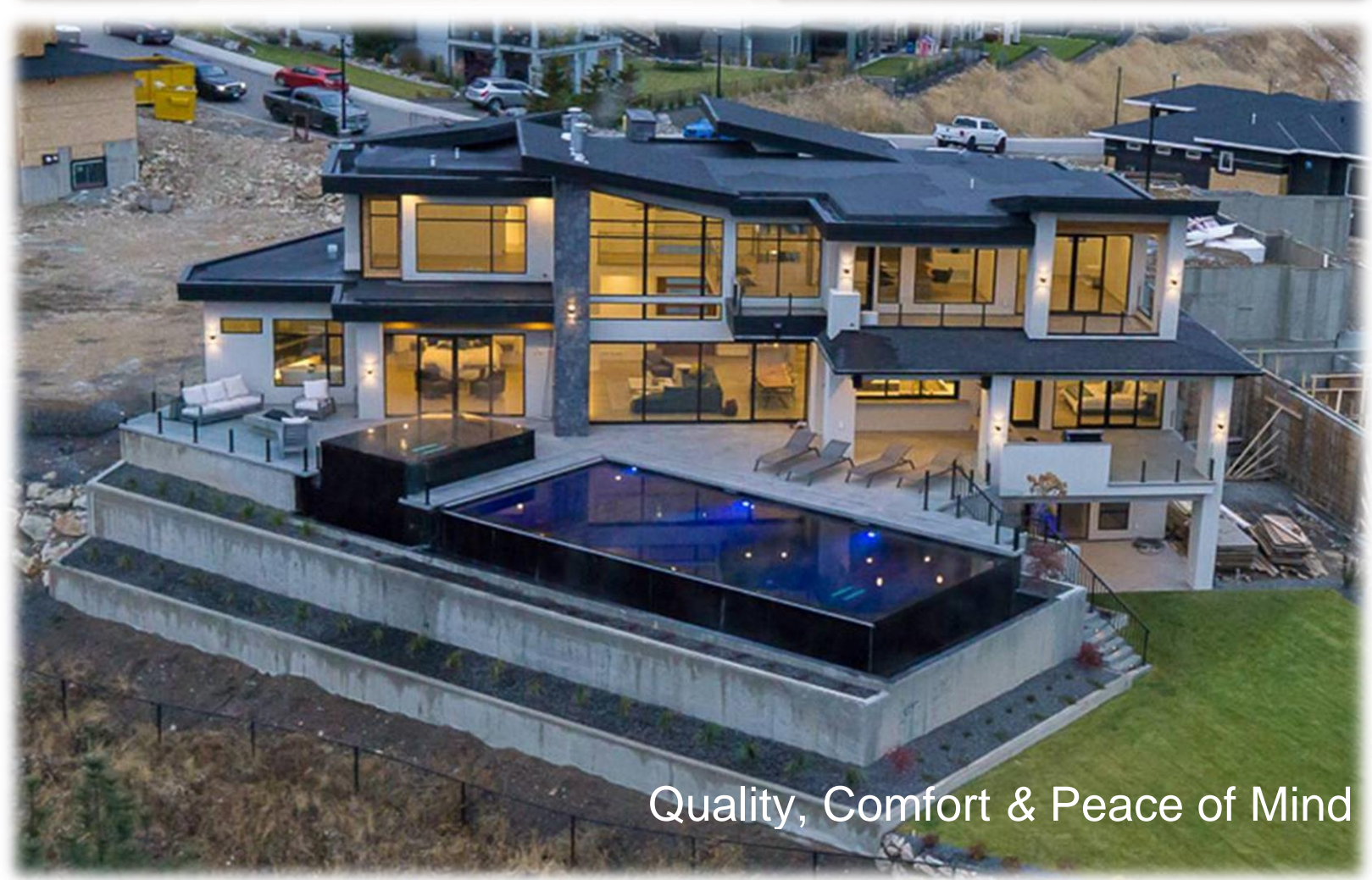


**STARLINE
WINDOWS**

Series 7100

Vinyl Casement/Awning/Fixed Window



Quality, Comfort & Peace of Mind



Foreword

This Design Guide provides specifications on the Series 7100 Vinyl Casement/Awning/Fixed Window.

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.

This document subject to change without notice.

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

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Recommended Size Guidelines

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

Double Glazed Fixed Lite and Combination Window Maximum Weight and Area

FRAME FINISH ¹	MAXIMUM WEIGHT ²	MAXIMUM FIXED LITE AREA ³	MAXIMUM COMBO WINDOW AREA ⁴
White (unpainted). Beige, Silver -UV Cure Coat	250 pounds	50 sq. ft.	72 sq. ft.
Black, Charcoal, and Brown -UV Cure Coat	250 pounds	50 sq. ft.	60 sq. ft.

Triple Glazed Fixed Lite and Combination Window Maximum Weight and Area

FRAME FINISH ¹	MAXIMUM WEIGHT ²	MAXIMUM FIXED LITE AREA ³	MAXIMUM COMBO WINDOW AREA ⁴
White (unpainted). Beige, Silver -UV Cure Coat	250 pounds	50 sq. ft.	62 sq. ft.
Black, Charcoal, and Brown -UV Cure Coat	250 pounds	50 sq. ft.	50 sq. ft.

Maximum Combination Window Width and Height

FRAME FINISH ¹	MAXIMUM WIDTH	MAXIMUM HEIGHT
White (unpainted). Beige, Silver -UV Cure Coat	144"	120"
Black, Charcoal, and Brown -UV Cure Coat	120"	96"

Note: Limitations are guidelines and depend on site conditions.

Maximum Fixed Window Width and Height

FRAME FINISH ¹	MAXIMUM WIDTH	MAXIMUM HEIGHT
White (unpainted). Beige, Silver -UV Cure Coat	108"	108"
Black, Charcoal, and Brown -UV Cure Coat	108"	108"

Note: Limitations are guidelines and depend on site conditions.

For instructions and examples on how to calculate area and weight, refer to [Calculate Fixed, Combination, and Vent Window Size and Weight](#).

¹ UV Cure coat is available for the exterior and interior of the window frame.

² Maximum weight is a guideline that considers, production capabilities, tailgate deliveries and window installer capabilities. Please consult with the window installers on a project specific basis to determine their ideal overall window weight with respects to handling and installing. Industry standard for installation typically ranges from 200 lbs. and up, depending on site conditions, man power and equipment that will be used to assist with installation. If an overall window is greater than 300 lbs site glazing is required due to manufacturing limitations. Windows that are heavier than installers are willing to install (approximate range 200lbs – 300 lbs) site glazing may be an option, however it is Starline Window's recommendation that factory glazing, in a controlled environment, is utilized whenever possible.

³ Maximum fixed lite area for an individual insulated glass unit (IGU) is dependent on the glass thickness selected. Once the desired IGU area has been determined, refer to [Maximum IGU Area Based on Glass Lite Thickness](#) for minimum allowable glass thickness. **Note:** There may be certain design, structural, building code, by-law etc. requirements that could dictate the glass thickness. Glass thickness will be confirmed during the shop drawing phase, if applicable, and /or ordering of the windows.

⁴ A combo window is a window that has multiple lites, either fixed and / or operable vents. These lites are divided either by mullions and / or couplers and / or T-Bars.

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Maximum Vent Size

In order to design an operable vent that is within Starline's recommended maximum vent size, refer to the chart below:

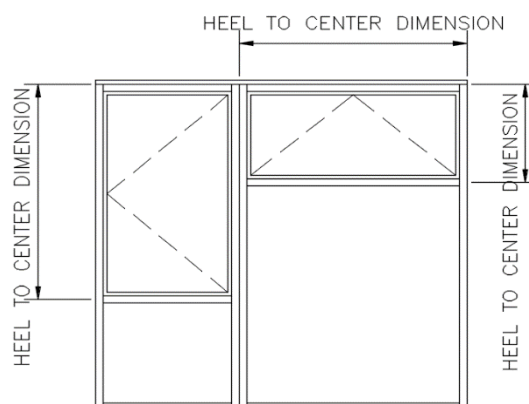
OPERABLE VENT	MAX. WIDTH	MAX. HEIGHT	MAX. AREA DOUBLE GLAZED	MAX. AREA TRIPLE GLAZED	MAX. WEIGHT
AWNING – CAM HANDLE	54"	48"	10 sq. ft.	7 sq. ft.	40 pounds
AWNING – ROTO GEAR	54"	48"	15 sq. ft.	10 sq. ft.	50 pounds
CASEMENT – CAM HANDLE	36"	84"	10 sq. ft.	7 sq. ft.	40 pounds
CASEMENT – ROTO GEAR	42"	84"	15 sq. ft.	10 sq. ft.	50 pounds

Minimum Vent Size

Sizes are based on heel to center dimensions

HARDWARE	OPERABLE VENT	WIDTH (In)	HEIGHT (In)
Standard Hardware: Cam Handles	Awning	12"	12"
	Casement	12"	12"
Optional Hardware: <ul style="list-style-type: none"> Roto with Single Point Claw locking handle Roto with multi-point locks 	Awning	16 1/2"	16 1/2"
	Casement	16 1/2"	16 1/2"

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



¹ Sizes are based on heel to center

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 Starline Calculator

Starline has a **Maximum Fixed, Combination and Vent Window Size Calculator** available for use. Enter the required parameters and the calculator will advise if the window is within Starline's recommended design guidelines (PASS) or if it exceeds a certain parameter (FAIL). To retain 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 /or Structural Engineer for feasibility and structural compliance.

