



CASCADIA

WINDOWS & DOORS

CASCADIAWINDOWS.COM



CASCADIA – EDUCATIONAL PRESENTATION

TACKLING WINDOW PAIN

Understanding the benefits of high-performance fenestration

WEBINAR ADMIN

WEBINAR TECHNICAL SUPPORT -

- Technical support is available for any issues during the webinar

CONTINUING EDUCATION CERTIFICATES -

- Will be automatically emailed after the presentation
- AIA & AIBC are automatically submitted (no need to self-report)
- All other association learning credits can be claimed via self-reporting

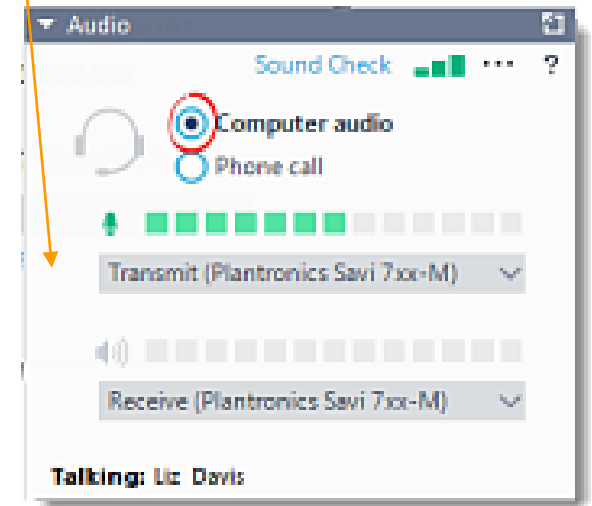
QUESTIONS -

- Feel free to post questions at any point during the presentation

AUDIO -

- We recommend using your computer audio to listen to the presentation. Calling into the presentation may incur long-distance charges from your phone provider.

Remember to select
your audio source
(headsets vs speakers)





AGENDA: WHAT ARE WE LOOKING AT TODAY?

- Intro to Cascadia Windows & Doors
 - Impact of windows on building envelope performance
 - Understanding the design factors and performance metrics of high-performance fenestration
 - Design flexibility of high-performance fenestration
 - Cost-Optimizing high-performance fenestration
 - Window U-values in the real world
 - High-performance fenestration in commercial projects
-

INTRO TO CASCADIA WINDOWS & DOORS



INTRO TO CASCADIA WINDOWS & DOORS



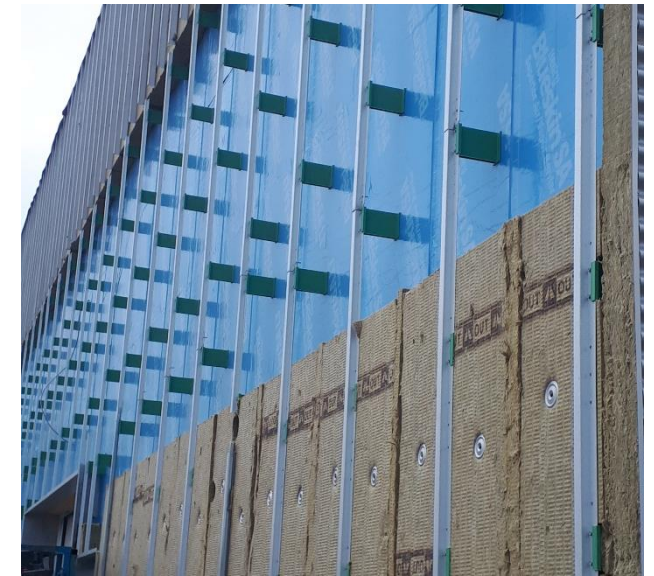
COMMERCIAL & MULTI-FAMILY

Windows & Window Wall
Storefront Glazing



RESIDENTIAL

Fixed & Operable Windows
Swing & Sliding Doors
Passive House Windows & Doors



THERMAL SPACER

Exterior Cladding Assemblies
Low-sloped Roofs & Soffits

INTRO TO CASCADIA WINDOWS & DOORS

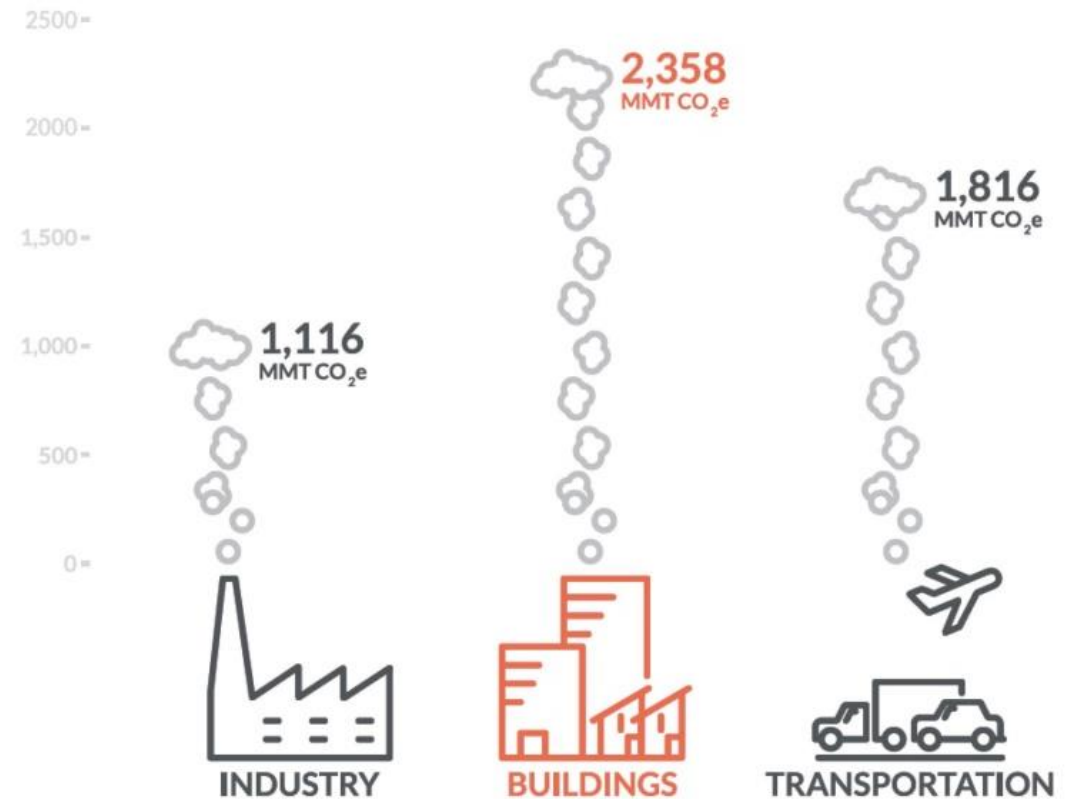


A modern interior space featuring large, arched windows and a curved wooden ceiling. The room has a light-colored sofa, a dark leather ottoman, and a black armchair with a fur pillow. A large, shaggy rug is on the floor. The view outside the windows shows a body of water and a distant shoreline. An orange overlay on the left side of the image contains the text "CHANGING BUILDING CODES & ENERGY STANDARDS".

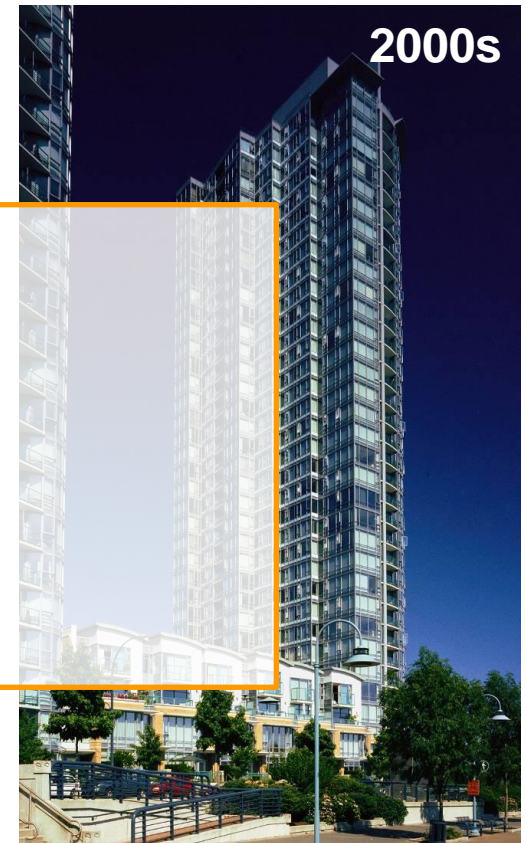
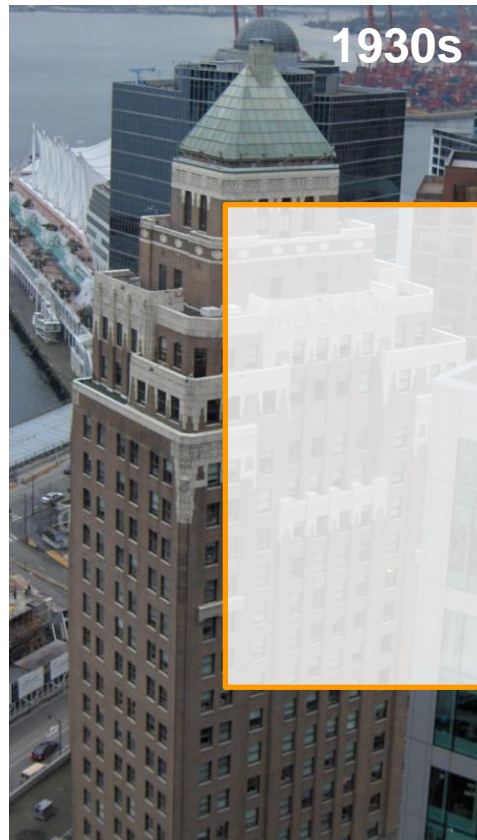
CHANGING BUILDING CODES & ENERGY STANDARDS

WHY ARE BUILDING CODES CHANGING?

**BUILDINGS ARE
RESPONSIBLE FOR 44.5%
OF US CO₂ EMISSIONS.**



WHAT R THE VALUES?



ALL THREE BUILDINGS
ARE SOMEWHERE BETWEEN
R-2 & R-3.5

ENERGY CONSERVATION IN BUILDINGS

**REGULATORY CHANGES
MUST BE BASED IN REALITY, SO**



FIRST – YOU HAVE TO HAVE THE TECH




**THEN – YOU CAN CHANGE THE LAWS TO REQUIRE HIGHER
PERFORMANCE**



**NEW TECH *ENABLES* MORE STRINGENT
REGULATIONS**

Bloomberg Law Search Environment & Energy News Advanced Search Go Login

Environment & Energy




The Robert S. Fulton public housing development stands in New York City in 2020.
Photographer: Christopher Occhicone/Bloomberg via Getty Images

New York City Votes to Expand Landmark Building Emissions Law

Aug. 26, 2021, 12:39 PM

New York's City Council on Thursday approved a [bill](#) to include public housing in the city's landmark buildings emissions law.

 **Stephen Lee**
Reporter

Facebook LinkedIn Twitter Email

ENERGY CODES NEED COMPONENTS

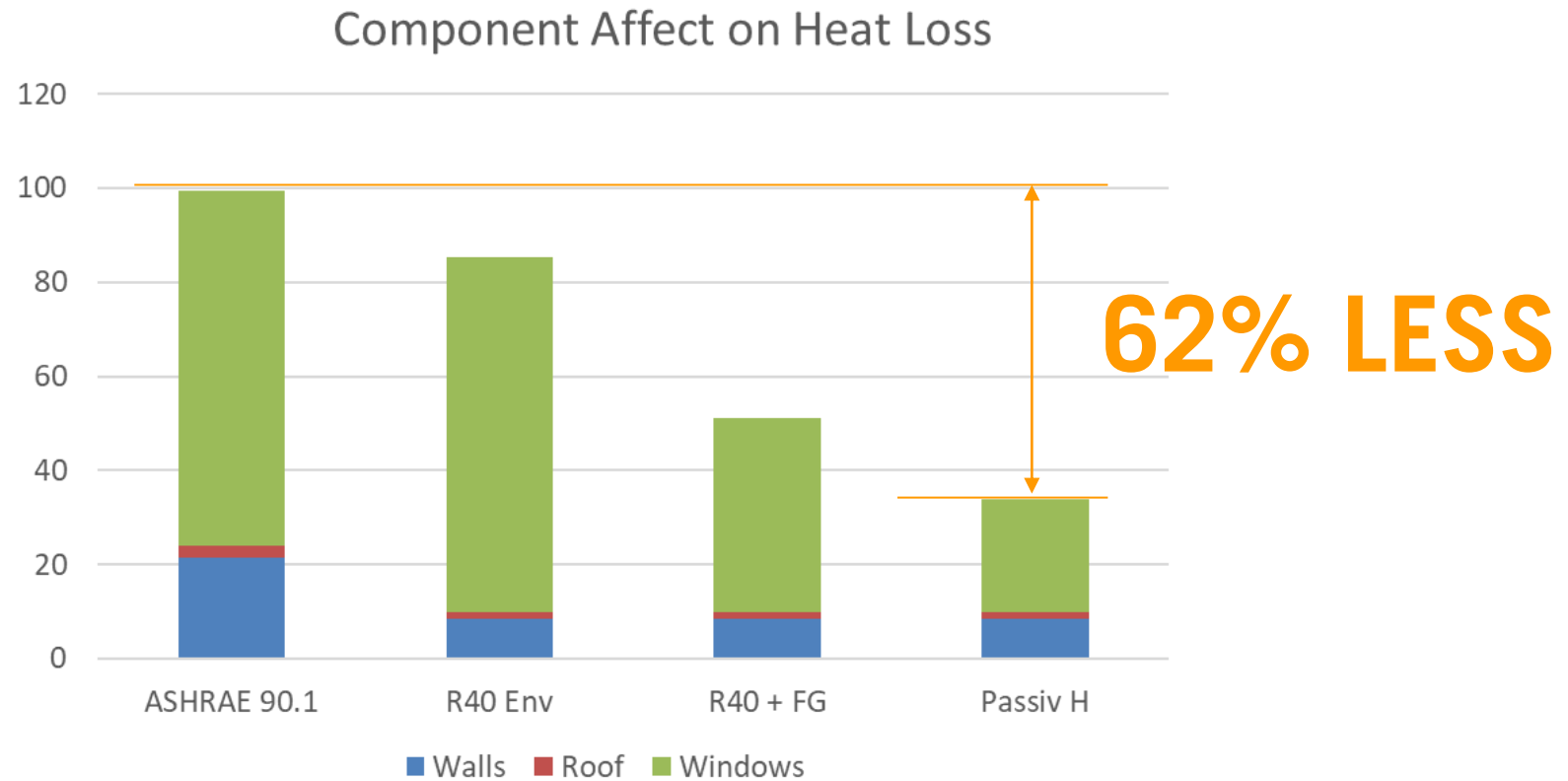
PATHWAY TO 2032: **PART 9 (HOMES)**

2017

2032



THE IMPACT OF HIGH-PERFORMANCE





THERMAL PERFORMANCE

30-50%

of a building's heating & cooling energy
is lost through windows

20-30%

of a typical window area is
represented by the window frame

**BY IMPROVING
THE FRAME, YOU IMPROVE
THE OVERALL PERFORMANCE
OF THE ENTIRE WINDOW**

DICTATING BETTER PERFORMANCE



CITY of BOSTON



Connecticut



NYC
Buildings



ILLINOIS.gov



IDAHO

THESE CODES ARE DIFFERENT

PREVIOUS ENERGY CODES



SEPARATE ASSEMBLY R-VALUES

NOW (BC ENERGY STEP CODE EXAMPLE)



ONE ENERGY USE LIMIT

IMPACT OF WINDOWS ON BUILDING PERFORMANCE

PROJECT EXAMPLE

- Mid-rise, MURB
- Window-to-wall ratio of roughly 1:2
- Overall building energy performance target of $> R-8$



Jervis Street
Vancouver, BC

RUNNING PERFORMANCE NUMBERS

ASSEMBLIES	R-Value (effective) ▼	Area (%) ▼
Walls		
Windows		
<div>ADD NEW ROW +</div>		
Results		area total --> 0.00
Total U-value:		0.00 (imp) 0.00 (metric)
Total R-value:		Infinity (imp) Infinity (metric)

MORE GLAZING AREA

ALUMINUM WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 35 kWh/m²
TEUI - 111 kWh/m²



FIBERGLASS WINDOW WALL

65%

WINDOW-TO-WALL RATIO

TEDI - 30 kWh/m²
TEUI - 109 kWh/m²





POLL – WINDOW CHARACTERISTICS

**ARE YOU FAMILIAR
WITH FIBERGLASS WINDOWS?**

WHY FIBERGLASS?



