mm Clear	1.62	0.29	0.29	0.25	0.44	STL-A-50-00061-00001
	6mm SB60 (#2) / 4mm SB60 (#4) / 4mm Clear	1.39	0.24	0.26	0.22	0.39	STL-A-50-00062-00001
	6mm SB67* (#2) / 4mm Clear / 4mm Clear	1.62	0.29	0.22	0.19	0.34	-
	6mm SN68 (#2) / 4mm Clear / 4mm Clear	1.63	0.29	0.28	0.24	0.42	STL-A-50-00059-00001
	6mm SN68 (#2) / 4mm RLE70/36 (#4) / 4mm Clear	1.39	0.24	0.24	0.21	0.36	STL-A-50-00060-00001
	6mm SNR50* (#2) / 4mm Clear / 4mm Clear	1.61	0.28	0.19	0.16	0.30	-
	6mm SNX51/23* (#2) / 4mm Clear / 4mm Clear	1.61	0.28	0.17	0.15	0.32	STL-A-50-00067-00001
	6mm SNX62/27* (#2) / 4mm Clear / 4mm Clear	1.61	0.28	0.20	0.17	0.39	STL-A-50-00065-00001

I.G.U. (Insulated Glass Unit)	GLASS	WARM EDGE SPACER	GAS FILL
	Guardian IS20*, SN68, SNR50*, SNX51/23*, SNX62/27*, Vitro SB60, SB67*	DG - 14.6mm (9/16") TG - 2 x 13.6mm (1/2")	90% Argon & 10% Air

Based on NFRC CPD - Certification Date: April 2022 Expiration Date: August 2026

Fenestration = Frame, mullions, sash and vision glass. Refer to www.nfrc.org for more information.

*** - Available at a cost premium.**

Prepared by:
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