For any type of window; fixed, combination and /or vents, there may be certain 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 /or ordering of the windows.

Using Manual Calculations

Once the fixed and /or combination window and /or vent style 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.

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

Example #1: is intended to provide a sample calculation for a fixed window ¹.

Example #2 & #3: are intended to provide sample calculations for each of the operable vent styles.

Example #4: is intended to provide a sample calculation for a combination window.

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

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

Typical Float Glass Weight per Thickness

GLASS LITE THICKNESS	3mm	4mm	5mm	6mm	8mm	10mm
Monolithic Glass – Weight (lb/ ft ²)	1.54	2.05	2.56	3.07	4.10	5.12
Double Glazed IGU – Weight (lb/ ft ²)	3.08	4.10	5.12	6.15	8.19	10.24
Triple Glazed IGU – Weight (lb/ ft ²)	4.61	6.15	7.68	9.22	12.29	15.36

Maximum IGU Area and Lineal Inches Based on Glass Lite Thickness²

GLASS THICKNESS	MAX. IGU AREA	MAX. UNITED INCHES (One Width + Height)
3mm	19.5 sq. ft.	<105"
4mm	30 sq. ft.	105"-150"
5mm	41 sq. ft.	>150"-175"
6mm	50 sq. ft.	>175" +

Series 7100 Vinyl Window Design Guidelines



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 certain 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/or ordering of the windows.

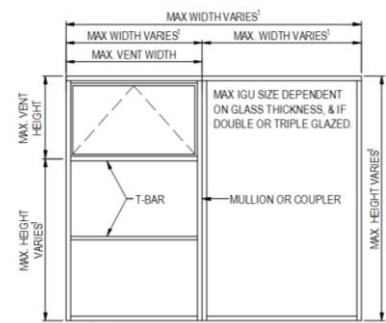


Figure 1
¹ Dimensions vary according to many factors, such as frame finish, glass lite thickness, etc. Review entire design guidelines document for further information and clarity.

Figure 1 provides an example of a combination window.

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

The following overall dimensions, square footage and weight are all ok for roto hardware only. If cam hardware is preferred, reduce the overall vent size to **10.00** ft² and overall vent weight to **40** lbs.

Ex.#1- Fixed Window

- | | | |
|--|--|---|
| 1. Determine fixed window size ¹ - 60" wide x 96" tall. | $(60" \times 96") / 144" = 40 \text{ ft}^2$ | ✓ |
| 2. Determine glass weight - Based on area, min. 5mm glass required
Max. united inches can be <150"-175" | $60" + 96" = 156$ | ✓ |
| 3. Determine glass weight based on 5mm | $= 5.12 \text{ lbs/ft}^2$ | ✓ |
| 4. Calculate overall weight | $40 \text{ ft}^2 \times 5.12 \text{ lbs/ft}^2 = 204 \text{ lbs}$ | ✓ |

Ex.#2- Awning

- | | | |
|--|---|---|
| 1. Determine awning size - 48" wide x 30" tall. | $(48" \times 30") / 144" = 10 \text{ ft}^2$ | ✓ |
| 2. Determine glass weight - Based on area, min. 5mm glass required
Max. united inches can be <105 | $48" + 30" = 78"$ | ✓ |
| 3. Determine Glass - Double glazed unit 3mm / Air / 3mm | $= 3.08 \text{ lbs/ft}^2$ | ✓ |
| 4. Calculate overall weight | $10 \text{ ft}^2 \times 3.08 \text{ lbs/ft}^2 = 30.8 \text{ lbs}$ | ✓ |

Ex.#3- 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.

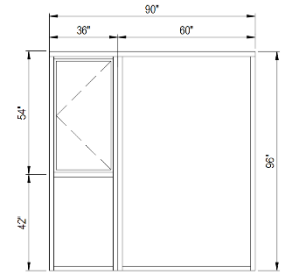
- | | | |
|--|---|---|
| 1. Determine casement size – 36" wide x 54" tall | $(36" \times 54") / 144" = 13.5 \text{ ft}^2$ | ✓ |
| 2. Determine glass weight - Based on area, min. 5mm glass required
Max. united inches can be <105 | $36" + 54" = 90"$ | ✓ |
| 3. Determine Glass - Double glazed unit 3mm / Air / 3mm | $= 3.08 \text{ lbs/ft}^2$ | ✓ |
| 4. Calculate overall weight | $13.5 \text{ ft}^2 \times 3.08 \text{ lbs/ft}^2 = 41.6 \text{ lbs}$ | ✓ |

Ex.#4- 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 - 90" wide by 96" tall (90" x 96") / 144" = 60 ft² ✓
2. Confirm combination window width and height are within recommended design guidelines. (UV cure coat for this example) Width = 90" ≤ 120" ✓
Height = 96" ≤ 96" ✓
3. Summarize individual fixed lite and operable vent overall weight based on previous calculations completed (as demonstrated in Example #1-#3)
*This step is required in order to determine overall weight of combination window. Remember to confirm united inches for each individual lite.
 - a. Casement 36" x 54" (13.5 ft²) 3mm glass = 41.6 lbs ✓
 - b. Fixed Lite 36" x 54" (10.5 ft²) 3mm glass = 32.4 lbs ✓
 - c. Fixed Lite 60" x 96" (40 ft²) 5mm glass = 204 lbs ✓
4. Calculate overall weight 41.6+ 32.4 + 204 = 278 lbs ³ ?

¹ 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 [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. For 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 41 sq. ft. maximum, however structural requirements due to the building's 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 Maximum weight is a guideline that considers, production capabilities, tailgate deliveries and window installer capabilities. Please consult with the window installers on a project specific basis to determine their ideal overall window weight with respects to handling and installing. Industry standard for installation typically ranges from 200 lbs. and up, depending on site conditions, man power and equipment that will be used to assist with installation. If an overall window is greater than 300 lbs site glazing is required due to manufacturing limitations. Windows that are heavier than installers are willing to install (approximate range 200 – 300 lbs) site glazing may be an option, however it is Starline Window's recommendation that factory glazing, in a controlled environment, is utilized whenever possible.

Frame and Accessory Options

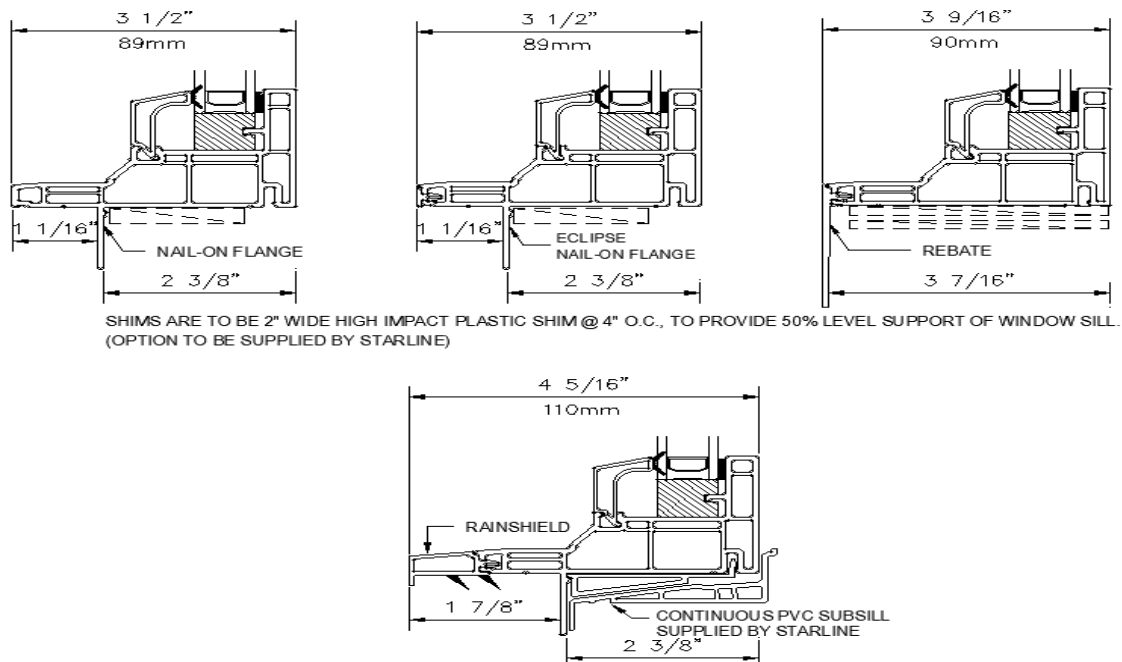
Starline Windows offers the following types of perimeter frames and accessories to best suite your project specific needs.