MANUFACTURING PROCESS

PROCESS BEGINS
WITH GLASS ROVING
& MAT

RESIN-SOAKED
GLASS FIBER MATRIX
IS PULLED THROUGH
HEATED DIES

LINEALS ARE
MADE TO SPECIFIC
WINDOW & DOOR
PROFILES

CHOICE OF
COLORS IS
THEN APPLIED



MANUFACTURING PROCESS





COMMERCIAL-GRADE STRENGTH

**10x STIFFER THAN
TRADITIONAL VINYL**

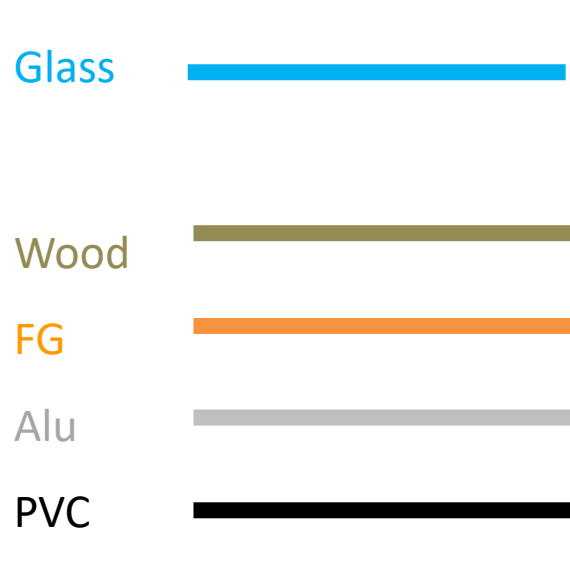
**THERMOSET
FIBERGLASS**

**WITHSTAND EXTREME
TEMPERATURES**
(- 40°F TO 350°F)

>50-YEAR LIFESPAN
(MODELED)

HIGH-PERFORMANCE CHARACTERISTICS

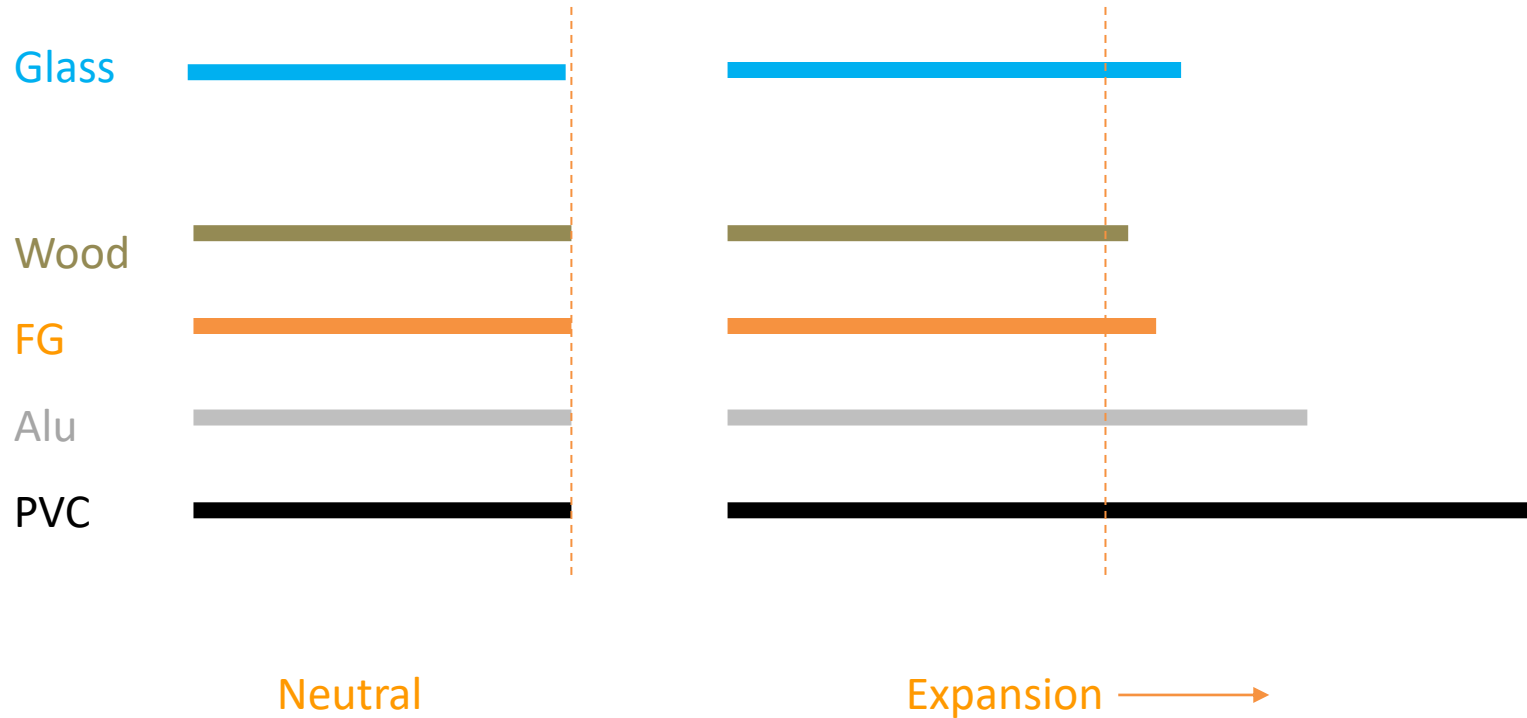
THERMAL EXPANSION COEFFICIENT - $10^{-6}\text{M}/(\text{M}^{\circ}\text{C})$



Neutral

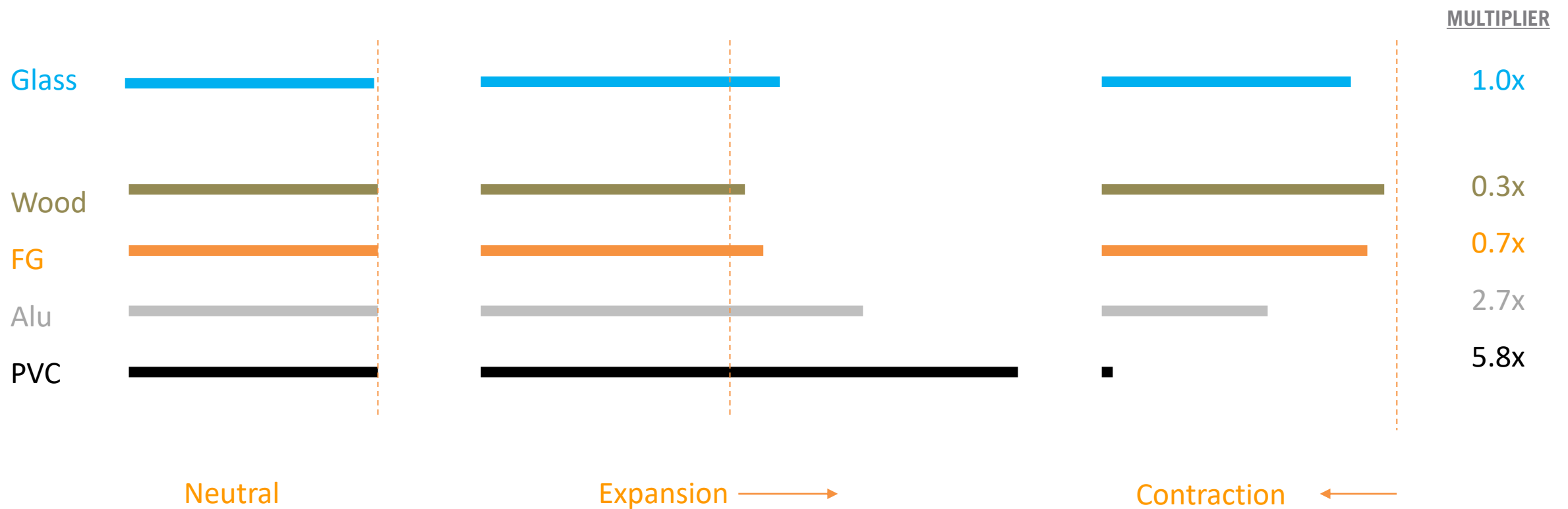
HIGH-PERFORMANCE CHARACTERISTICS

THERMAL EXPANSION COEFFICIENT - $10^{-6}\text{M}/(\text{M}^{\circ}\text{C})$



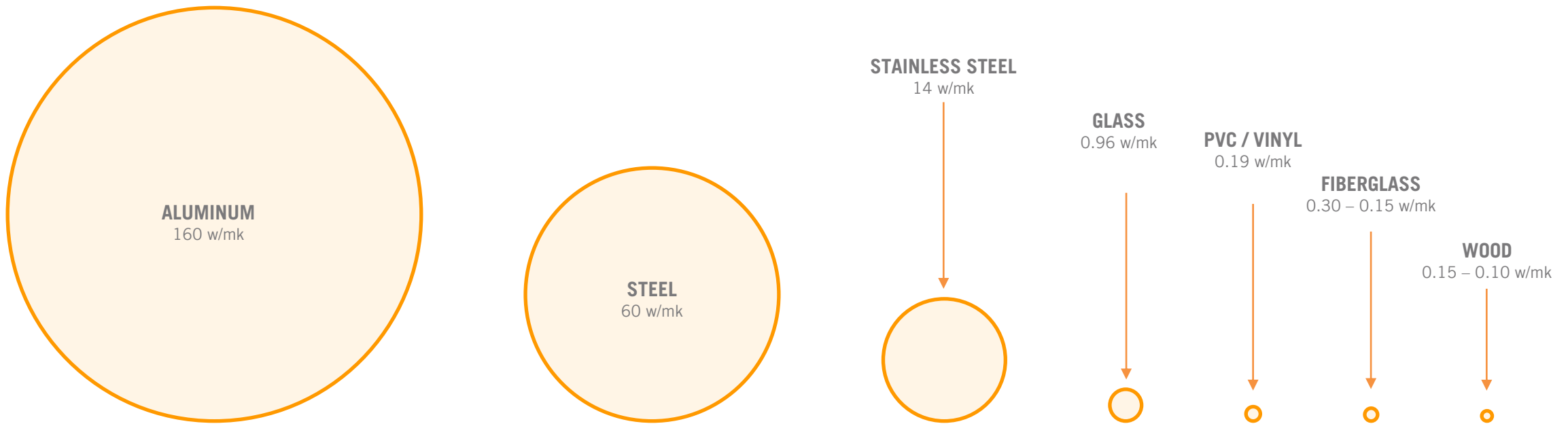
HIGH-PERFORMANCE CHARACTERISTICS

THERMAL EXPANSION COEFFICIENT - $10^{-6}\text{M}/(\text{M}^{\circ}\text{C})$



HIGH-PERFORMANCE CHARACTERISTICS

THERMAL CONDUCTIVITY (W/MK)





HIGH-PERFORMANCE CHARACTERISTICS



CR-39

The diagram shows a cross-section of a thermally broken aluminum frame. It consists of two rectangular sections separated by a vertical gap, representing the thermal break. Dashed lines indicate the outer dimensions of the frame assembly.

TYPICAL THERMALLY BROKEN ALUMINUM FRAME



CR-57

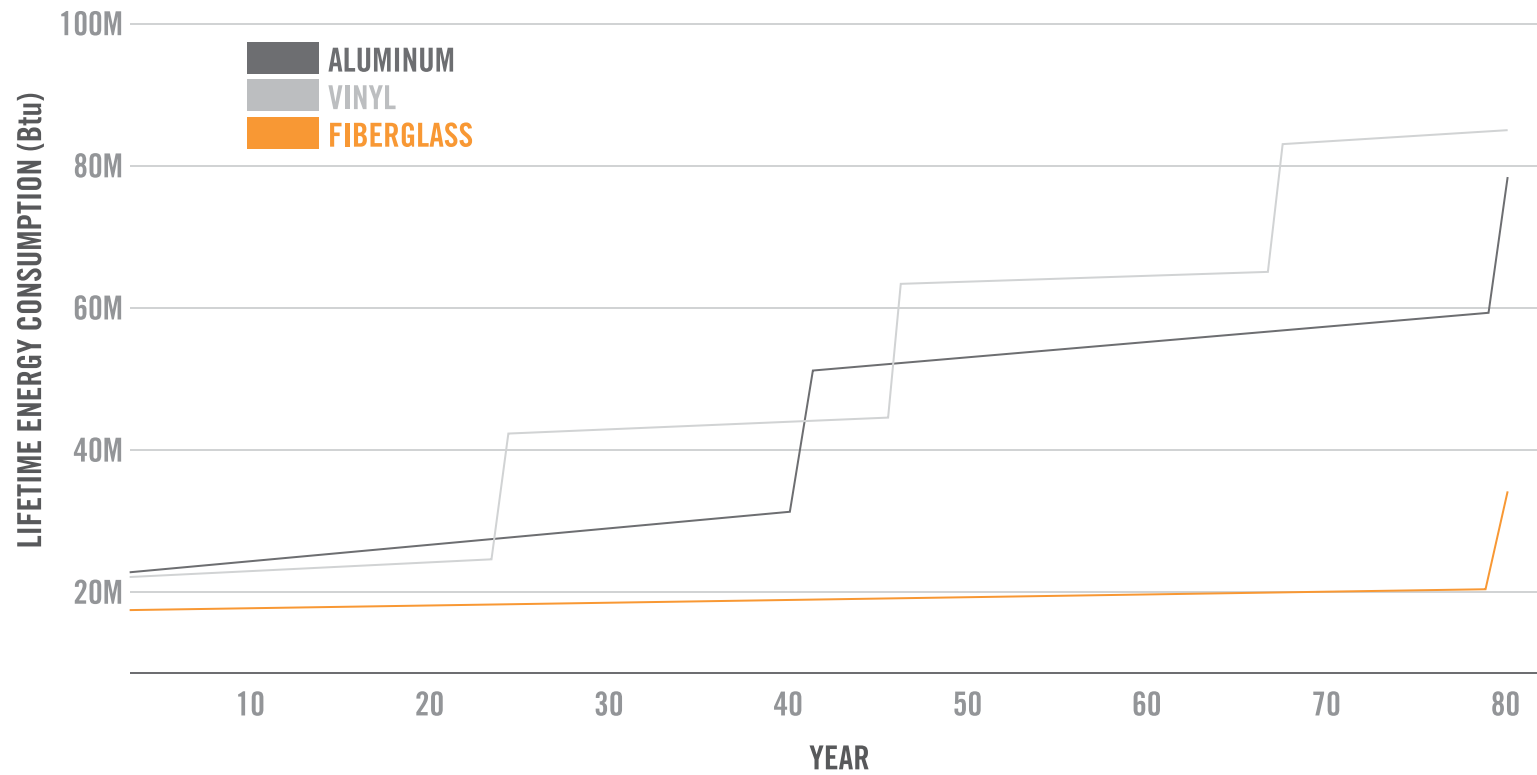
The diagram shows a cross-section of a Universal Series fiberglass frame. It consists of two rectangular sections separated by a vertical gap, representing the thermal break. Dashed lines indicate the outer dimensions of the frame assembly.

TYPICAL UNIVERSAL SERIES™ FIBERGLASS FRAME

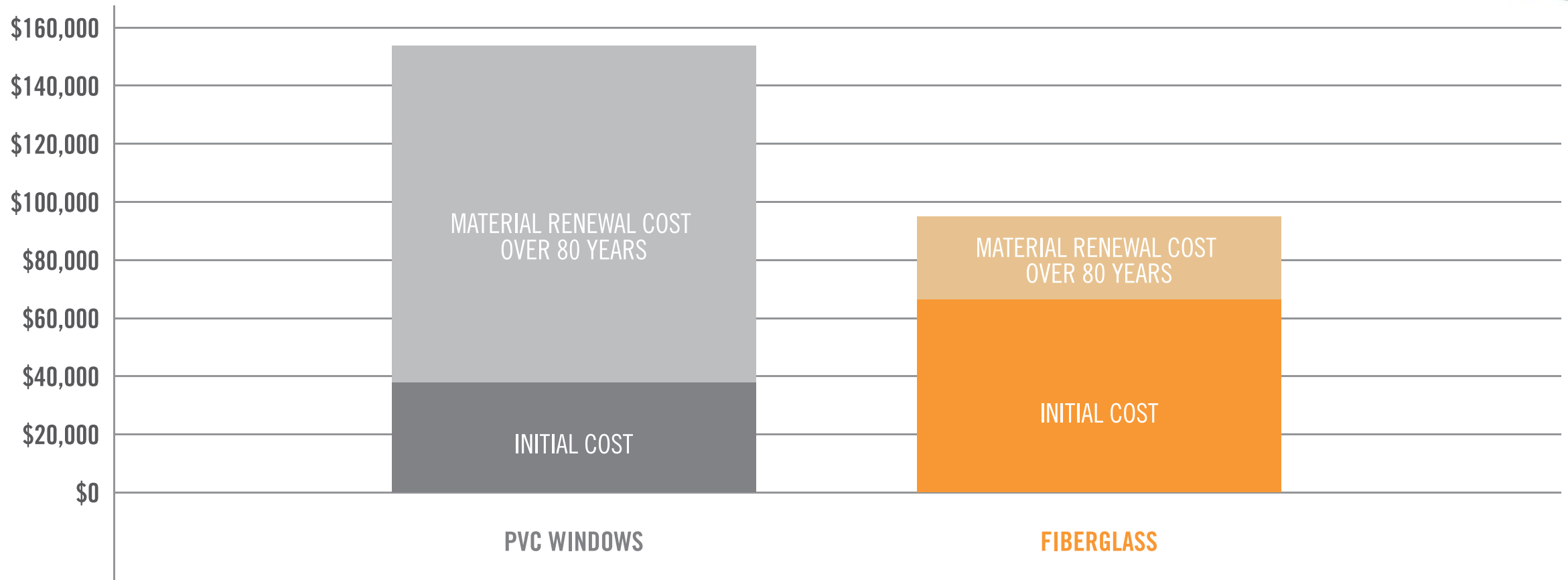
46% IMPROVEMENT

And reduction in condensation potential using actual NFRC certified U-values from window fabricators

HIGH-PERFORMANCE CHARACTERISTICS



HIGH-PERFORMANCE CHARACTERISTICS



HIGH-PERFORMANCE CHARACTERISTICS



TYPICAL THERMALLY BROKEN ALUMINUM FRAME

HIGH-PERFORMANCE CHARACTERISTICS

**85% IMPROVEMENT
REDUCED HEAT LOSS THROUGH WINDOWS**

USING ACTUAL NFRC CERTIFIED U-VALUES FROM WINDOW FABRICATORS

TYPICAL THERMALLY BROKEN ALUMINUM FRAME

TYPICAL FIBERGLASS FRAME

HIGH-PERFORMANCE CHARACTERISTICS

CASCADIA EXAMPLES

R-4.1

Double Glazing

OVER 100% IMPROVEMENT

TYPICAL THERMALLY BROKEN ALUMINUM FRAME

R-7.1

Triple Glazing

OVER 250% IMPROVEMENT

TYPICAL FIBERGLASS FRAME



HIGH-PERFORMANCE CHARACTERISTICS

**WHAT ABOUT
COMBUSTIBILITY?**

HIGH-PERFORMANCE CHARACTERISTICS



CANADA

**NON-METAL WINDOWS ARE COMMON IN
TALL BUILDINGS AROUND THE WORLD
DUE TO ECONOMY AND ENERGY
EFFICIENCY.**

NOT IN CANADA. UNTIL NOW.

TIMELINE – ROAD TO THE NEW NORMAL

**THE CODE-CHANGE IS NOW ACCEPTED FOR
THE UPCOMING 2020 NBC**

ALTERNATE SOLUTIONS (AS) REFERENCE FUTURE CODE CONFORMANCE AND
SUCCESSFUL TEST

Documents have become “cookie-cutter”

**AFTER NBC 2020 ADOPTION IN PROVINCES
CANADA CATCHES UP TO THE REST OF THE WORLD**

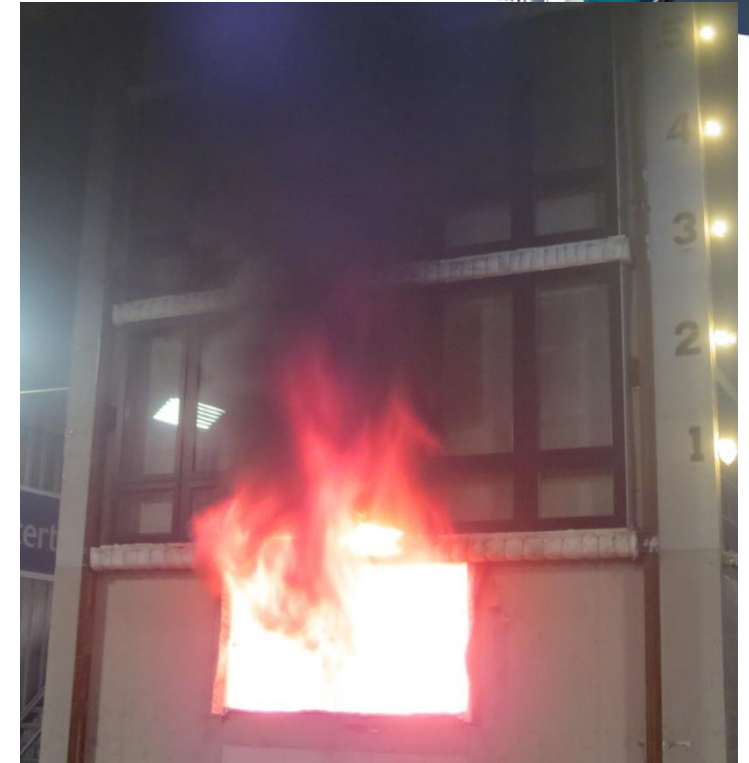
**WE ARE
HERE NOW!**



EXPLORING A CODE CHANGE

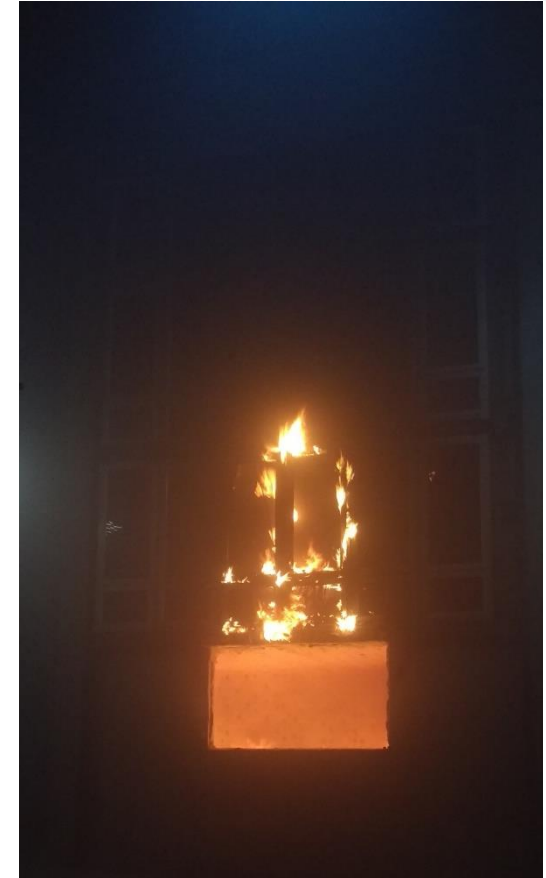
NATIONAL RESEARCH CANADA PARTNERED WITH 10 WINDOW MANUFACTURERS TO STUDY COMBUSTIBLE WINDOWS.

- Lots of fire testing
- Including S134... three storey high
- Successful, positive results



No specimen burning;
just the test fuel.

S134 TESTING - FIBERGLASS



S134 TESTING - FIBERGLASS



FIBERGLASS & ALUMINUM

BOTH PASSED

BOTH SAFE

NRC-CMRC



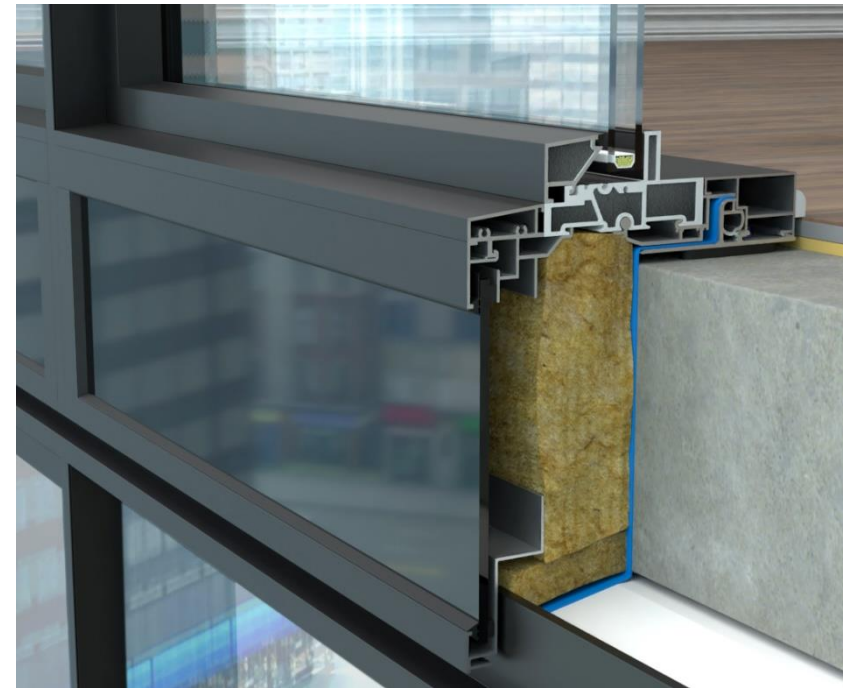
TEST 4 ALUMINUM



TEST 5 FR FIBERGLASS

THE NEW NORMAL

3.1.5.4.(5) *COMBUSTIBLE* WINDOW SASHES AND FRAMES ARE PERMITTED IN A *BUILDING* REQUIRED TO BE OF *NONCOMBUSTIBLE CONSTRUCTION* PROVIDED **THEY ARE VERTICALLY NON-CONTIGUOUS BETWEEN STORIES.**





IMPACTS OF HIGH-PERFORMANCE

IMPACT OF HIGH-PERFORMANCE WINDOWS?



IMPACTS OF HIGH-PERFORMANCE

THERMAL
PERFORMANCE

STRENGTH
& STIFFNESS

LOW THERMAL
EXPANSION &
CONTRACTION
COEFFICIENT

SAVINGS

DURABILITY

LOWER
ENVIRONMENTAL
IMPACT



HIGH PERFORMANCE WINDOWS WILL LET YOU...

1. INCREASE GLAZING AREA FOR MORE VIEWS AND LIGHT

2. REDUCE MECHANICAL SYSTEM PLACEMENT AND SIZE

- Smaller system
- Less ductwork
- Less floor space for central system (it's smaller)

3. INCREASE USEABLE FLOOR SPACE IN SUITES

4. REDUCE INSULATION REQUIREMENTS ELSEWHERE

- Tricky details
- Insulated concrete projections, etc.
- Exterior insulation on wood frame

5. INSTALLATION COST SAVINGS

- Compared to triple glazing in other frames

6. REDUCE FUTURE OPERATING COSTS

WINDOW DESIGN

What does a high-performance window look like?





POLL – WINDOW CHARACTERISTICS

**TYPICALLY,
WHAT ARE THE TOP 3
CHARACTERISTICS
YOU LOOK FOR IN WINDOWS?**

FRAME TYPES & APPLICATIONS

WOOD FRAME



PHOTO CREDIT: NEUFFER WINDOWS

VINYL / UPVC



PHOTO CREDIT: EUROLINE WINDOWS

FIBERGLASS

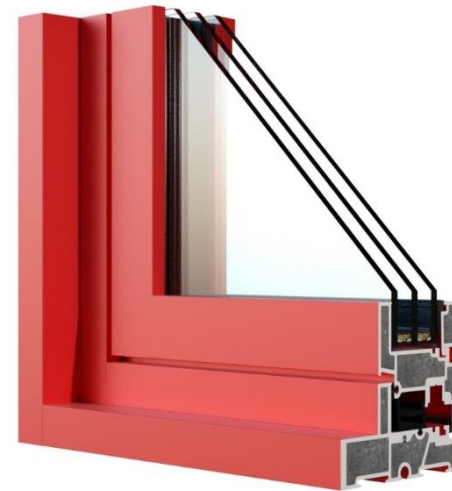


PHOTO CREDIT: CASCADIA WINDOWS & DOORS

ALUMINUM



PHOTO CREDIT: GLO EUROPEAN WINDOWS

FRAME TYPES & APPLICATIONS

WOOD FRAME



PHOTO CREDIT: NEUFFER WINDOWS

VINYL / UPVC



PHOTO CREDIT: EUROLINE WINDOWS

FIBERGLASS



PHOTO CREDIT: CASCADIA WINDOWS & DOORS

ALUMINUM



PHOTO CREDIT: GLO EUROPEAN WINDOWS



CONSIDERATIONS WHEN SELECTING WINDOW TYPE?

**WHAT ARE YOUR
DESIGN CRITERIA?**

CONSIDERATIONS WHEN SELECTING WINDOW TYPE?



THERMAL PERFORMANCE

● ●

● ●

● ● ●

●

LIFETIME

● ●

●

● ● ●

● ●

STRUCTURAL STRENGTH

●

●

● ●

● ● ●

FLEXIBILITY

● ●

● ●

●

● ● ●

CURTAIN/WINDOW WALL

● ●

● ● ●

WEATHER RESISTANCE

●

● ●

● ● ●

● ● ●

NON-COMBUSTIBILITY

●

●

LIFECYCLE COST

\$\$\$

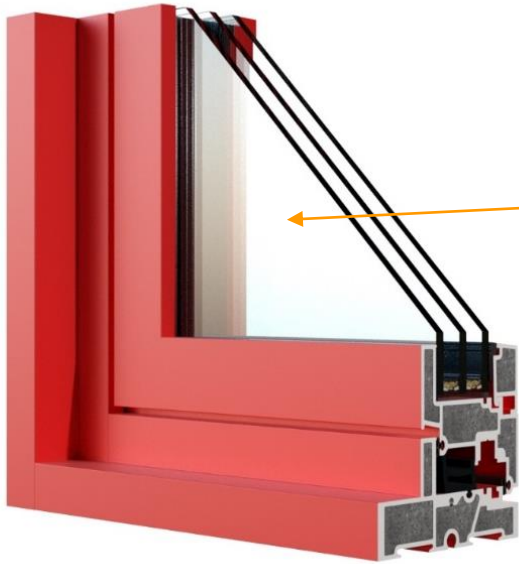
\$\$\$

\$\$

\$\$

HIGH-PERFORMANCE WINDOW STRATEGY

SUMMARY OF GOOD WINDOW DESIGN



TRIPLE PANE
(GAS-FILLED
& LOW E-COATINGS)

HIGH-PERFORMANCE WINDOW STRATEGY

SUMMARY OF GOOD WINDOW DESIGN

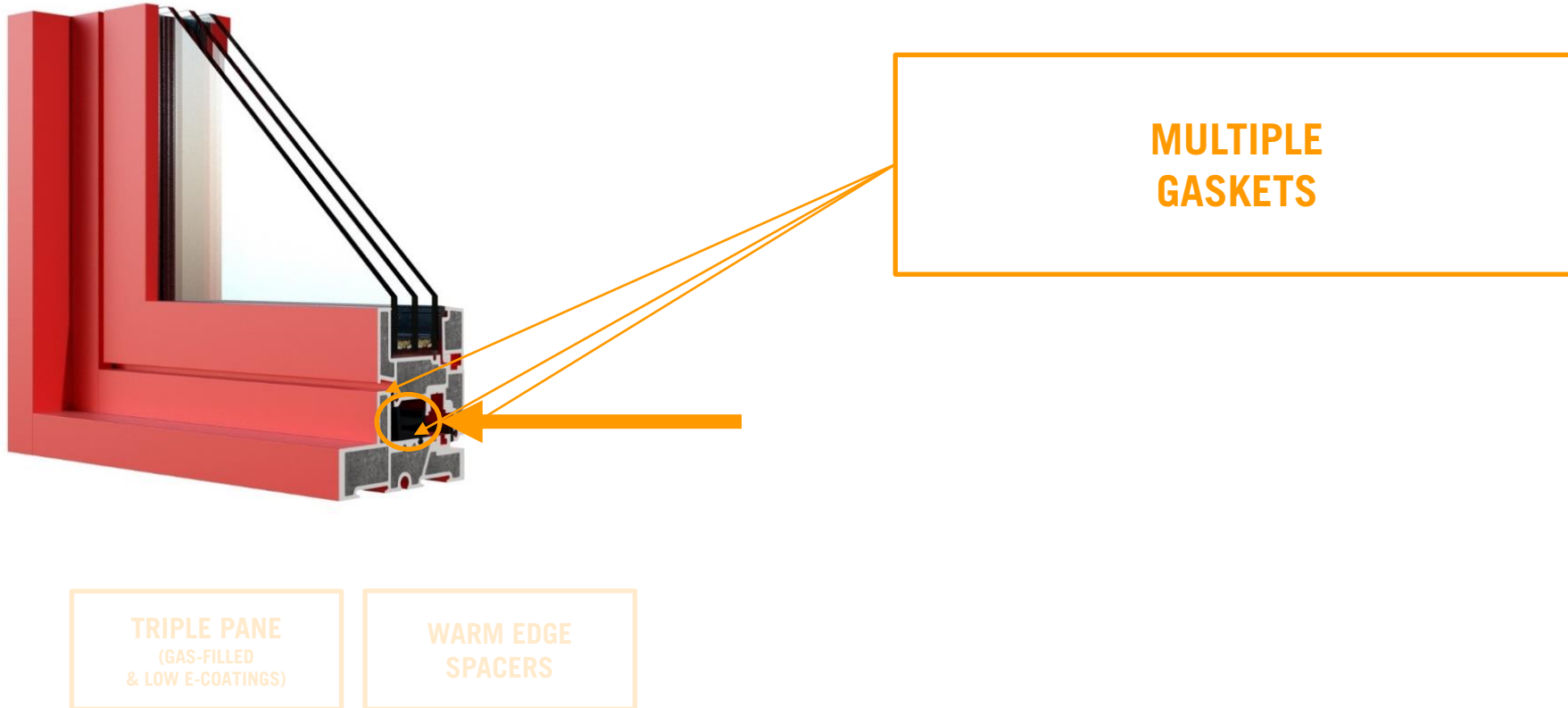


**WARM
EDGE SPACERS**

TRIPLE PANE
(GAS-FILLED
& LOW E-COATINGS)

HIGH-PERFORMANCE WINDOW STRATEGY

SUMMARY OF GOOD WINDOW DESIGN



HIGH-PERFORMANCE WINDOW STRATEGY

SUMMARY OF GOOD WINDOW DESIGN



INSULATED FRAME
(LOW CONDUCTIVITY
&/OR THERMAL BREAKS)