Perimeter Frame Options

Starline Windows offers the following types of perimeter frames to best suite your project specific needs.

- NAIL-ON FLANGE
 - STANDARD
 - ECLIPSE
- REBATE¹
- RAINSHIELD

To support drainage when an interior air seal is required², it is Starline's recommendation to order the window sill nail on flange with factory drilled 3/8" x 5/8" slots at 30" o/c and 8" from the end of the frame, as this allows for sub sill drainage. The flanged weep holes are an industry-accepted practice. Shimming between the nailing flange and the sheathing at the sill only is **not ok** as the shimmed flange provides unnecessary stress on the window sill and will result in Starline's warranty being void. If the building design requires shimming between the nailing flange and sheathing at the sill, head and jambs must also be shimmed out the same thickness as at the sill. Minimum 3/8" gap required between sheathing and nailing flange to allow for proper sub sill drainage.



Note: Refer to the ***Emerald 7100 Series – Standard Details*** pdf for further information. These details will provide some standard installation methods for the above frame options. These installation details are a suggested method of installation and does not necessarily represent a detail that is suitable for a specific project. To confirm project specific details, please check with your Waterproofing / Building Envelope Consultant.

¹Rebate frame is available for project specific conditions only. Please email any project specific enquiries to sales@starlinewindows.com

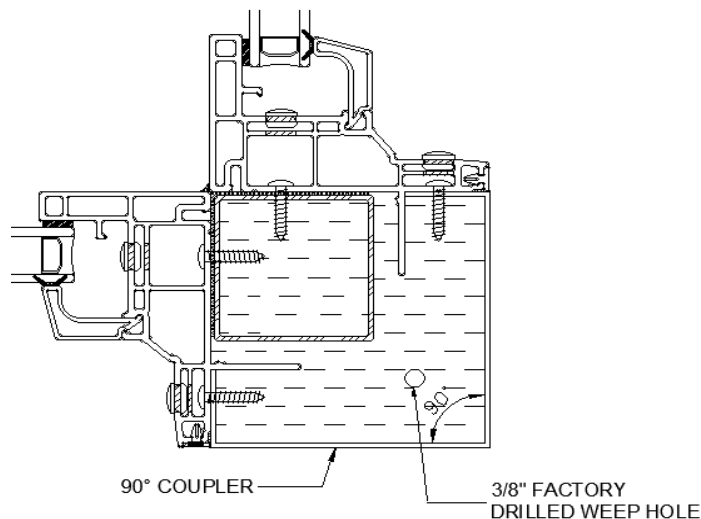
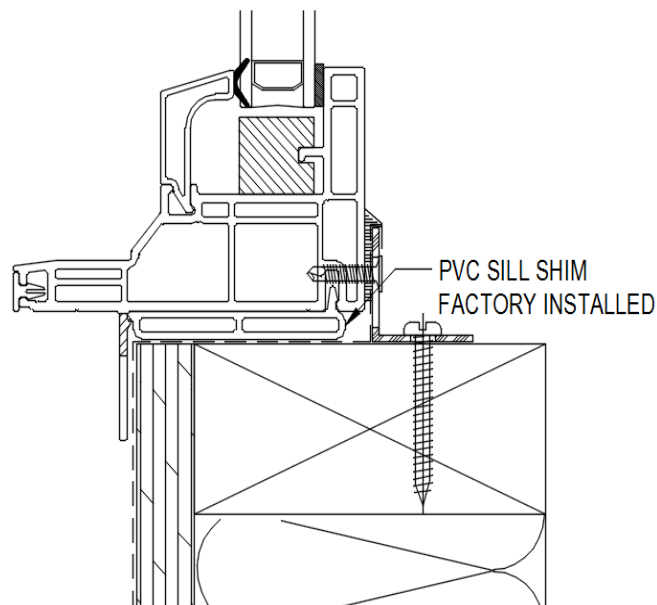
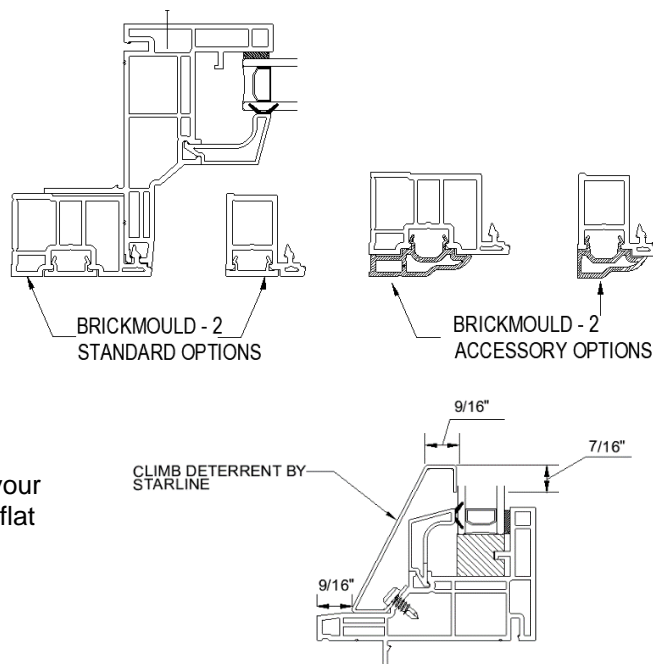
²Starline and industry best practice guidelines recommends having an interior air seal.

Accessory Options

There are various accessory and add on options available for the Eclipse 7100 Series, such as:

- Brickmould (2 profiles to choose from) with 2 accessory options
- Sill shims (factory installed)
- Variable degree couplers, 180°, 135° & 90°
- Climb Deterrent
- Surface mounted (plant on) muntins
- Insulated glass internal grilles
- Insect Screens

The climb deterrent will discourage anyone from climbing onto your window as it acts as a safety feature due to its sharp angle and flat surface at the sill of your window.



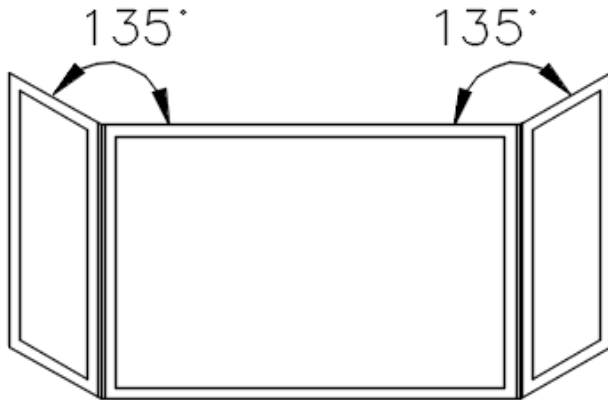
Factory installed sill shims will save time and simplify the installation process. These shims are available for an additional cost. It is Starline's recommendation that an interior sill angle is used when using the factory installed sill shims, this detail is a suggested method of installation and does not necessarily represent a detail that is suitable for a specific project. To confirm project specific details, please check with your Waterproofing / Building Envelope Consultant.

Note: Refer to the **Emerald 7100 Series – Standard Details** pdf for further information. The pdf contains details for some of the accessory options available. For additional and complete information regarding the available accessory options, contact your local Starline Sales rep at sales@starlinewindows.com.