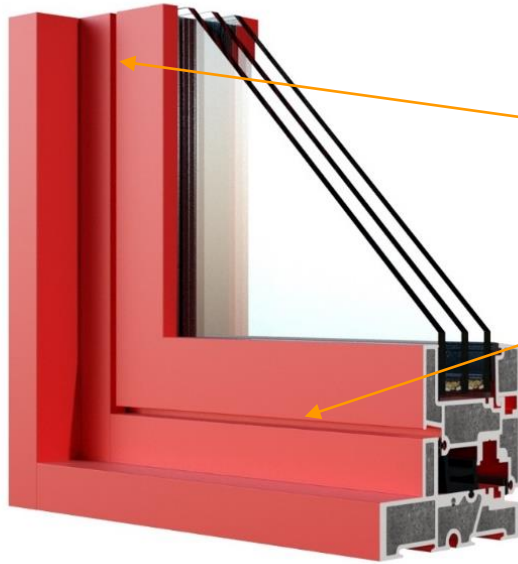
TRIPLE PANE
(GAS-FILLED
& LOW E-COATINGS)

**WARM EDGE
SPACERS**

**MULTIPLE
GASKETS**

HIGH-PERFORMANCE WINDOW STRATEGY

SUMMARY OF GOOD WINDOW DESIGN



**MULTI-POINT
LOCKING**

TRIPLE PANE
(GAS-FILLED
& LOW E-COATINGS)

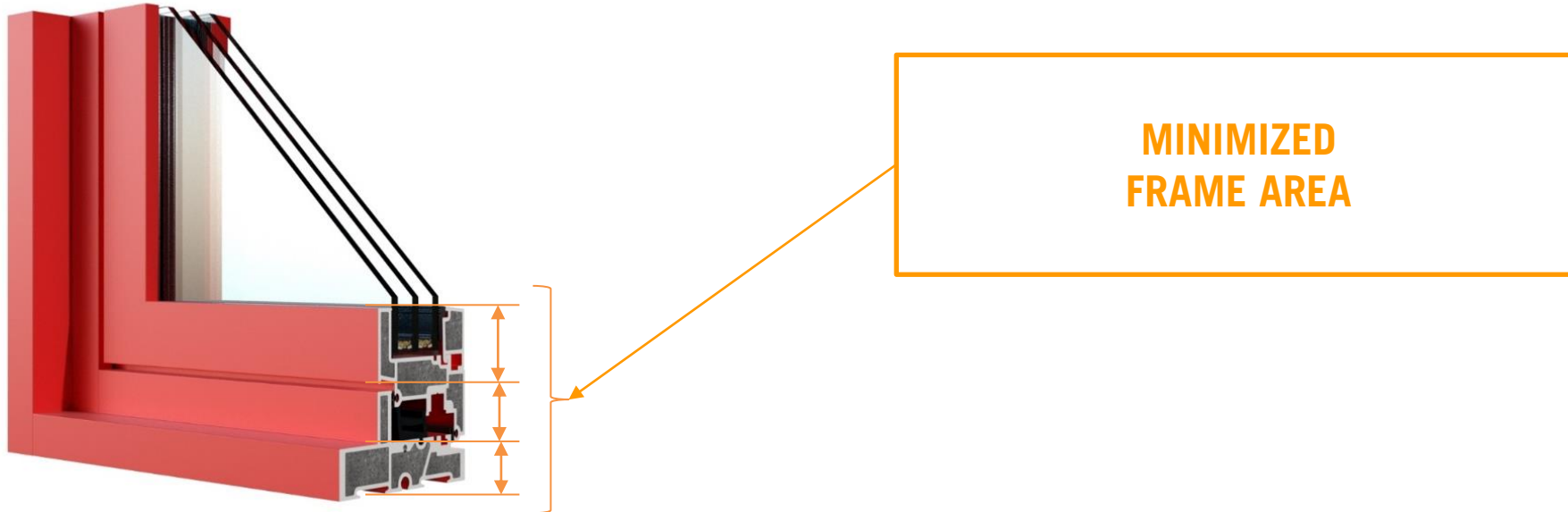
**WARM EDGE
SPACERS**

**MULTIPLE
GASKETS**

INSULATED FRAME
(LOW CONDUCTIVITY
&/OR THERMAL BREAKS)

HIGH-PERFORMANCE WINDOW STRATEGY

SUMMARY OF GOOD WINDOW DESIGN



TRIPLE PANE
(GAS-FILLED
& LOW E-COATINGS)

WARM EDGE
SPACERS

MULTIPLE
GASKETS

INSULATED FRAME
(LOW CONDUCTIVITY
&/OR THERMAL BREAKS)

MULTI-POINT
LOCKING

MINIMIZED
FRAME AREA

DOUBLE OR TRIPLE GLAZING? PH CERTIFIED?

WINDOWS & DOORS - DOUBLE GLAZED										
LOW-E OPTIONS	CENTER-OF-GLASS DATA			U _w (U-VALUE OF WINDOW) PER NFRC METHOD [BTU/HR*FT ² *F]						
CARDINAL (90% ARGON FILL, UNO)	U _g	SHGC	VT	FIXED	CASEMENT	AWNING	TILT & TURN	HOPPER	SWING DOOR	SLIDING DOOR
STANDARD DOUBLE GLAZED (ONE LOW-E ON SURFACE #2 OR #3 / STAINLESS STEEL SPACER)										
180 (#3)	0.26	0.68	0.79	0.26	0.25	0.25	0.25	0.24	0.24	0.24
272 (#2)	0.25	0.41	0.72	0.25	0.24	0.24	0.24	0.24	0.23	0.24
270 (#2)	0.25	0.37	0.70	0.25	0.24	0.24	0.24	0.24	0.23	0.23
366 (#2)	0.24	0.27	0.65	0.24	0.24	0.24	0.23	0.23	0.23	0.23
340 (#2)	0.25	0.18	0.39	0.25	0.24	0.25	0.24	0.23	0.23	0.23
OPTIONS W/ CAPILLARY TUBES – AIR FILL (ONE LOW-E ON SURFACES #2 / STAINLESS STEEL SPACER)										
272 (#2)	0.30	0.41	0.72	0.29	0.27	0.27	0.27	0.26	0.25	0.25
PREMIUM DOUBLE GLAZED (TWO LOW-E ON SURFACES #2 & #4 / STAINLESS STEEL SPACER)										
180/i89	0.21	0.62	0.77	0.21	0.22	-	-	-	0.20	0.21
272/i89	0.20	0.41	0.70	0.21	0.21	-	-	-	0.20	0.20
270/i89	0.20	0.36	0.69	0.21	0.21	-	-	-	0.20	0.20
366/i89	0.20	0.27	0.63	0.20	0.21	-	-	-	0.19	0.20
340/i89	0.20	0.17	0.38	0.20	0.21	-	-	-	0.19	0.20

DOUBLE OR TRIPLE GLAZING? PH CERTIFIED?

LOW-E 366 (#2)

R-4.2

STANDARD DOUBLE-GLAZED IGU /
STAINLESS STEEL SPACER

FIXED WINDOW



LOW-E 366 / 180

R-7.1

STANDARD TRIPLE-GLAZED IGU /
TRISEAL SUPER SPACER

FIXED WINDOW

AVAILABLE IN NON-CERTIFIED &
PASSIVE HOUSE CERTIFIED

DOUBLE OR TRIPLE GLAZING? PH CERTIFIED?

STANDARD DOUBLE

LOW-E 366 (#2)

R-4.2

STANDARD DOUBLE-GLAZED IGU /
STAINLESS STEEL SPACER
FIXED WINDOW

R - 4.2

STANDARD TRIPLE

LOW-E 366 / 180

R-7.1

STANDARD TRIPLE-GLAZED IGU /
TRIPLE SEAL SUPER SPACER
FIXED WINDOW

R - 7.1

AVAILABLE IN NON-CERTIFIED &
PASSIVE HOUSE CERTIFIED

≈ 40%

IMPROVEMENT

DOUBLE OR TRIPLE GLAZING? PH CERTIFIED?

LOW-E 366 (#2)

R-4.2

STANDARD DOUBLE-GLAZED IGU /
STAINLESS STEEL SPACER

FIXED WINDOW

LOW-E 366 / 180

R-7.1

STANDARD TRIPLE-GLAZED IGU /
TRISEAL SUPER SPACER

FIXED WINDOW

AVAILABLE IN NON-CERTIFIED &
PASSIVE HOUSE CERTIFIED

LOW-E 366 / 180 / i89

R-7.7

PREMIUM TRIPLE-GLAZED IGU /
TRISEAL SUPER SPACER

FIXED WINDOW

AVAILABLE IN NON-CERTIFIED &
PASSIVE HOUSE CERTIFIED

DOUBLE OR TRIPLE GLAZING? PH CERTIFIED?

LOW-E 366 (#2)

R-4.2

STANDARD DOUBLE-GLAZED IGU /
STAINLESS STEEL SPACER

FIXED WINDOW

STANDARD TRIPLE

LOW-E 366 / 180

R-7.1

STANDARD TRIPLE-GLAZED IGU /
TRISEAL SUPER SPACER

FIXED WINDOW

PREMIUM TRIPLE

LOW-E 366 / 180 / 189

R-7.7

PREMIUM TRIPLE-GLAZED IGU /
TRISEAL SUPER SPACER

FIXED WINDOW

≈ 7%

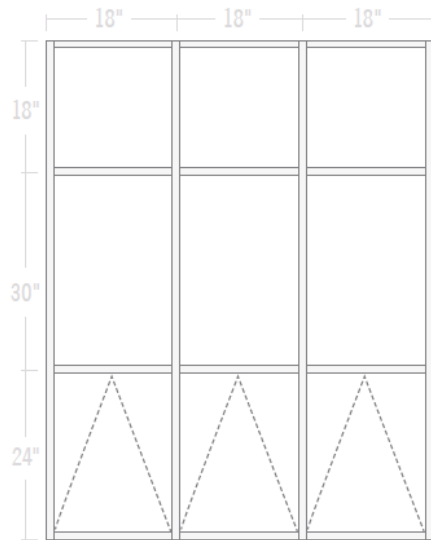
IMPROVEMENT

AVAILABLE IN NON-CERTIFIED & **R - 7.1**
PASSIVE HOUSE CERTIFIED

R - 7.7 AVAILABLE IN NON-CERTIFIED &
PASSIVE HOUSE CERTIFIED

OPTIMIZING WINDOWS

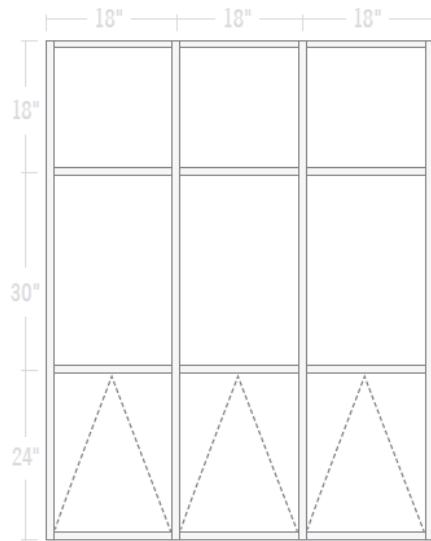
Reduce Mullions



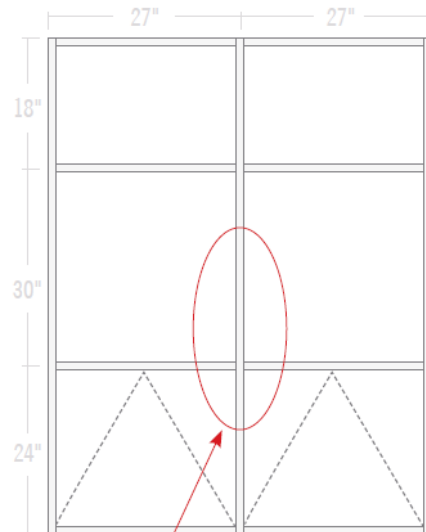
\$\$\$\$

OPTIMIZING WINDOWS

Reduce Mullions



\$\$\$\$

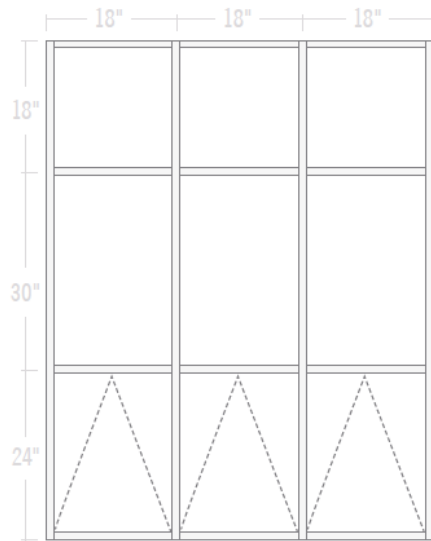


Reduce vertical mullions
and number of operables

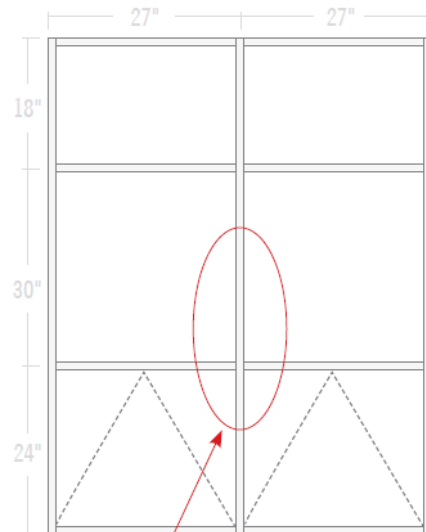
\$\$\$

OPTIMIZING WINDOWS

Reduce Mullions

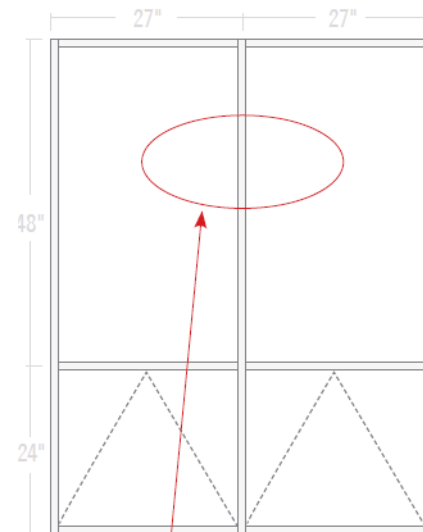


\$\$\$\$



Reduce vertical mullions
and number of operables

\$\$\$

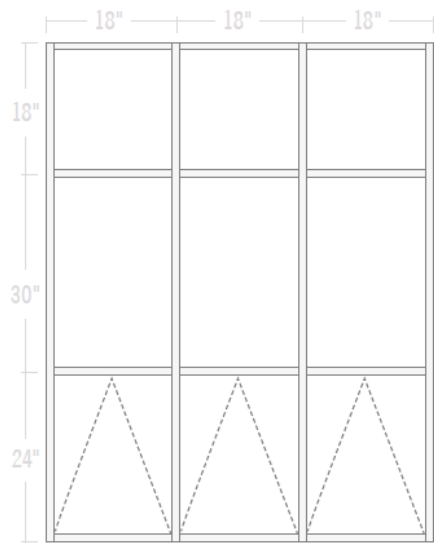


Reduce horizontal mullions

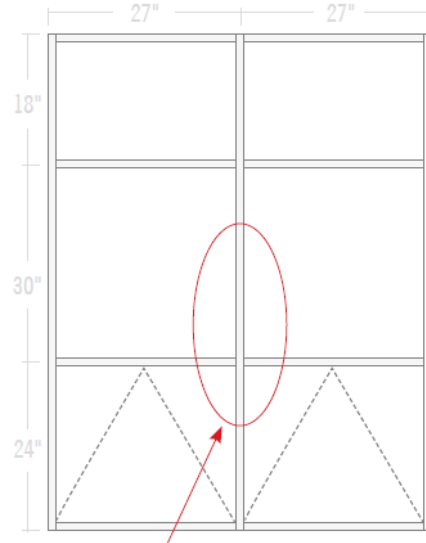
\$\$

OPTIMIZING WINDOWS

Reduce Mullions

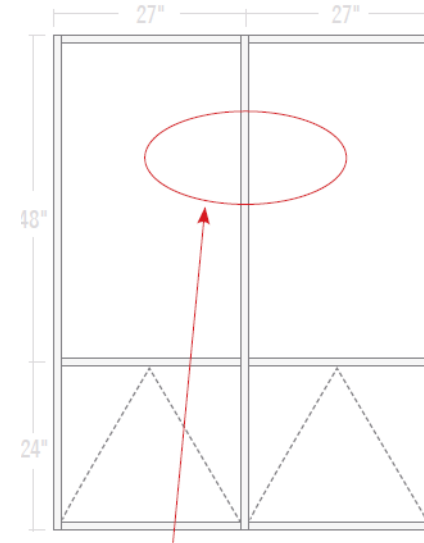


\$\$\$\$



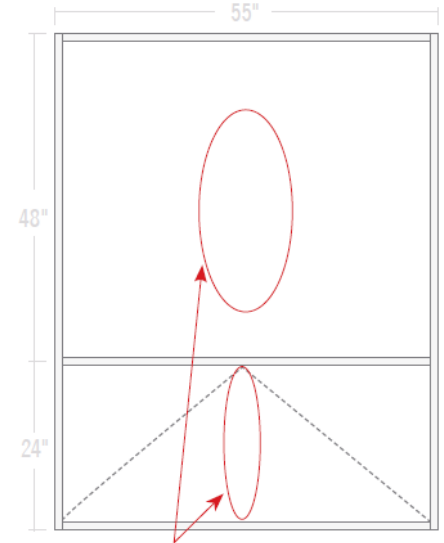
Reduce vertical mullions
and number of operables

\$\$\$



Reduce horizontal mullions

\$\$



Increase vision area
and increase operable size

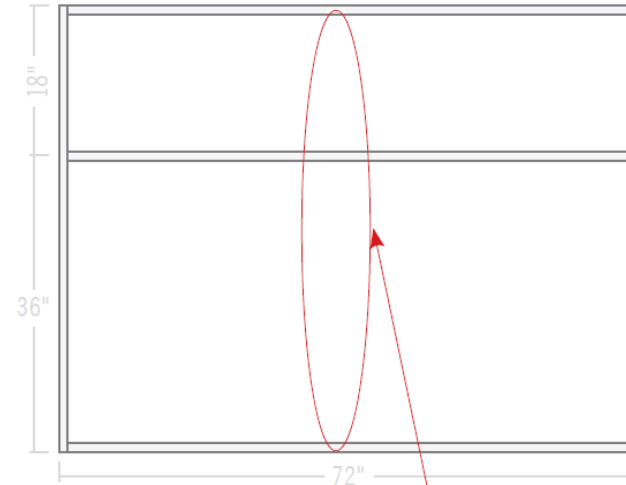
\$

OPTIMIZING WINDOWS

Increase Window Size

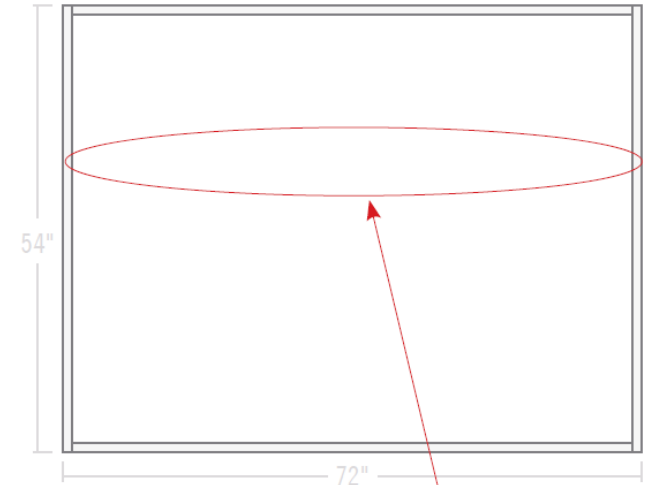


\$\$\$\$ / FT²



Increase overall window size

\$\$\$ / FT²

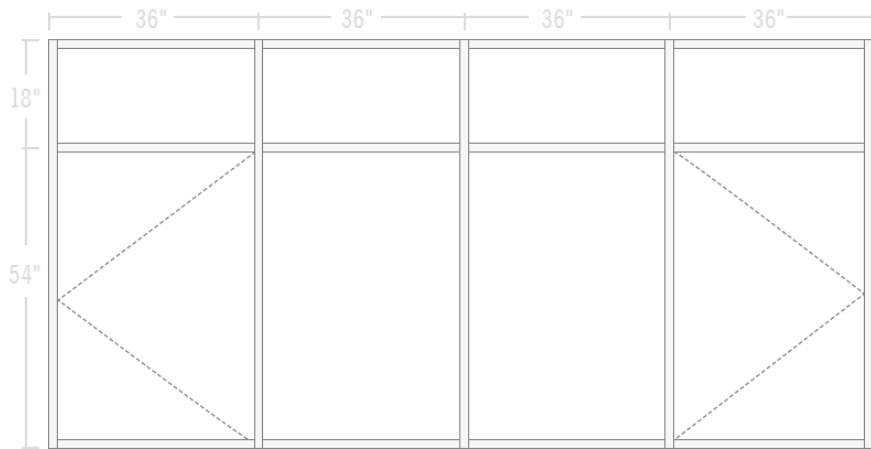


Reduce mullions

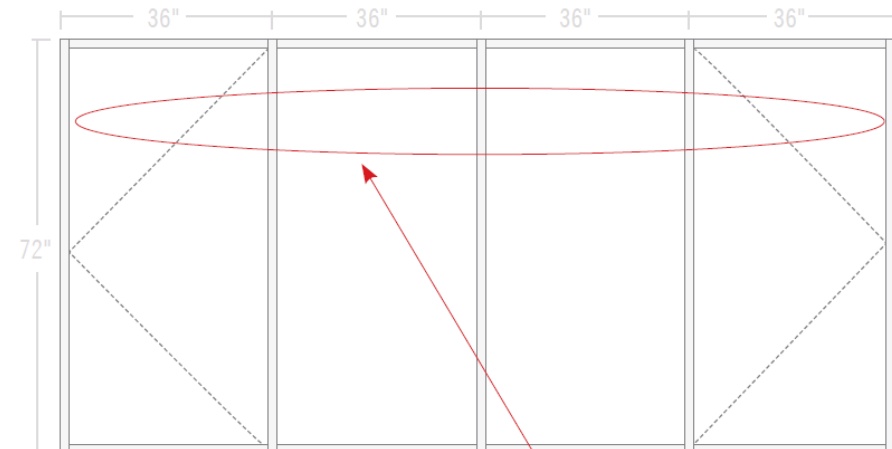
\$\$ / FT²

OPTIMIZING WINDOWS

Increase Window Size



\$\$\$\$

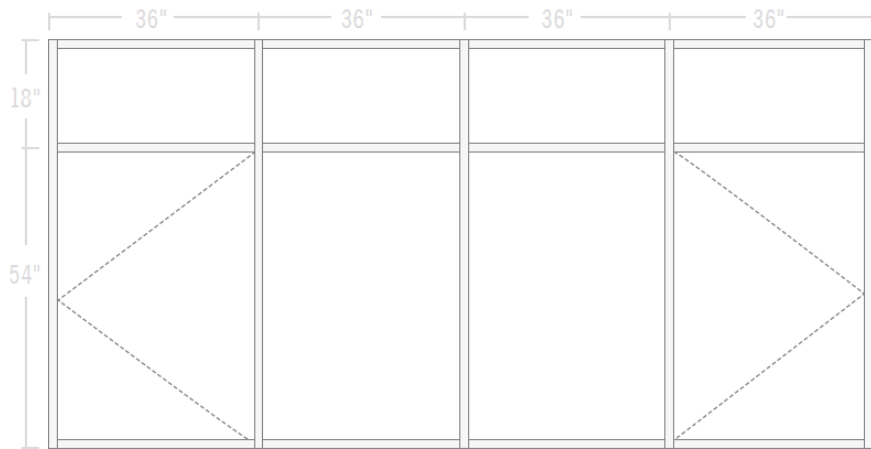


Reduce horizontal mullions
and increase operable size

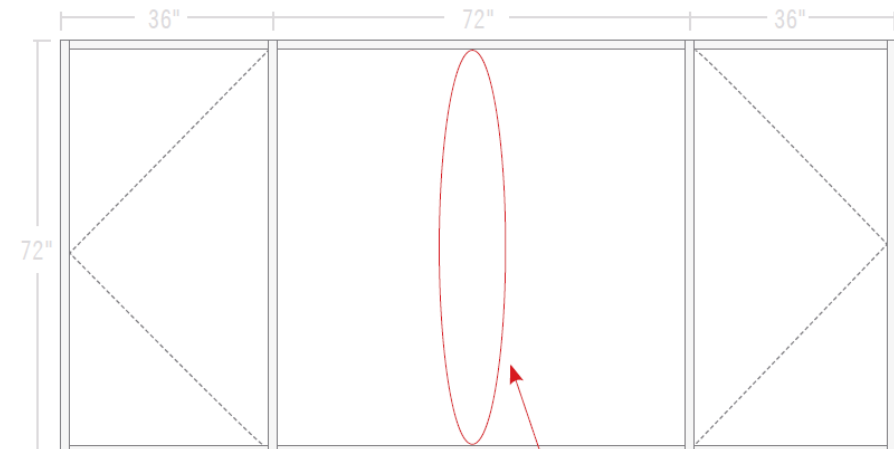
\$\$

OPTIMIZING WINDOWS

Increase Window Size



\$\$\$\$

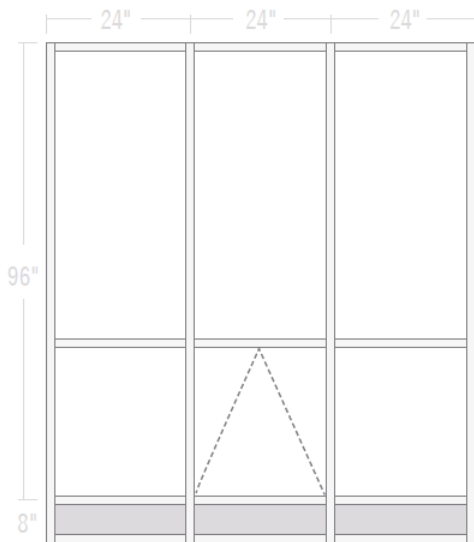


Reduce vertical mullions
and increase vision glass

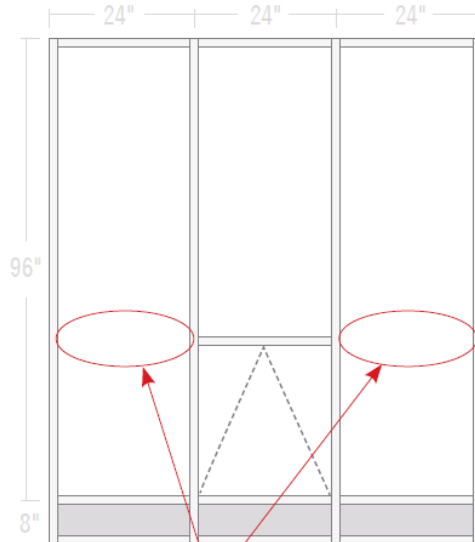
\$

OPTIMIZING WINDOWS

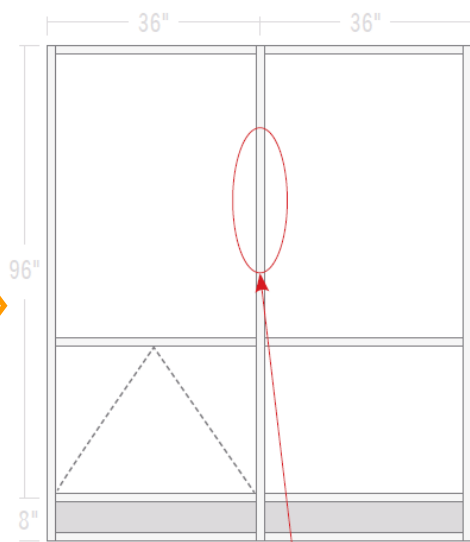
Window Wall



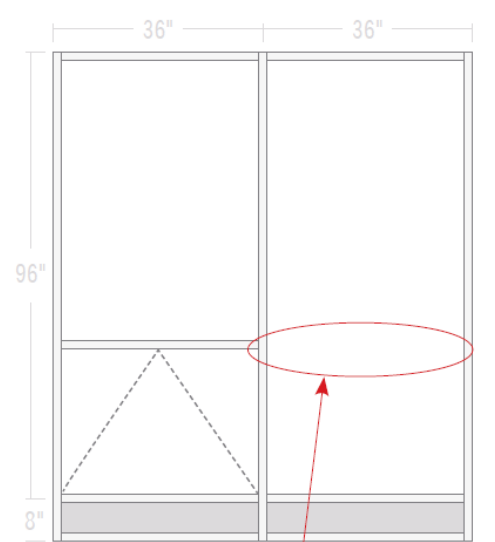
\$\$\$\$



\$\$\$



\$\$



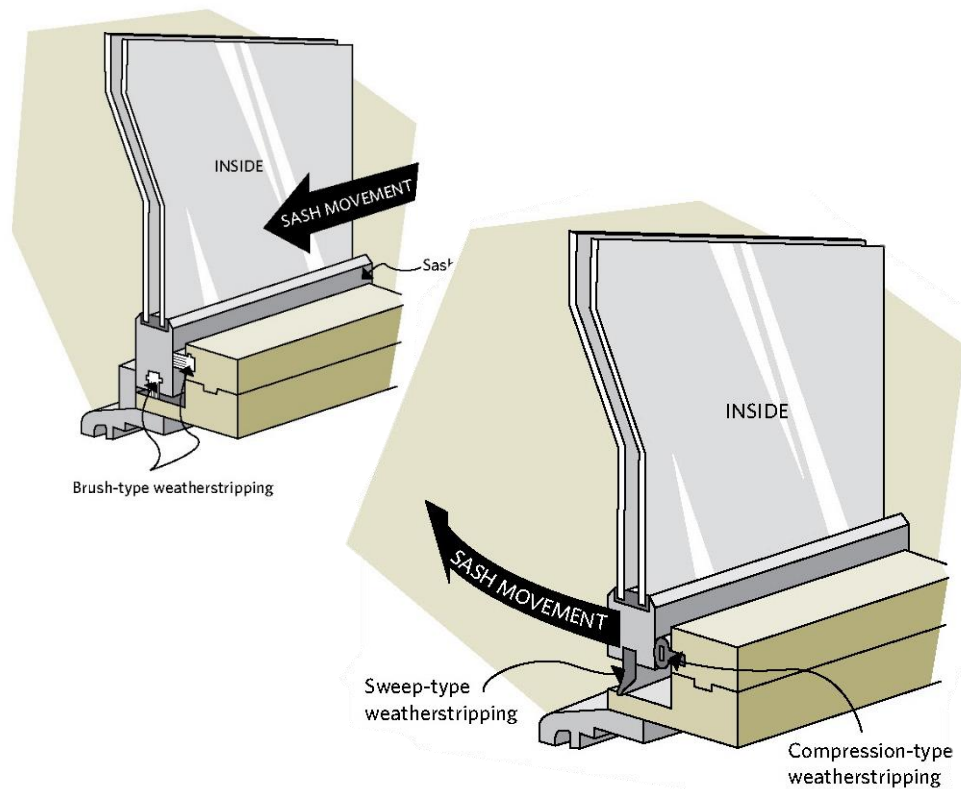
\$

OPTIMIZING THE WINDOW IN THE ENVELOPE

Mitigating weaknesses and leveraging strengths in the building envelope design



AIR LEAKAGE



GOVERNMENT OF CANADA



NOPPHALUX KOSAKORN



PAUL MENZ

WHY AIR LEAKAGE MATTERS

AIR LEAKAGE RESISTANCE

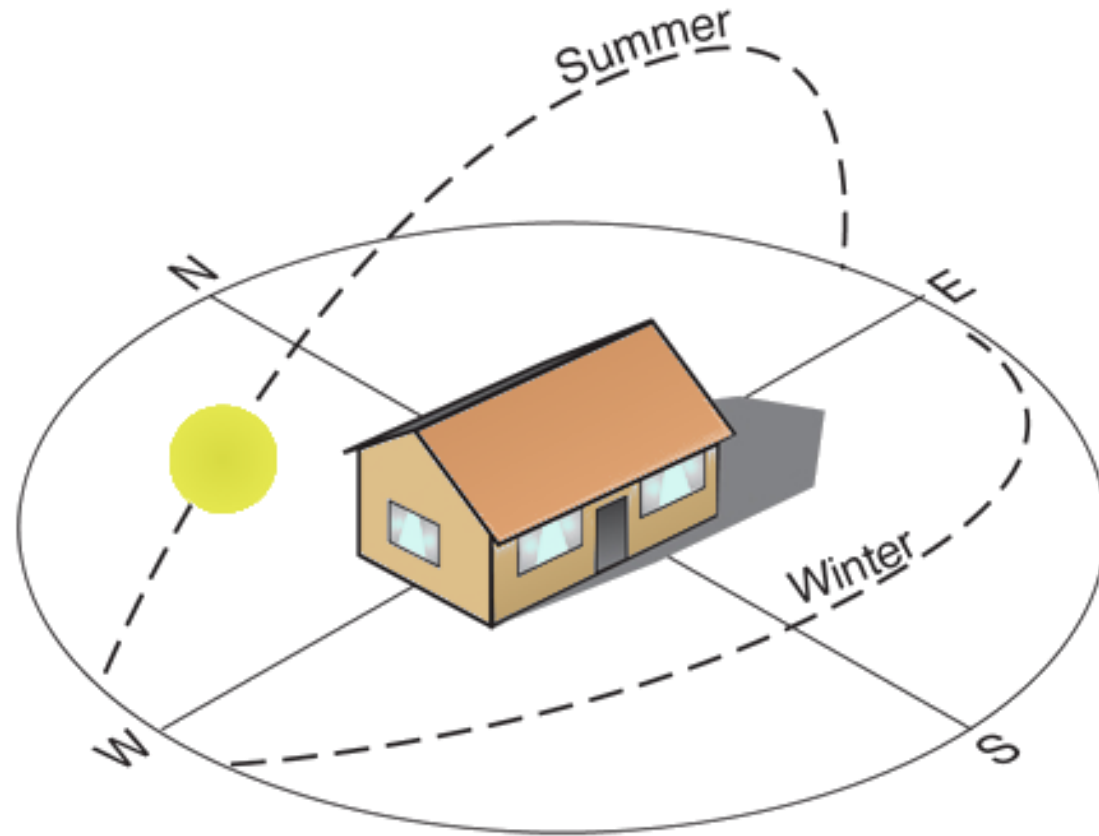
Air test data is indicated in the following table:

Property	Area m ² (ft ²)	Infiltration Rate L/s*m ² (cfm/ft ²)	Exfiltration Rate L/s*m ² (cfm/ft ²)	Compliance US (CAN)
Overall Assembly @ 75 Pa	3.84 (41.28)	0.00 (0.00)	0.00 (0.00)	Pass (A3)
Overall Assembly @ 300 Pa	3.84 (41.28)	0.00 (0.00)	0.00 (0.00)	Pass (A3)
Allowable Leakage Rates				
Maximum allowable air leakage rate (US):			1.5 L/s*m ² , 0.3 cfm/ft ²	
Maximum allowable air leakage rate (CAN – A3):			0.5 L/s*m ² , 0.1 cfm/ft ²	

The overall system **met** the US and Canadian performance requirements as reported above when evaluated under NAFS-08, NAFS-11, A440S1-09 and A440S1-17.