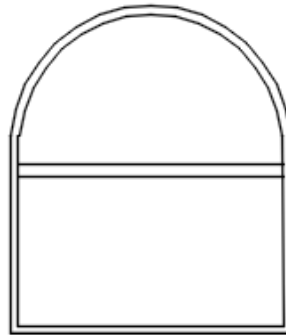
Refer to the **Vinyl Windows & Doors – Internal Grilles & Surface Mounted Muntins** document in the Miscellaneous section of the catalogue for more detailed information regarding options available.

Radius, Angled, Bay, and Bow Windows

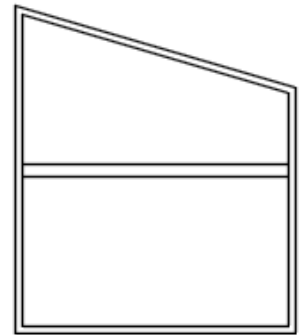
There are various special shapes sizes and configurations that Starline Windows can manufacture. Below is a few examples of different styles of windows Starline has to offer. There are other options available. Contact your local Starline Sales rep at sales@starlinewindows.com for further information on these types of windows.



Bay Window



Half Round Window



ANGLED Window (Trapezoid)

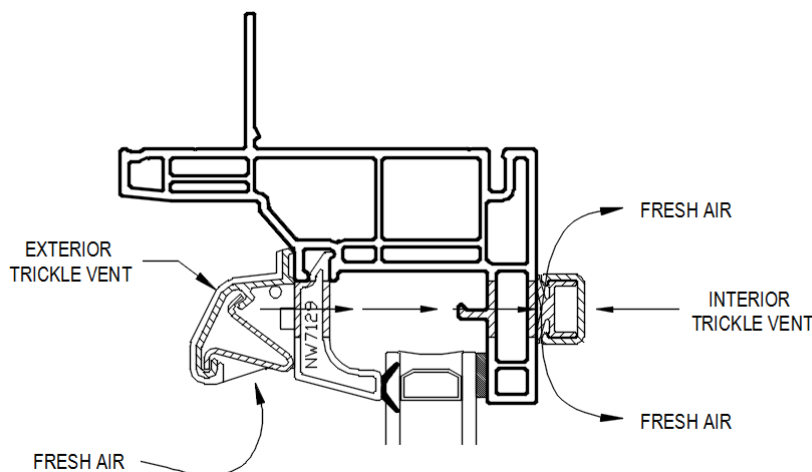
Note: Starline does not offer radius or angled casement or awning windows.

Trickle Vent

The series 7100 head trickle ventilator has been tested in a combination window scenario under the AAMA/WDMA/CSA 101 I.S.2/A440-08, AAMA/WDMA/CSA 101 I.S.2/A440-11 and CSA A440SI-09 requirement. The test results provided an A3 rating for air leakage resistance and 730Pa for water penetration resistance for a lab test. For an onsite water penetration resistance test a rating of 400Pa would be expected.

33 CFM at 75Pa is expected for each trickle ventilator when in the open position.

The head trickle vent has not been tested for acoustic ratings; expect some localized exterior sound transmission to the interior. The trickle vent assembly is also not tested for thermal performance, expect localized exterior cooling/heating to the interior.



Window Head Trickle Vent with Exterior and Interior Vent

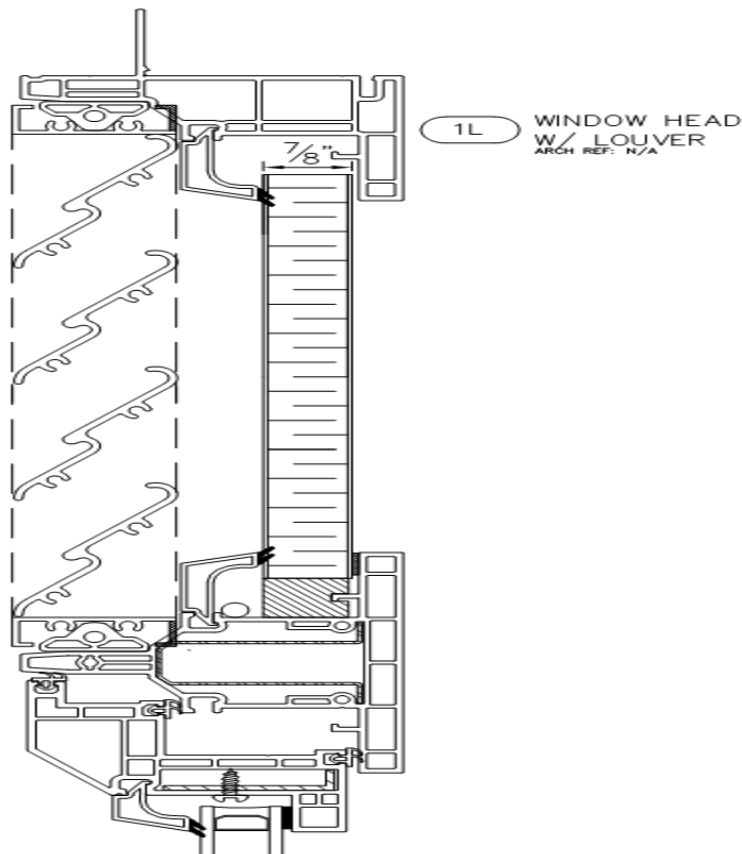
Grilles

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.

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 10sq.ft. overall are the recommended size guidelines for grilles.



Window Hardware

The standard handle for the Series 7100 operable vents are single point cam handles made from zinc alloy. 1 or 2 handles will be included depending on the operable vent size (refer to the table below). These handles lock positively against a PVC mounted keeper. Handles and mounted keeper are available in white and / or beige.

VENT SIZES WITH 1 OR 2 CAM HANDLES

	1 CAM HANDLE	2 CAM HANDLES
AWNING WIDTH	UP TO 28 7/8"	>28 7/8" TO 48"
CASEMENT HEIGHT	UP TO 28 7/8"	>28 7/8" TO 60"

Options

- Roto operator hardware. Rotary handle + single-point claw locking handle available in white or beige.
- Multi point locks with roto operator hardware available for casements only. Cam handles are not an option when multi-point locks are selected. Rotary handle + multi point locks and handle available in white or beige.
- Insect Screens: Frames are made from extruded aluminum and are rigidly joined at the corners. Aluminum frame shall be finished to match interior window frame colour. Screen shall be black fiber mesh. Screens are held in place with clips.
- 4" Restrictor
- 90 degree egress hinge.

Frame Finishes

Starline Windows offers various options for vinyl frame finish.

Starlines standard finish for the exterior and interior of the vinyl frame is Standard White. The extrusion is left as a bare substrate (not painted) as the colour is impregnated into the vinyl material.

Options

There is an option to paint the exterior of the frame using an exterior grade UV cure coating which is specifically designed for use on vinyl fenestration products. This coating contains 100% solids, thus emits no volatile organic compounds (VOCs) or hazardous air pollutants (HAPs).

The following **standard colours** are available:

- *Black
- *Kendall Charcoal

The following **semi-standard colours**¹ are available:

- *Brown
- *Silver
- *Beige

***Available to be painted on the exterior and interior**

Custom colours may also be available for the exterior and interior of the frame. 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: Standard and Semi-standard colours are available for an additional cost. May require up to a 4-week lead time.

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

¹Semi Standard colors that are painted on the exterior and interior must have a minimum of 10 windows to apply.

Refer to the **Vinyl Finishes** document in the **Miscellaneous section** of the catalogue for images of the stock and semi-standard colours available.

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 thickness of 3/4" (19 mm).
- Standard high-performance soft coat (sputtered) Low E which is applied to surface #2.
- Aluminum spacer with argon fill.
- Minimum glass thickness is 3mm.

Options

There is an option to upgrade to a triple glazed IGU¹, which will provide 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 1/4" (32 mm).
- Standard high-performance soft coat (sputtered) Low E which is applied to surface #2.
- Aluminum spacer with argon fill.
- Minimum glass thickness is 3mm.

Additional options are available for an additional cost.

¹Triple glazed windows must have the middle glass lite tempered when there is more than 1 low E coating being used.

Maximum IGU Area Based on Glass Lite Thickness

GLASS THICKNESS	MAX IGU AREA	MAX. UNITED INCHES (One Width + Height)
3mm	19.5 sq. ft.	< 105"
4mm	30 sq. ft.	105"-150"
5mm	41 sq. ft.	>150"-175"
6mm	50 sq. ft.	>175" +

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 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.

Refer to the **Vinyl Windows & Doors - Glass & IGU Product Information** document in the Miscellaneous section of the catalogue for more detailed information regarding size limitations, available configurations, defects and definitions.