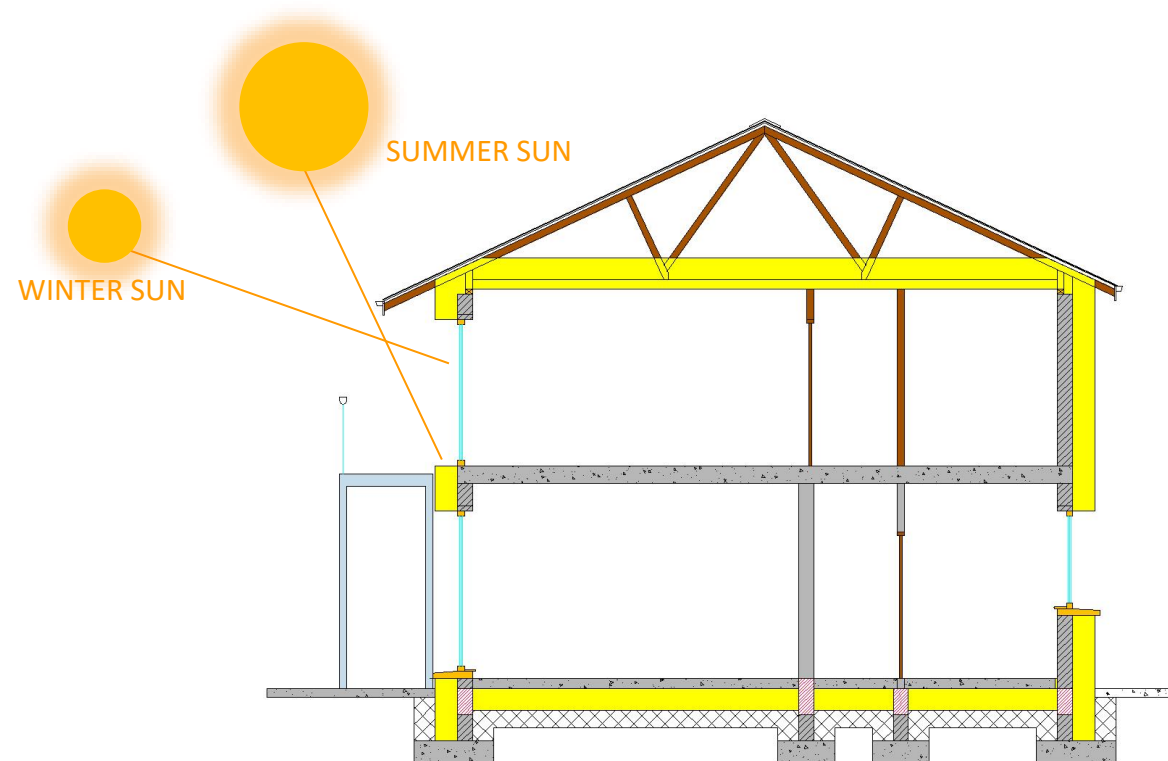
SHADING

BUILDING ORIENTATION



SHADING

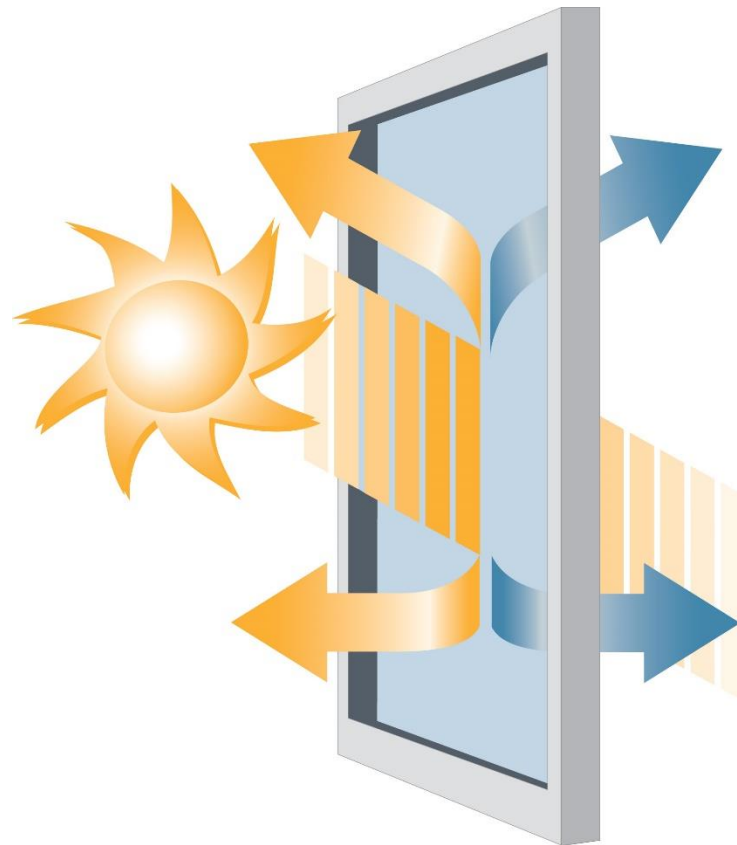
EXTERIOR SHADING



BUILDING
ORIENTATION

SHADING

GLASS COATINGS



BUILDING
ORIENTATION

EXTERIOR
SHADING

SHADING

INTERIOR SHADING






BUILDING
ORIENTATION

EXTERIOR
SHADING

GLASS
COATINGS

WHY SHADING MATTERS

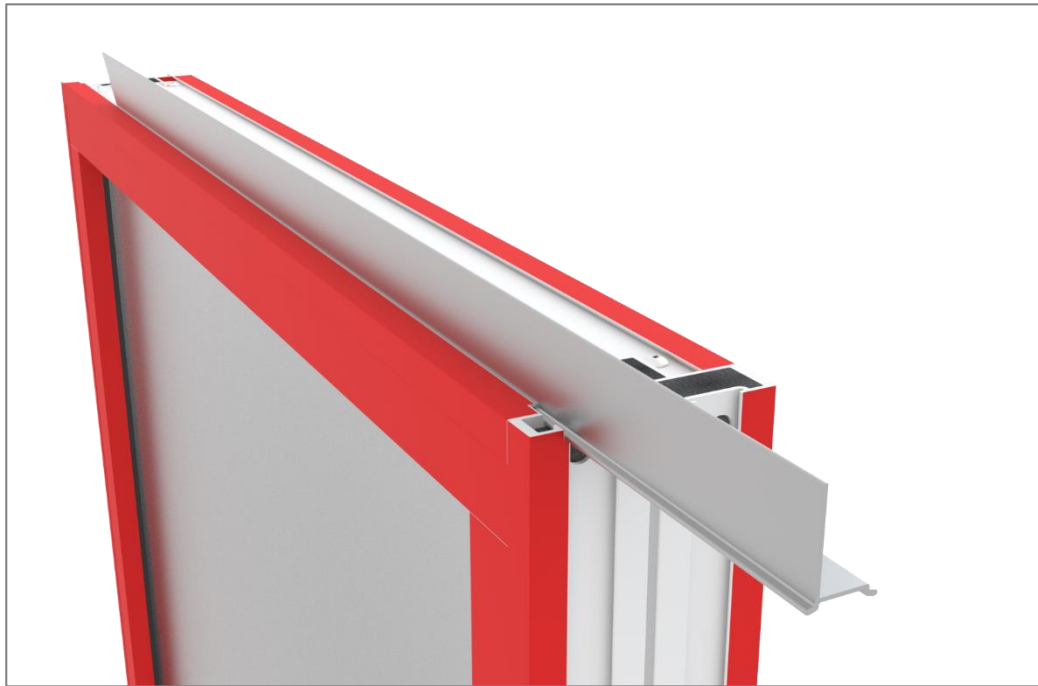
	OVERHANGS	EXTERIOR SHADING	GLASS COATINGS	INTERIOR SHADING
PRIVACY				
GLARE	 SOMEWHAT		 SOMEWHAT	
HEAT GAIN			 MOSTLY	



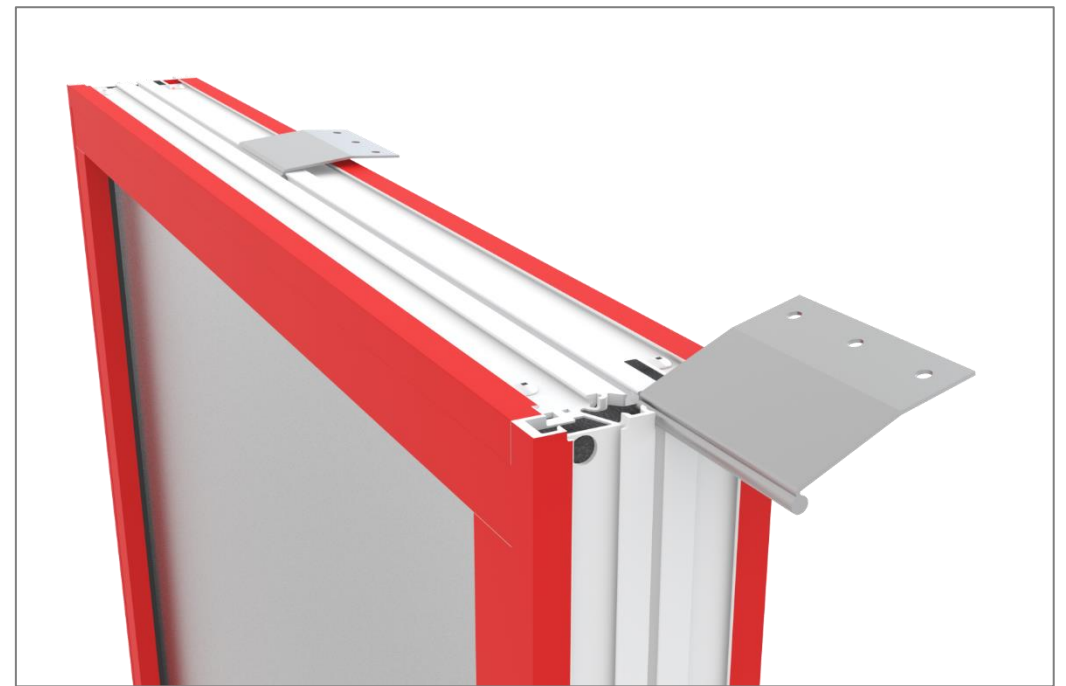
WINDOW INSTALLATION

**WHAT ABOUT
HIGH-PERFORMANCE
INSTALLATION?**

TO FLANGE OR STRAP?



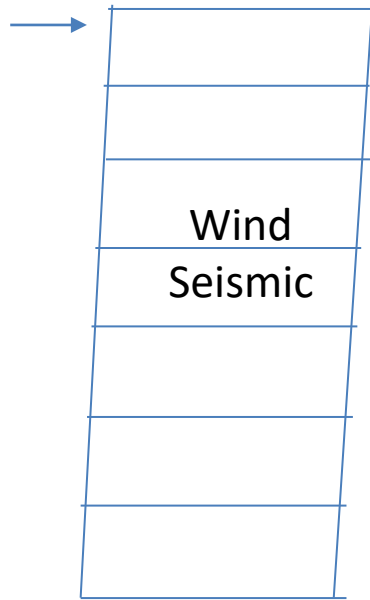
NAIL FLANGES



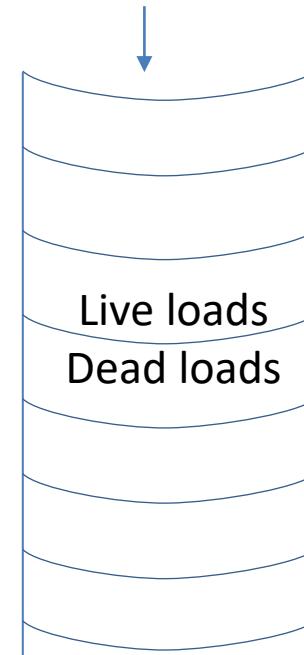
STRAP ANCHORS

BUILDING MOVEMENT

WHAT WAYS DO BUILDINGS MOVE?



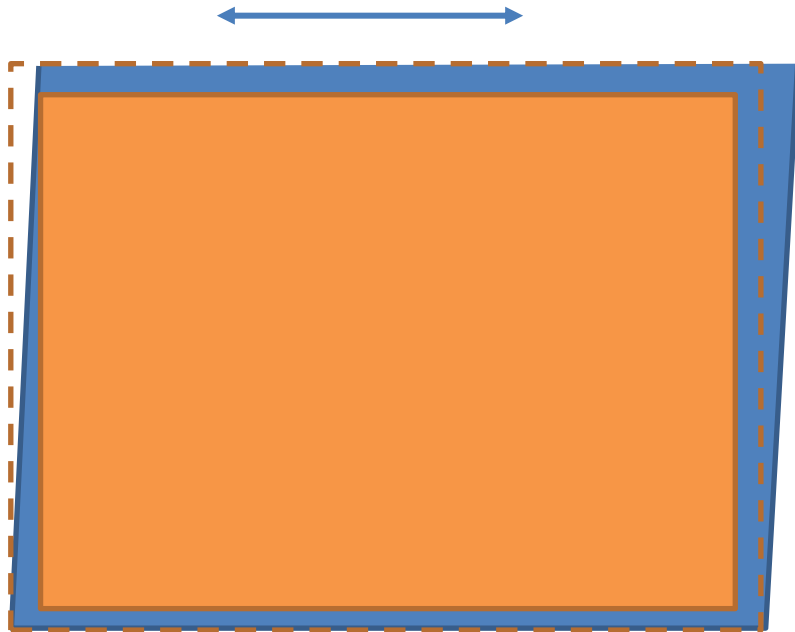
Horizontal Drift



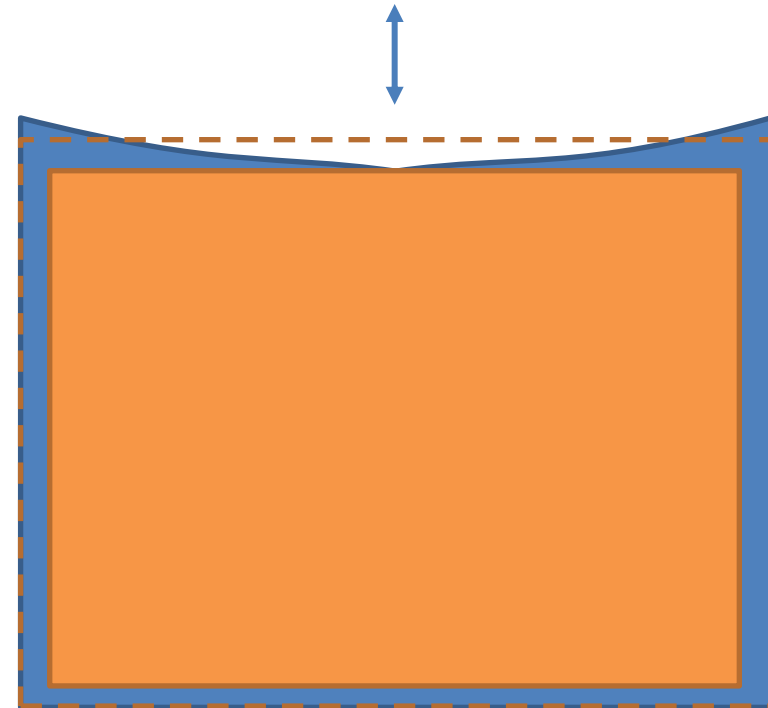
Vertical Deflection

BUILDING MOVEMENT

EFFECT ON WINDOW OPENING AND WINDOW

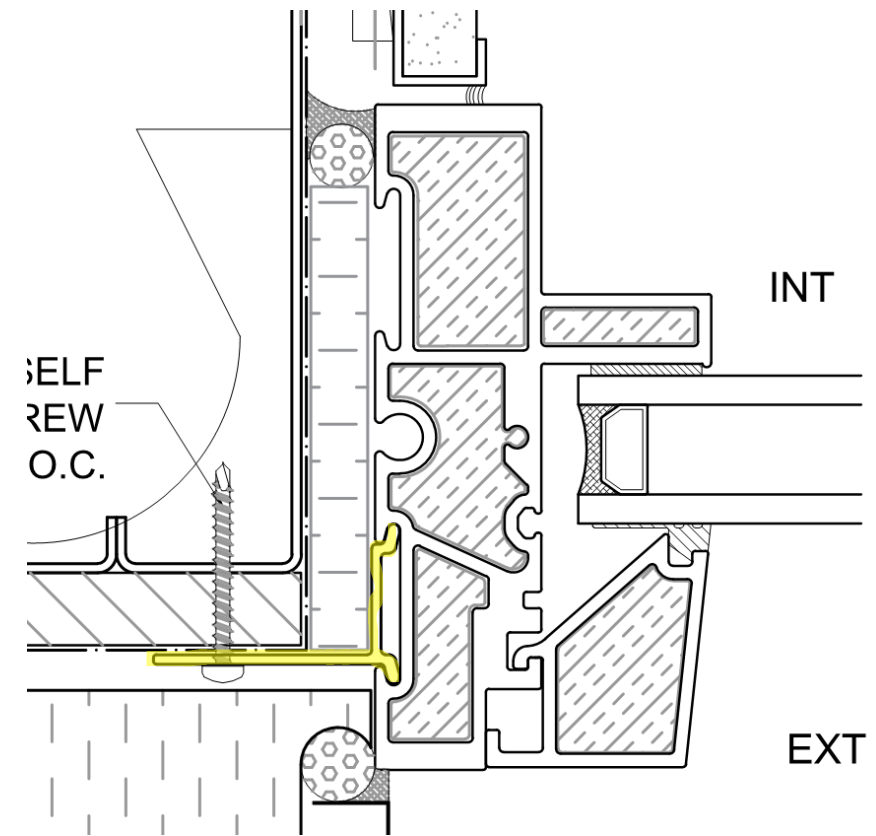
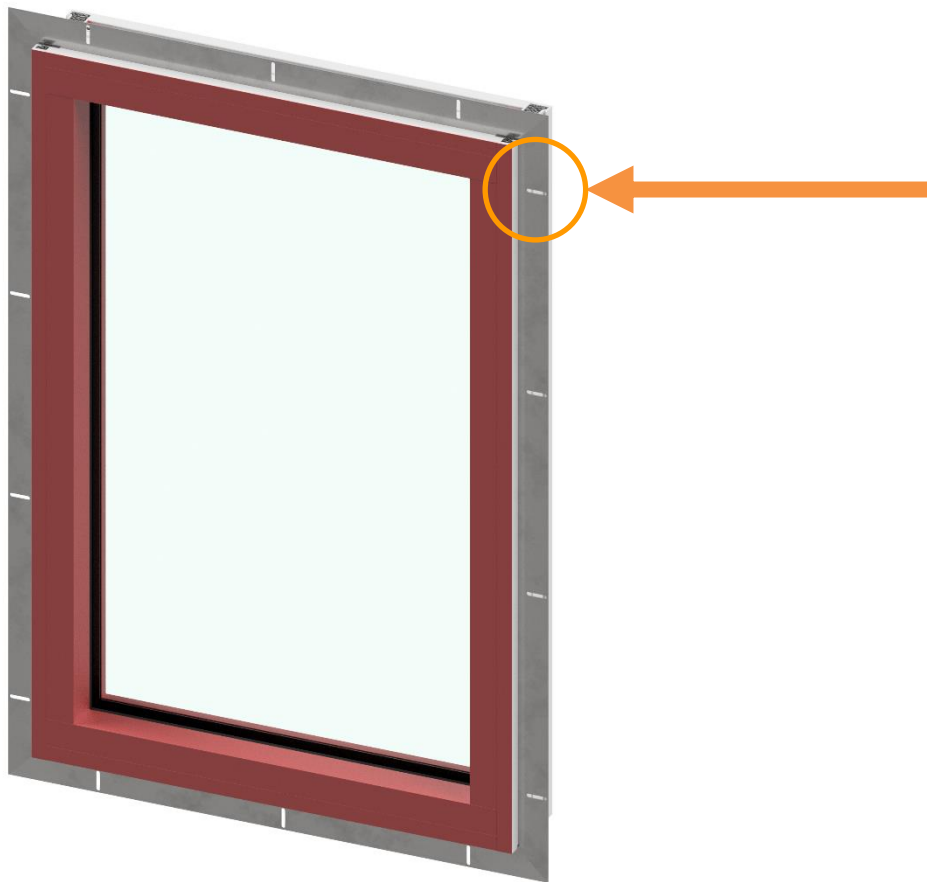


HORIZONTAL DRIFT

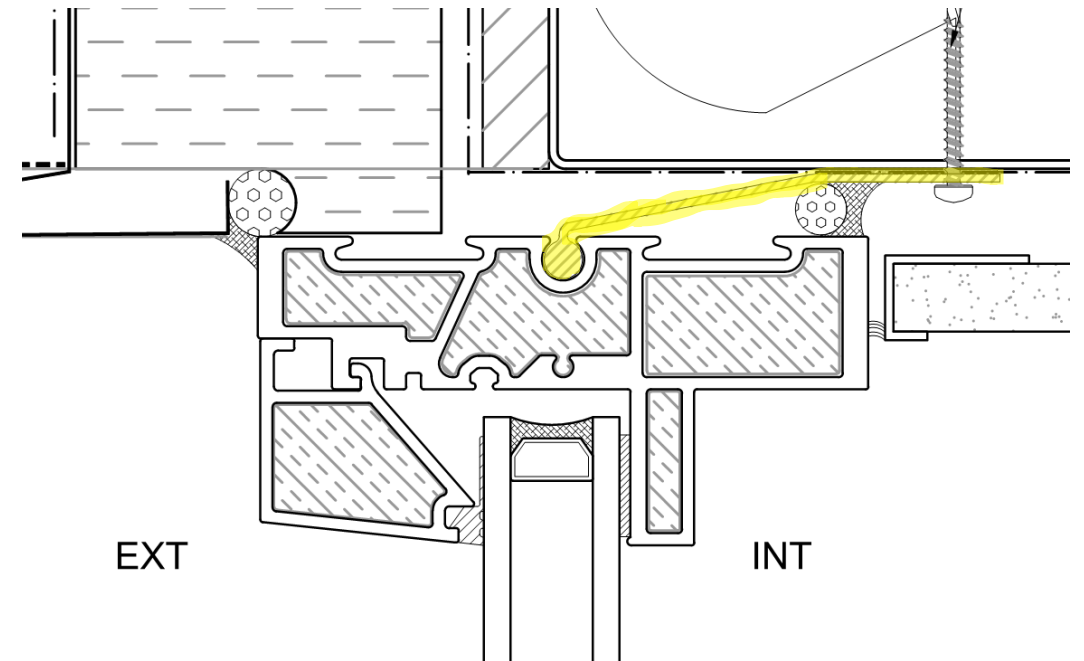


VERTICAL DRIFT

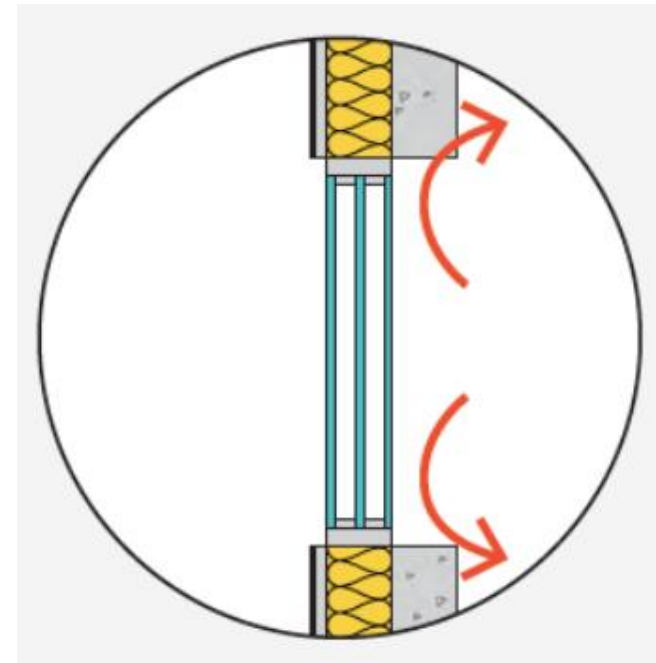
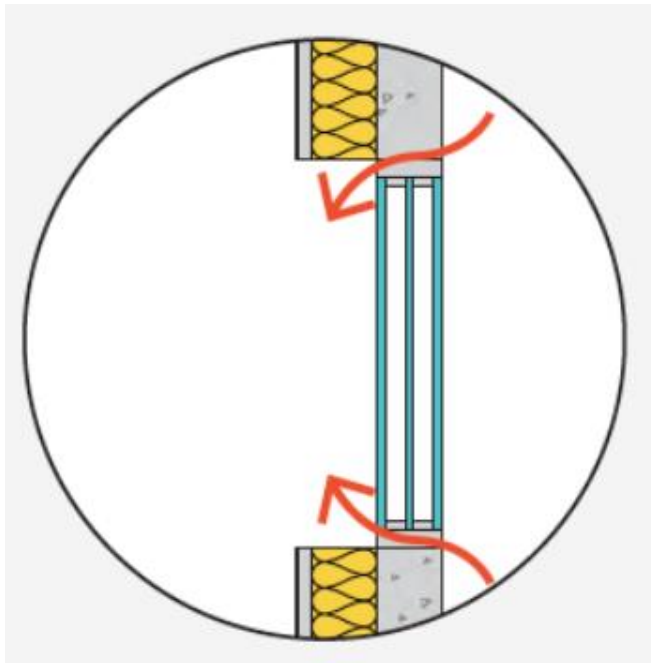
NAIL FLANGE / NAIL FIN



STRAP ANCHORS



THE FUTURE OF INSTALLATION?



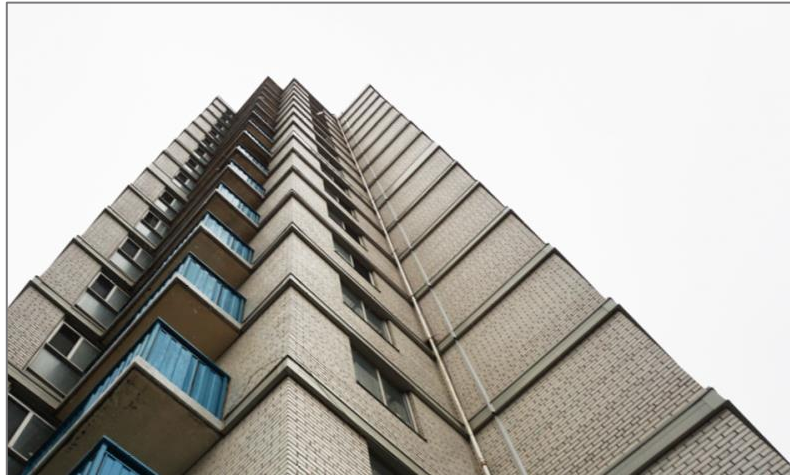
U-VALUES IN THE REAL WORLD

*Project examples & the variety of window
configurations used to achieve 'high-performance'*

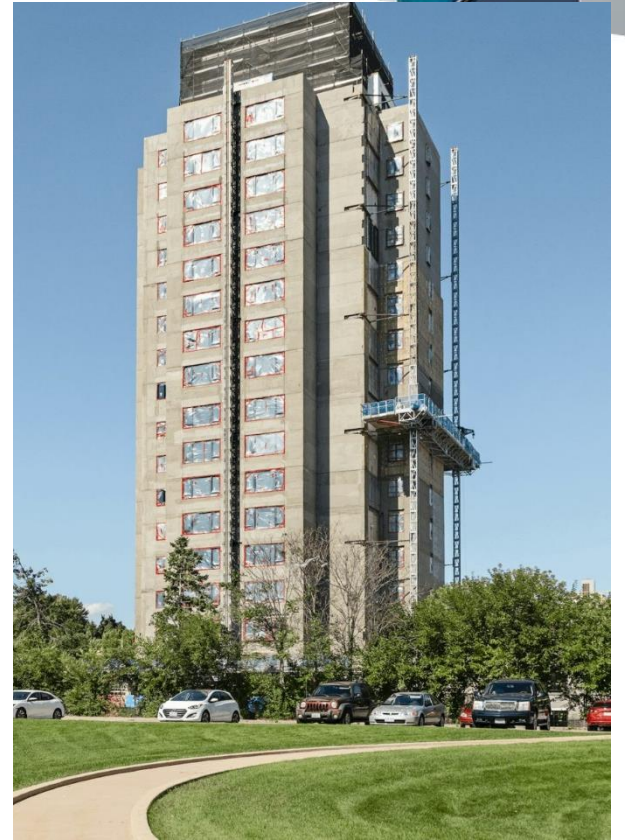


KEN SOBLE TOWER

- Hamilton, ON (EnerPHit)
- Non-combustible construction
- **PH certified, inswing windows**
- Triple glazed windows (Three Low-E 270 / 180 / i89)
- 'Juliet Balcony' attached directly to the windows



KEN SOBLE TOWER

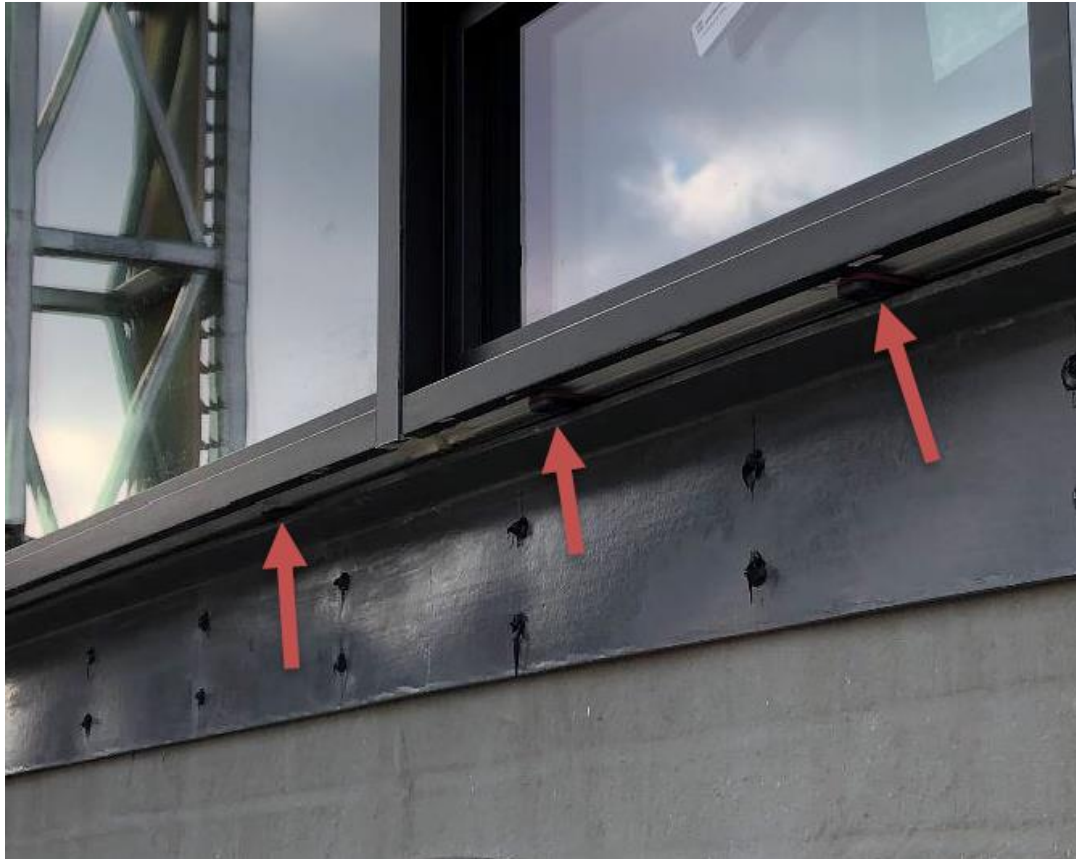


PROJECT TEAM

Architect: ERA Architects | Owner: CityHousing Hamilton | Construction Management: PCL Construction