IGU Charts

SERIES 7100 DOUBLE GLAZED IGU: 19mm, Overall thickness of primary seal (Butyl): 0.8mm

EXTERIOR		SPACER		INTERIOR	
mm	inch	mm	inch	mm	inch
3	1/8	12.6	1/2	3	1/8
4	5/32	11.6	7/16	4	5/32
4	5/32	9.6	3/8	6	1/4
5	3/16	9.6	3/8	5	3/16
6	1/4	6.6 ¹	1/4 ¹	6	1/4
4	5/32	9.6	3/8	6LAM .030	1/4

SERIES 7100 TRIPLE GLAZED IGU: 32 mm Overall thickness of primary seal (Butyl): 0.8mm

EXTERIOR		SPACER		CENTRE		SPACER		INTERIOR	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
3	1/8	11.6	7/16	3	1/8	11.6	7/16	3	1/8
4	5/32	9.6	3/8	4	5/32	9.6	3/8	4	5/32
4	5/32	9.6	3/8	4	5/32	9.6	3/8	6	1/4
5	3/16	9.6	3/8	5	3/16	9.6	3/8	5	3/16

¹Warm edge spacer is not available

Note: The IGU, glass thickness and spacer bar size is based on nominal dimension. Actual dimensions will vary slightly. There are other glass make-up combinations available other than noted in the above chart. These charts' purpose is to provide a few examples. There are various other combinations available that can be reviewed on a project specific basis.

Acoustical Ratings

DOUBLE GLAZED IGU

GLASS EXT.	GAP	GLASS INT.	TEST NUMBER	STC	OITC
3mm Ann.	13mm AIR	3mm Ann.	TL7201	32	26
3mm Ann.	12 mm AIR	4mm Ann.	TL8570	33	27
3mm Ann.	12mm AIR	5mm Ann.	TL8572	35	28
4mm Ann.	10mm AIR	6mm Ann.	TL8571	35	29
4mm Ann.	24mm AIR	6mm Ann.	TL7207	39	31

DOUBLE GLAZED IGU WITH LAMI

GLASS EXT.	GAP	GLASS INT.	TEST NUMBER	STC	OITC
4mm Ann.	10mm AIR	6mm Lam. W/0.8mm PVB	TL8575	37	30
4mm Ann.	24mm AIR	6mm Lam. W/0.8mm PVB	TL8576	40	30
6mm Ann.	18mm AIR	*8mm Lam. W/0.8mm PVB	TL8569A	39	33
4mm Ann.	24mm AIR	*6mm Lam. W/1.5mm PVB	TL7205	41	32
6mm Ann.	19mm AIR	*6mm Lam. W/1.5mm PVB	TL7204	40	33

*These acoustical tests are strictly for multifamily projects only **NOT** single-family dwellings. If you need more information or need to meet a specific acoustical requirement, please contact the technical department at Starline Windows. technical@starlinewindows.com.

TRIPLE GLAZED IGU

GLASS EXT.	GAP	GLASS CENTRE	GAP	GLASS INT.	TEST NUMBER	STC	OITC
3mm Ann.	11mm	3mm Ann.	13mm	3mm Ann.	TL7261	33	25

Note: All acoustical glazing for radius windows that require above an OITC 29 and STC 36 cannot be manufactured.

Performance Test Results¹

Series 7100 muller assembly window has been tested to AAMA/WDMA/CSA 101 I.S.2/A440-08, AAMA/WDMA/CSA 101 I.S.2/A440-11 and CSA A440SI-09.

Canada

PRODUCT DESIGNATOR	AIR TIGHTNESS	WATER PENETRATION RESISTANCE		UNIFORM LOAD DEFLECTION	RESISTANCE TO FORCED ENTRY
		LAB TESTED	FIELD TEST ^{2,3}		
CW-PG55	A3	730 Pa	400 Pa	2640 Pa	Pass

USA

PRODUCT DESIGNATOR	AIR TIGHTNESS	WATER PENETRATION RESISTANCE		UNIFORM LOAD STRUCTURAL	RESISTANCE TO FORCED ENTRY
		LAB TESTED	FIELD TEST ^{2,3}		
CW-PG55	0.00 CFM/ft ² @ 1.57 psf	15.3 psf	8.35 psf	82.7 psf	Pass

¹The performance test results are based on lab testing and will vary depending on the specific window configuration. Contact your local Starline Sales Representative to determine the specific performance test results for the window configurations on a project specific basis.

² Water penetration resistance field tests shall follow the criteria and testing procedures as outlined in the AAMA 502-08 specification standard.

³ 400Pa / 8.35 psf is the maximum field test result that can be achieved. Should the Project Specifications state a water penetration field test requirement of a lesser value, the project specified values shall govern.

Egress Requirements

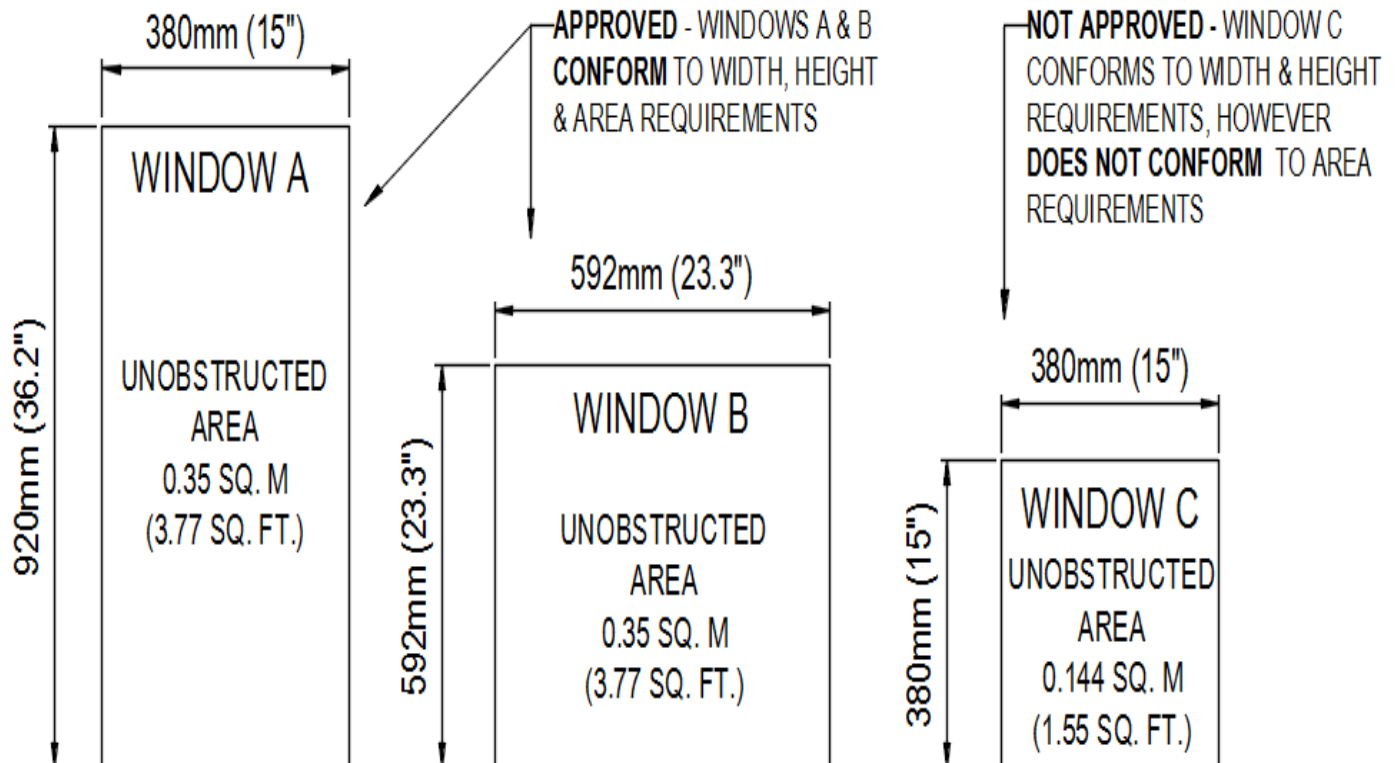
NBC 2015, BCBC 2012 & IBC 2015 Egress Size Requirements

Windows have to be a certain size in order to meet egress requirements. The size of the window is dependent on the project location.

Generally, for buildings that are 3 stories or less and except where the suite is sprinklered, or a bedroom door provides direct access to the exterior, each bedroom shall have one window which can be opened and leads to the exterior.

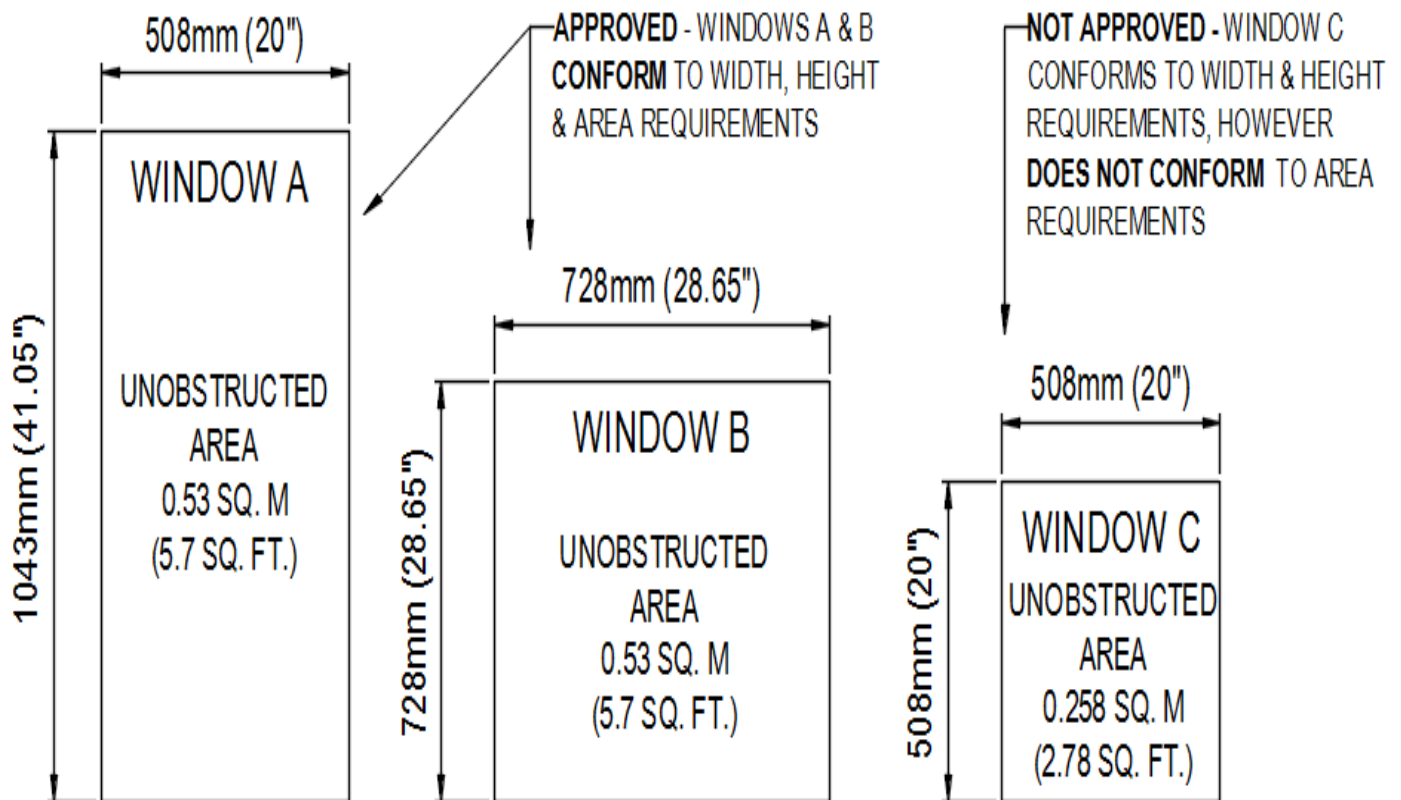
The NBC 2015 & BCBC 2012 – Part 9 – 9.9.10.1.2 codes requirement for egress is as follows:

- Minimum Clear Opening Width = 15" (380 mm)
- Minimum Clear Opening Height = 15" (380 mm)
- Minimum Clear Opening Area = 3.77 sq. ft or 543 sq. in (0.35 m²)



The IBC – Section 1030.2 & 1030.2.1 codes requirement for egress is as follows:

- Minimum Clear Opening Width = 20" (508 mm)
- Minimum Clear Opening Height = 24" (610 mm)
- Minimum Clear Opening Area = 5.7 sq. ft (0.53 m²)
 - **Exception:** Minimum Clear Opening Area Ground Floor = 5.0 sq. ft (0.47 m²).



Determining Clear Opening Based on Heel Dimension Provided

CANADA: CLEAR OPENING (CO) REQUIREMENTS: 15" WIDTH; 15" HEIGHT; 543 SQ. IN. TOTAL AREA

CL or CR

CAM HANDLE:

Clear Opening Width = Heel Width – 4.125

Clear Opening Height = Heel Height – 4.25

CL or CR

ROTO HANDLE:

Clear Opening Width = Heel Width – 5.4375

Clear Opening Height = Heel Height – 4.25

CO, OC, COC, CC, COOC

CAM HANDLE:

Clear Opening Width = Heel to C/L of T-Bar – 5.3125

Clear Opening Height = Heel Height – 4.25

CO, OC, COC, CC, COOC

ROTO HANDLE:

Clear Opening Width = Heel to C/L of T-Bar – 6.9375

Clear Opening Height = Heel Height – 4.25

CO/O, OC/O, O/CO, O/OC

CAM HANDLE:

Clear Opening Width = Heel to C/L of Vert. T-Bar
– 5.3125

Clear Opening Height = Heel to C/L of Horiz. T-Bar
– 4.0625

CO/O, OC/O, O/CO, O/OC

ROTO HANDLE:

Clear Opening Width = Heel to C/L of Vert. T-Bar
– 6.9375

Clear Opening Height = Heel to C/L of Horiz. T-Bar
– 4.0625

Legend:

O= Fixed Lite
C= Casement Window
CL= Casement Left
C/L= Center Line
CR= Casement Right

NOTE: No clear opening dimension can be smaller than 15 1/2" in either the width or the height as it is Starline's policy to manufacture to a 1/2" larger dimension than minimum code requirement while also ensuring a minimum area for the clear opening is 543 sq. in. or greater.

Product Specification 08 53 13 – Vinyl Windows



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

Part 1 - General

A fully welded 3 1/2" PVC window frame designed for single family homes, townhouses, residential low and midrise construction and institutional projects. ¹

¹ Note to specifier: Frame depth depends on frame type selected. Nail-on Flange, Rebate, and Rainshield frame depths vary. Above frame depth is based on Starline's standard Nail-on Flange frame. If a frame type other than Nail-on Flange is selected, contact technical@starlinewindows.com for further information.

1.1 Summary

A. Section Includes: Vinyl Windows:

1. Vinyl **fixed and/or casement and/or awning** windows complete with **Nail-on Flange and /or Rebate and / or Rainshield frame** to be Starline's Emerald 7100 Series window manufactured by Starline Windows Ltd.
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 15 23 – Vinyl-Framed Glass Swing Doors
5. 08 32 13 – Sliding Vinyl-Framed Glass Doors
6. 08 80 00 – Glazing

1.2 Quality Assurance

- A. Drawings and specifications for Work of this Section are based upon the Emerald Series 7100 Punched Windows 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/A440-08, AAMA/WDMA/CSA 101 I.S.2/A440-11, and CSA A440SI-09 requirements.
- C. Manufacturer Qualifications:
 1. Manufacturer to have a minimum 10 years of documented experience.

2. Manufacturer capable of providing a vinyl window system that meet or exceed the performance requirements indicated.
- D. Installers to follow manufacture's installation procedures and recommendations.
- 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 color, and workmanship standard.

1.3 Structural requirements¹

Specifier to select or remove section depending if project is engineered.

A. Limit mullion deflection to L/175.

B. Allow for deflection of building structure. Vinyl windows shall be designed, fabricated and installed to withstand slab edge vertical differential deflections of maximum $3/4''^2$ and seismic inter-story lateral drift movements of elastic $\pm 3/8''^1$ without significant damage to the fenestration system or in-elastic $\pm 1 3/4''^1$ with significant damage expected but framing to be designed to remain anchored to the structure.

¹ Note to specifier: This section is only applicable if there is a Professional Engineer involved with the project.

² 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 **CW-PG55** when tested to AAMA/WDMA/CSA 101 I.S.2/A440-08, AAMA/WDMA/CSA 101 I.S.2/A440-11, and CSA A440SI-09:
 1. Air Infiltration: Fixed window air infiltration shall not exceed 0.00 cfm/ft² (A3) when tested in accordance with ASTM E 283 with a pressure difference of 1.57 psf / 75 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 15.3 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 8.35 psf / 400 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 55 psf / 2640 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 82.7 psf / 3960 Pa, positive and negative.
 5. Thermal Performance³
 - I. U-value: The maximum fixed window thermal transmittance U-value shall be **0.32 BTU/ hr*ft²*°F (1.82 W/m²*k) for double glazed and / or 0.23 BTU/ hr*ft²*°F (1.31 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 (**maximum or minimum**) of **0.34 for double glazed and /or 0.36 for triple glazed.**
 - III. Visible Light Transmittance: A (**maximum or minimum**) of **0.61 for double glazed and /or 0.55 for triple glazed.**

- B. Operable windows (ventilator) shall meet performance class **CW- PG55¹** when tested to AMA/WDMA/CSA 101 I.S.2/A440-08, AAMA/WDMA/CSA 101 I.S.2/A440-11 and CSA A440SI-09:
1. Air Infiltration: Operable window air infiltration shall not exceed 0.00 cfm/ft² (A3) when tested in accordance with ASTM E 283 with a pressure difference of 1.57 psf / 75 Pa.
 2. Water Penetration Resistance:
 - I. There shall be no water infiltration for operable windows when tested in accordance with ASTM E547 with a pressure difference of 15.04 psf / 720 Pa (Laboratory Test).
 - II. 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 8.35 psf/ 400 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 55 psf / 2640 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 82.7 psf / 3960 Pa, positive and negative.
 5. Operable windows shall meet performance criteria for Operating Force and Force to latch when tested to ASTM E2068.
 6. Thermal Performance³
 - I. U-value:
 - a. **Awning:** The maximum awning window thermal transmittance U-value shall be **0.31 BTU/ hr*ft²*F (1.76 W/m²*k) for double glazed and /or 0.22 BTU/ hr*ft²*F (1.25 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 0.31 BTU/ hr*ft²*F (1.76 W/m²*k) for double glazed and /or 0.24BTU/ hr*ft²*F (1.36W/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 **0.27 for double glazed and /or 0.25 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:
 - IV. **Awning:** A (maximum or minimum) of **0.47 for double glazed and /or 0.43 for triple glazed.**
 - V. **Casement:** A (maximum or minimum) of **0.47 for double glazed and /or 0.43 for triple glazed.**

¹Note 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: 400Pa / 8.35 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 shall follow the criteria and testing procedures as outlined in the AAMA 502-08 specification standard.

³ Note to specifier: Thermal performance depends on glass specified. For double glazed values the above test was preformed using 19mm double glazed insulated glass unit (3mm/Argon/3mm) with Standard high-performance soft coat (sputtered) Low E which is applied to surface #2, argon/air filled with aluminum spacer bar. For triple glazed values the above test was preformed using 32mm triple glazed insulated glass unit (3mm/Argon/3mm/Air/3mm) with

Standard high-performance soft coat (sputtered) Low E which is applied to surface #2, argon/air filled with aluminum spacer bar.

Note: A second low E coating can be applied to surface #4 to further increase the thermal performance. The NFRC test sizes were 47" x 59" (1200mm x 1500mm) for a fixed window, 24" x 59" (600mm x 1500mm) for a casement window and 59" x 24" (1500mm x 600mm) for a vertical sliding window

1.5 Submittals

- A. Product Data: Submit complete product data on system being used.
- B. Samples: Submit glass and frame colour(s) samples.
- C. Close-out Submittals:
 - 1. Warranty: Submit executed Manufacturer's warranty.
 - 2. Project Record Documents: Submit operation and maintenance data for installed product in accordance with General Conditions.

Part 2 – Products

2.1 Manufacturers

- A. Acceptable Manufacturers: Starline Windows
 - 1. Vinyl Windows (Punched Opening): Emerald 7100 Series
- B. Substitutions: Approved alternates

2.2 Material

- A. Vinyl Extrusion:
 - 1. 89 mm (3 1/2") deep perimeter frame member¹.
 - 2. Multi-chamber for strength and thermal performance with a nominal wall thickness of 1.93mm (0.078").
 - 3. Frame member and intermediate bars 100% uPVC and is UV stabilized for optimum outdoor performance.
- B. Fasteners: Stainless steel and / or steel coated with Leland DT200 coating and of sufficient size and quantity to perform their intended function.
- C. Gaskets: Extruded Santoprene, flexible PVC, Santoprene or EPDM
- D. Weather-stripping: Finseal material.
- E. Glass Setting Blocks:
 - 1. Fixed and Awning Windows: 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.
 - 2. Casement Windows: High density polyethylene. Block material shall be compatible with sealed unit edge sealant.
- F. Glazing bead: uPVC and glazed from the outside.
- G. Glazing tape: Foam tape.

¹Note to specifier: Frame depth depends on frame type selected. Nail-on flange, Rebate, and Rainshield frame depths vary. Above frame depth is based on Starline's standard Nail-on flange frame. If a frame type other than Nail-on Flange is selected, contact technical@starlinewindows.com for further information.

2.3 Fabrication

- A. Fabricate framing from extrusions of size and shape shown on approved shop drawings or approved signed order if shop drawings are not applicable.
- B. Main framing and operable sash (ventilator) extrusions shall be welded mitre corner construction.
- C. Intermediate mullions and T-Bars shall be butt jointed and gasketed, mechanically screwed and sealed to the main perimeter frame.
- D. All framing profiles shall be straight and free of deformations and defects.
- E. Joints shall be accurately machined, fitted and sealed.
- F. Coupling mullions shall be designed to provide a functional split to permit modular construction and allow for thermal expansion.
- G. Perimeter frame shall be 89mm (3 1/2") deep with a minimum wall thickness of 2mm (0.078") and be thermally broken.¹
- H. Operable window (ventilator) shall be 76mm (3") deep with a minimum wall thickness of 2mm (0.078") and be thermally broken.
- I. All interior joints and interior screw heads shall be sealed with a non-hardening sealant.
- J. Operable sash (ventilator) shall be weather sealed with triple gaskets.
- K. All glazing pockets shall be vented, pressure equalized, and drained to the outside.
- L. Glass bead shall be uPVC and a snap-in screw less type.

¹Note to specifier: Frame depth depends on frame type selected. Nail-flange, Rebate and Rainshield frame depths vary. Above frame depth is based on Starline's standard Nail-on flange frame.

2.4 Glazing^{1,2}

- A. Double glazed, double seal insulated glass unit (IGU) with an overall thickness of 3/4" (19 mm). **Triple glazed IGU 1 1/4" (32mm) thick is available** (Refer to [2.7.A.1](#) of this specification).
- B. Standard high-performance soft coat (sputtered) Low E applied to surface #2.
- C. Aluminum spacer with argon fill.
- D. Glass thickness shall be 3mm. 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 Note to specifier: Ensure 1.4.A.6 and / or 1.4.B.7 Thermal Performance values selected reflect if double and / or triple glazing is selected.

2.5 Hardware¹

- A. Hardware for the vinyl 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 stainless steel hinge. Hinges are completely concealed when operable sash (ventilator) is in its closed position.

Series 7100 Vinyl Window Design Guidelines

2. Zinc-alloy cam handle shall lock positively against the mounted keeper. Handles are available in white powder coat finish.
3. Mounted keeper is PVC and is available in white.
4. 60-degree hinge restricted to 4" with a plate restrictor.

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.F](#) of this specification.

2.6 Frame Finish¹

- A. All exposed surfaces of vinyl window and framing members shall be free of scratches and other serious surface blemishes.
- B. Finish: Standard white on the exterior and interior

¹ Note to Specifier: Option to have dual frame colour; painted colour on the exterior and interior of the window. Should an exterior colour be required, refer to [2.7.E](#) of this specification.

2.7 Optional Items

Specifier to select from the following options and remove options not being selected

- A. Glazing
 1. Triple glazed 1 1/4" (32mm) IGU with black warm edge spacer bar with air fill.
 2. **4mm, 5mm, 6mm and greater thickness** available.
 3. Tinted, obscured & reflective glass
 4. Laminated glass
 5. Insulated glass internal grilles
 6. Surface mounted (plant-on) muntins.
 7. Spacer bars
 - i. Warm edge spacer bar
 - ii. Black aluminum spacer bar
- B. Coupling mullions – Range of couplers are available, i.e.: 180°, 135° (Bay), variable degree, etc.
- C. Extruded aluminum head flashing
- D. Head Trickle vent.
- E. Dual frame color upgrade options – 1 color on exterior and white on the interior:
- F. Dual frame color upgrade options- 1 color on the exterior and one color on the interior
 1. UV cure coating¹: UV cure coating on the exterior with white interior or uv- cure coat both interior and exterior² (**Specifier to select from the colour(s) listed below**).

Black

Brown

Silver

Kendall Charcoal

Beige

2. **Custom colours³** may be available. Virtually any colour can be matched or 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.

- G. Shop Drawings: Submit complete shop drawings which include floor plans, elevations, window schedule, and product components including anchorage, fasteners, accessories and finish colour
 - 1. Non-engineered shop drawings.
 - 2. Engineered shop drawings, stamped and sealed by professional engineer.
- H. Hardware:
 - 1. Roto operator hardware. Rotary handle + single-point claw locking handle available in white or black.
 - 2. Multi point locking roto operator hardware. Rotary handle + multi point locks and handle available in **white and black**.
 - 3. Operator opening restrictor
 - 4. Egress Hinge
 - 5. Custom colour cam handles may be available. 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.
- I. Sill Shim (Factory Installed).
- J. Protection: Insulated Glass Unit shall be protected with smart guard on the **exterior and / or interior**.
- K. Insect Screens: Frames are made from extruded aluminum and are rigidly joined at the corners. Aluminum frame shall be finished to match interior window frame colour. Screen shall be black fiber mesh. Screens are held in place with clips.

¹ Note to Specifier: UV colours are available for an additional cost premium.

² Note to specifier: All colors are available to be painted on the exterior and interior for an additional cost premium (minimum 10 windows to apply).

³ 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 installation procedures and recommendations and **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.

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: 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 7100 NFRC Product Energy Chart

NFRC PRODUCT ENERGY CHART

DOUBLE (19mm IGU) TRIPLE (32mm IGU)	GLAZING (Exterior / Interior)	U VALUE (W/M ² K)	U VALUE - w/ FOAM (W/M ² K)	U VALUE (Btu/hft ² F)	U VALUE - w/ FOAM (Btu/hft ² F)	Shading Coefficient	Solar Heat Gain Coefficient	Visible Light Transmittance	CPD (Certified Product Directory)
Center of Glass (COG)	3mm 180 (#2) / 4mm Clear	1.47		0.26		0.74	0.64	0.79	
	3mm 270 (#2) / 4mm Clear	1.39		0.25		0.42	0.37	0.70	
	3mm 366 (#2) / 4mm Clear	1.35		0.24		0.31	0.27	0.65	
	3mm 180 (#2) / 4mm i89 (#4)	1.19		0.21		0.71	0.62	0.77	
	3mm 270 (#2) / 4mm i89 (#4)	1.13		0.20		0.41	0.36	0.68	
	3mm 366 (#2) / 4mm i89 (#4)	1.10		0.19		0.31	0.27	0.63	
	3mm 270 (#2) / 3mm Clear / 3mm Clear	1.06		0.19		0.39	0.34	0.64	
	3mm 270 (#2) / 3mm Clear / 3mm 270 (#5)	0.73		0.13		0.36	0.31	0.55	
	3mm 270 (#2) / 3mm 270 (#4) / 3mm i89 (#6)	0.64		0.11		0.32	0.28	0.53	
	3mm 366 (#2) / 3mm Clear / 3mm Clear	1.04		0.18		0.29	0.25	0.59	
	3mm 366 (#2) / 3mm Clear / 3mm 366 (#5)	0.70		0.12		0.27	0.24	0.47	
	3mm 366 (#2) / 3mm 366 (#4) / 3mm i89 (#6)	0.62		0.11		0.23	0.20	0.46	
Fixed Window	3mm 270 (#2) / 4mm Clear	1.48	1.42	0.26	0.25	0.36	0.31	0.59	
	3mm 366 (#2) / 4mm Clear	1.42	1.42	0.25	0.25	0.26	0.23	0.54	
	3mm 180 (#2) / 4mm i89 (#4)	1.25	1.25	0.22	0.22	0.60	0.52	0.65	
	3mm 270 (#2) / 4mm i89 (#4)	1.25	1.19	0.22	0.21	0.35	0.30	0.57	
	3mm 366 (#2) / 4mm i89 (#4)	1.19	1.19	0.21	0.21	0.26	0.23	0.53	
	3mm 270 (#2) / 3mm Clear / 3mm Clear	1.19	1.14	0.21	0.20	0.33	0.29	0.54	
	3mm 270 (#2) / 3mm Clear / 3mm 270 (#5)	0.91	0.85	0.16	0.15	0.30	0.26	0.46	
	3mm 270 (#2) / 3mm 270 (#4) / 3mm i89 (#6)	0.79	0.79	0.14	0.14	0.27	0.24	0.45	
	3mm 366 (#2) / 3mm Clear / 3mm Clear	1.14	1.14	0.20	0.20	0.24	0.21	0.50	
	3mm 366 (#2) / 3mm Clear / 3mm 366 (#5)	0.85	0.85	0.15	0.15	0.23	0.20	0.39	
	3mm 366 (#2) / 3mm 366 (#4) / 3mm i89 (#6)	0.79	0.79	0.14	0.14	0.20	0.17	0.38	

Series 7100 Vinyl Window Design Guidelines



Awning	3mm 270 (#2) / 4mm Clear	1.48	1.48	0.26	0.26	0.28	0.24	0.45	
	3mm 366 (#2) / 4mm Clear	1.48	1.42	0.26	0.25	0.21	0.18	0.42	
	3mm 270 (#2) / 4mm i89 (#4)	1.31	1.31	0.23	0.23	0.28	0.24	0.44	
	3mm 366 (#2) / 4mm i89 (#4)	1.31	1.25	0.23	0.22	0.21	0.18	0.41	
	3mm 270 (#2) / 3mm Clear / 3mm Clear	1.19	1.19	0.21	0.21	0.26	0.23	0.42	
	3mm 270 (#2) / 3mm Clear / 3mm 270 (#5)	1.02	0.97	0.18	0.17	0.24	0.21	0.35	
	3mm 270 (#2) / 3mm 270 (#4) / 3mm i89 (#6)	0.97	0.91	0.17	0.16	0.22	0.19	0.35	
	3mm 366 (#2) / 3mm Clear / 3mm Clear	1.19	1.19	0.21	0.21	0.19	0.17	0.39	
	3mm 366 (#2) / 3mm Clear / 3mm 366 (#5)	0.97	0.97	0.17	0.17	0.18	0.16	0.30	
	3mm 366 (#2) / 3mm 366 (#4) / 3mm i89 (#6)	0.91	0.91	0.16	0.16	0.16	0.14	0.30	

Casement	3mm 270 (#2) / 4mm Clear	1.48	1.42	0.26	0.25	0.28	0.24	0.45	
	3mm 366 (#2) / 4mm Clear	1.42	1.42	0.25	0.25	0.21	0.18	0.42	
	3mm 270 (#2) / 4mm i89 (#4)	1.25	1.25	0.22	0.22	0.27	0.24	0.44	
	3mm 366 (#2) / 4mm i89 (#4)	1.25	1.25	0.22	0.22	0.20	0.18	0.41	
	3mm 270 (#2) / 3mm Clear / 3mm Clear	1.19	1.19	0.21	0.21	0.26	0.23	0.42	
	3mm 270 (#2) / 3mm Clear / 3mm 270 (#5)	1.02	0.97	0.18	0.17	0.24	0.21	0.35	
	3mm 270 (#2) / 3mm 270 (#4) / 3mm i89 (#6)	0.97	0.91	0.17	0.16	0.21	0.19	0.35	
	3mm 366 (#2) / 3mm Clear / 3mm Clear	1.19	1.19	0.21	0.21	0.19	0.17	0.39	
	3mm 366 (#2) / 3mm Clear / 3mm 366 (#5)	0.97	0.97	0.17	0.17	0.18	0.16	0.30	
	3mm 366 (#2) / 3mm 366 (#4) / 3mm i89 (#6)	0.91	0.91	0.16	0.16	0.16	0.14	0.30	

I.G.U. (Insulated Glass Unit)	GLASS	WARM EDGE SPACER	GAS FILL
	Cardinal LoE ³ 366, LoE ² 270, LoE 180, i89	DG - 11.7mm (7/16") TG - 2 x 11.7mm (7/16")	90% Argon & 10% Air

Based on NFRC CPD - Certification Date: January, 2018 Expiration Date: November, 2022