Images courtesy of Intuitive / ERA Architects

KEN SOBLE TOWER



KEN SOBLE TOWER



KEN SOBLE TOWER

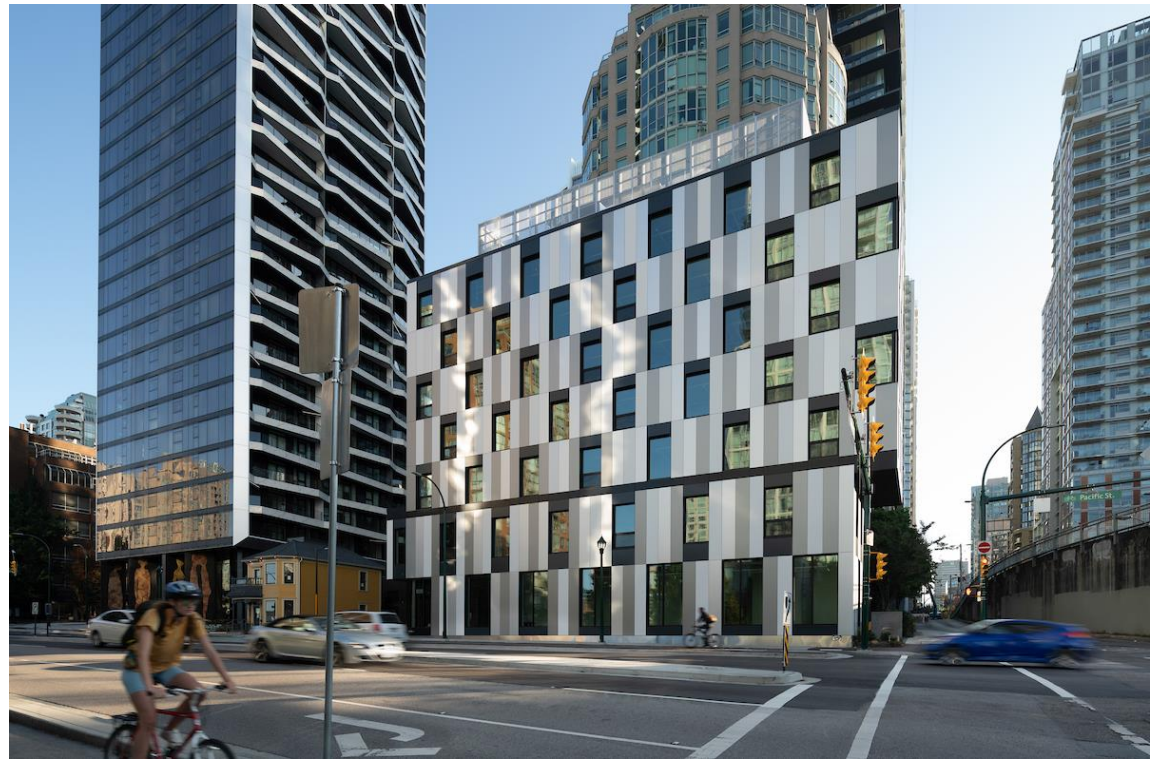


825 PACIFIC

- Vancouver, BC (new construction)
- **PH certified, inswing windows**
- Triple glazed windows (Two Low-E 366 / 180)



825 PACIFIC



PROJECT TEAM

Architect: IBI Group | Owner: City of Vancouver | Contractor: Ledcor | Consultant: Morrison Hershfield

Images courtesy of Cascadia Windows & Doors

SOUTHWESTERN OREGON COMMUNITY COLLEGE

- Umpqua Health & Science Building
- Coos Bay, OR (renovation)
- **Awning, hopper, fixed windows**
- Double glazed windows (Low-E 270)



SOUTHWESTERN OREGON COMMUNITY COLLEGE



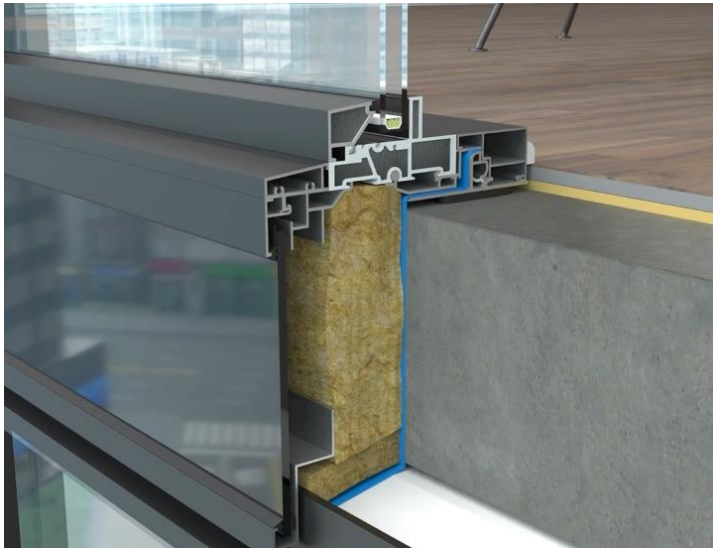
PROJECT TEAM

Architect: Opsis | Owner: Southwestern Oregon Community College | Contractor: Bogatay Construction

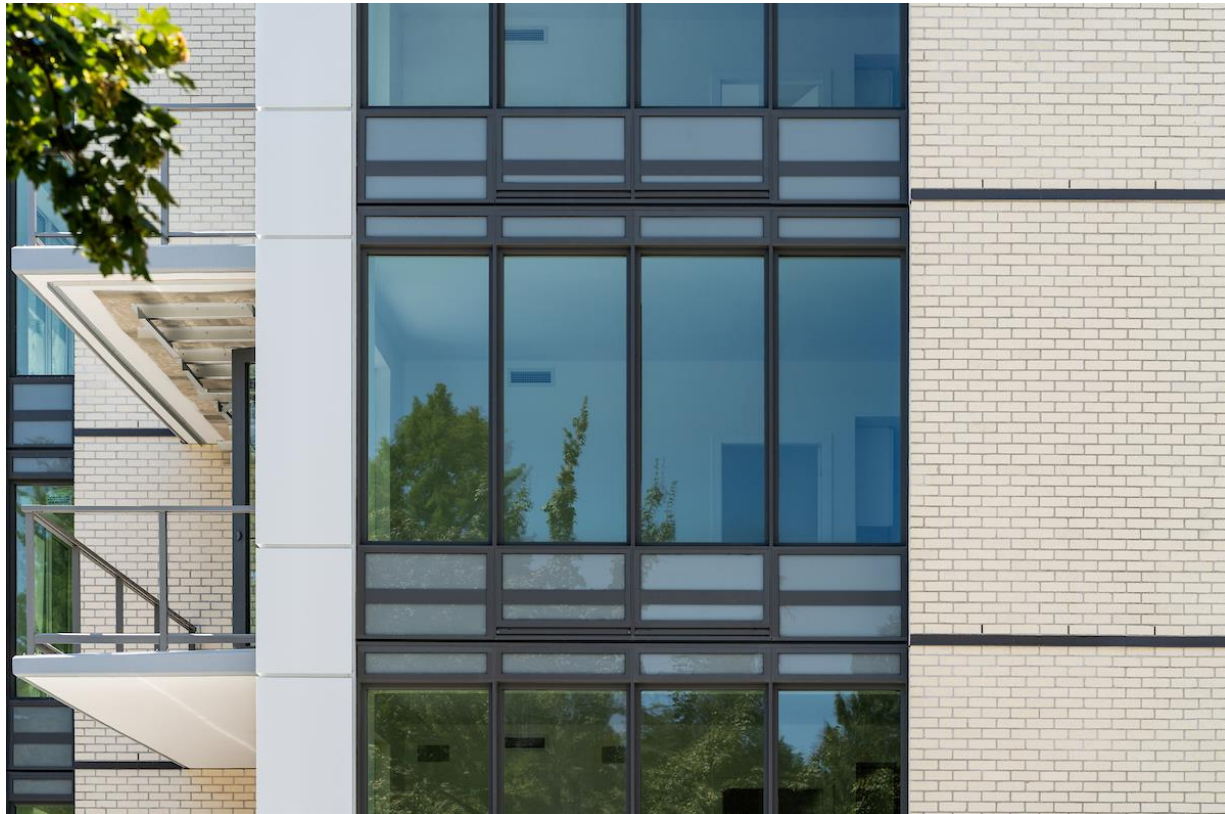
Images courtesy of Kamrin Nielsen

THE CHELSEA

- Vancouver, BC (new construction)
- **Window wall, sliding doors, swing doors**
- Double glazed windows (Low-E 366)



THE CHELSEA



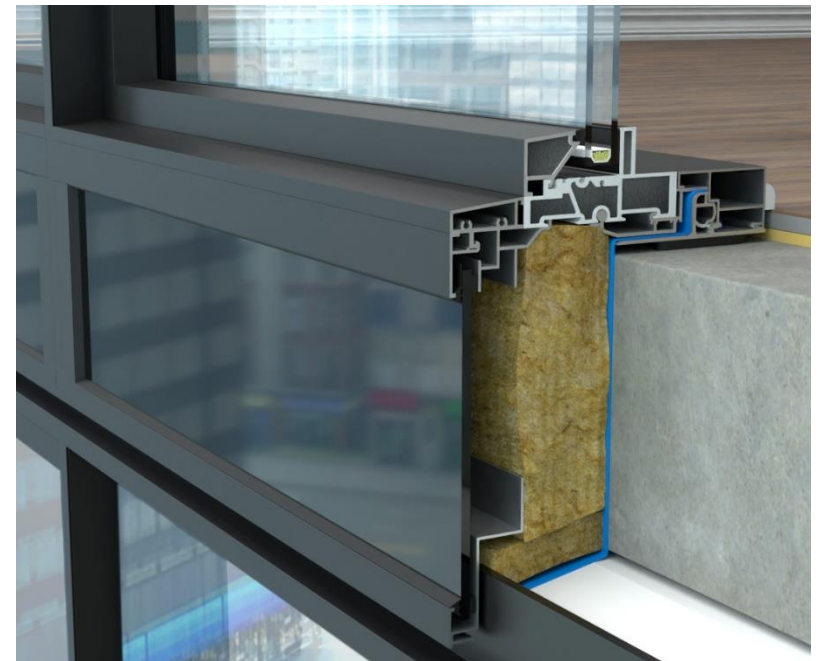
PROJECT TEAM

Architect: IBI Group | Owner: Cressey

A photograph of a modern building's exterior featuring large glass windows and dark frames. An orange semi-transparent banner is overlaid on the left side of the image.

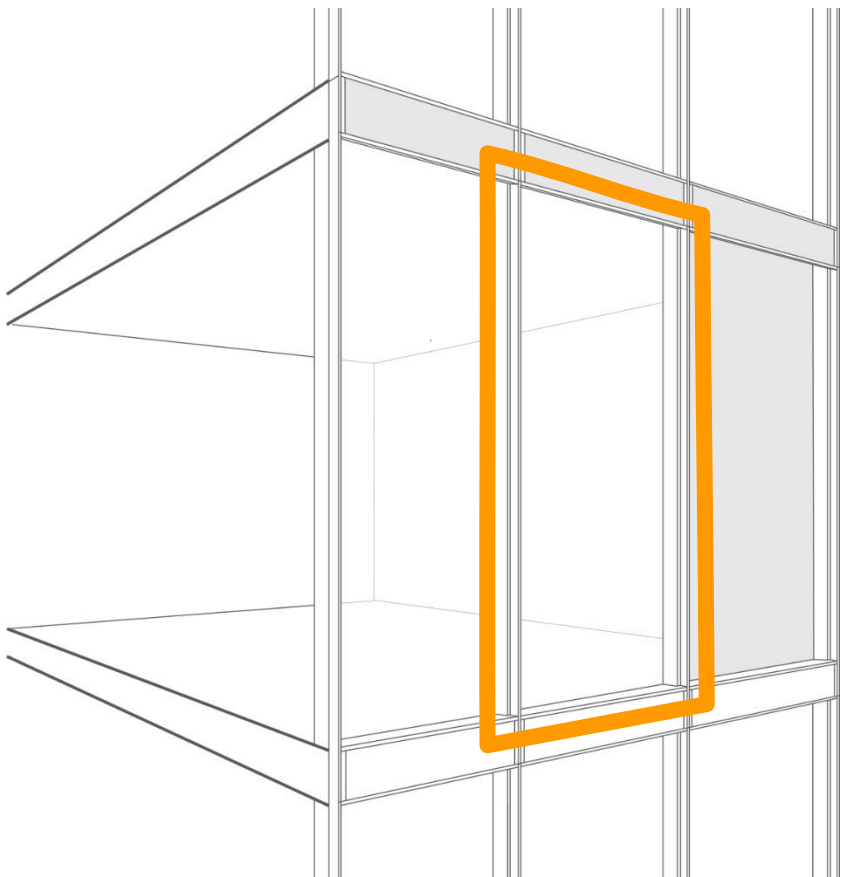
COMMERCIAL & HIGH-RISE GLAZING

WINDOW WALL



WINDOW WALL

VISION GLASS



R-4.1

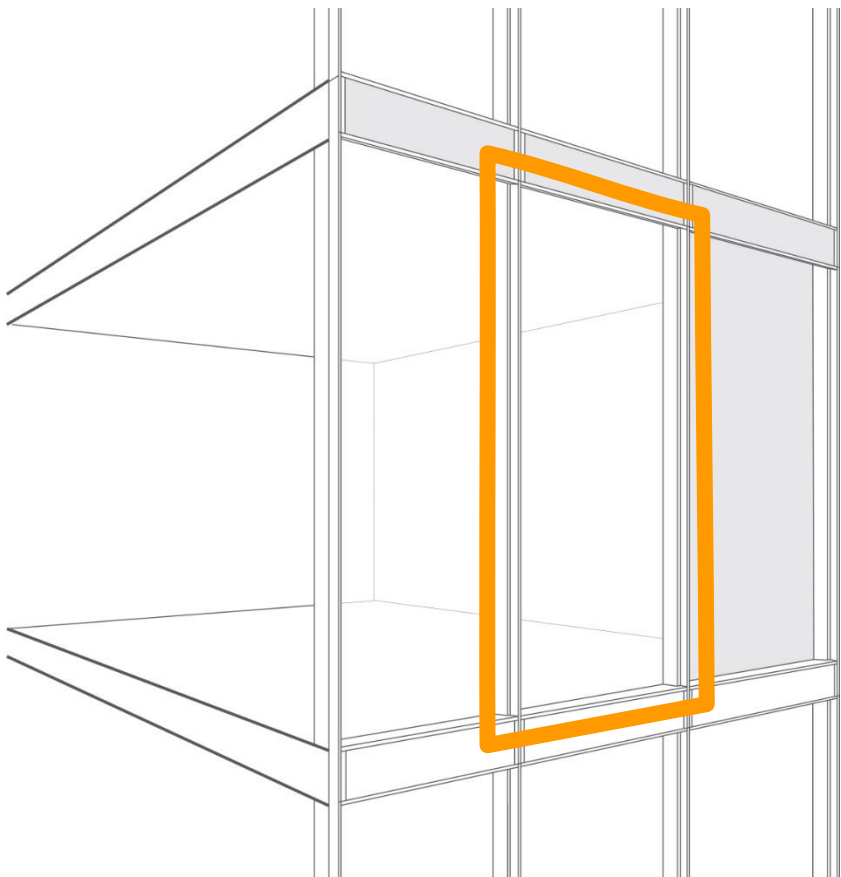
STANDARD DOUBLE GLAZING

R-5.1

PREMIUM DOUBLE GLAZING

WINDOW WALL

VISION GLASS



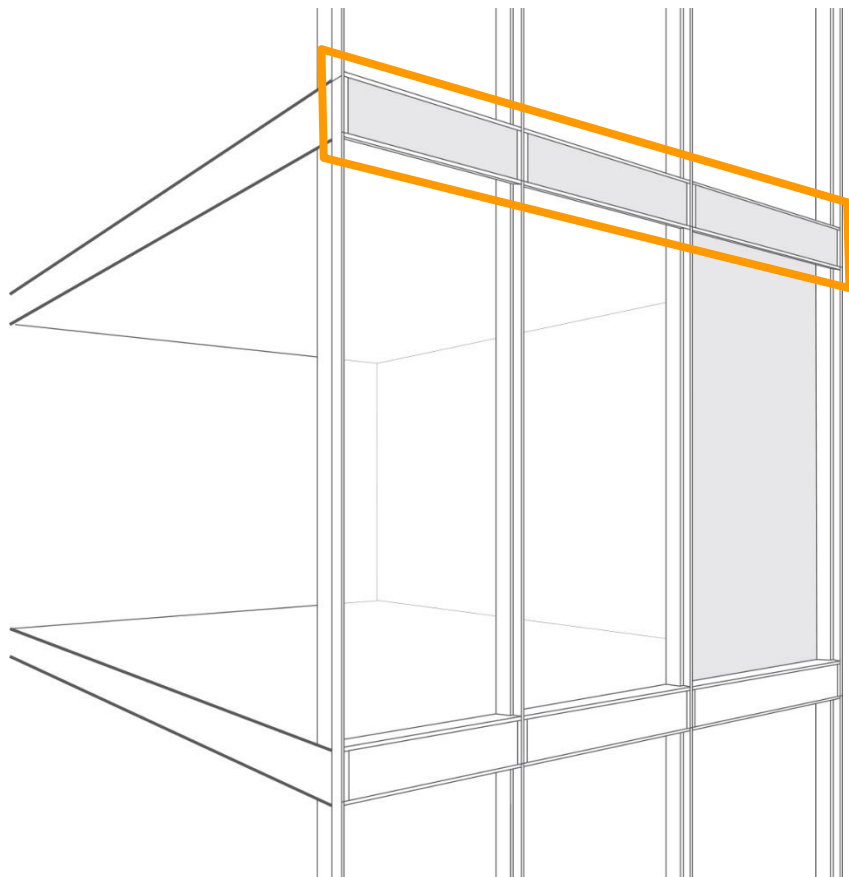
R-7.1

STANDARD TRIPLE GLAZING

R-7.7

PREMIUM TRIPLE GLAZING

WINDOW WALL



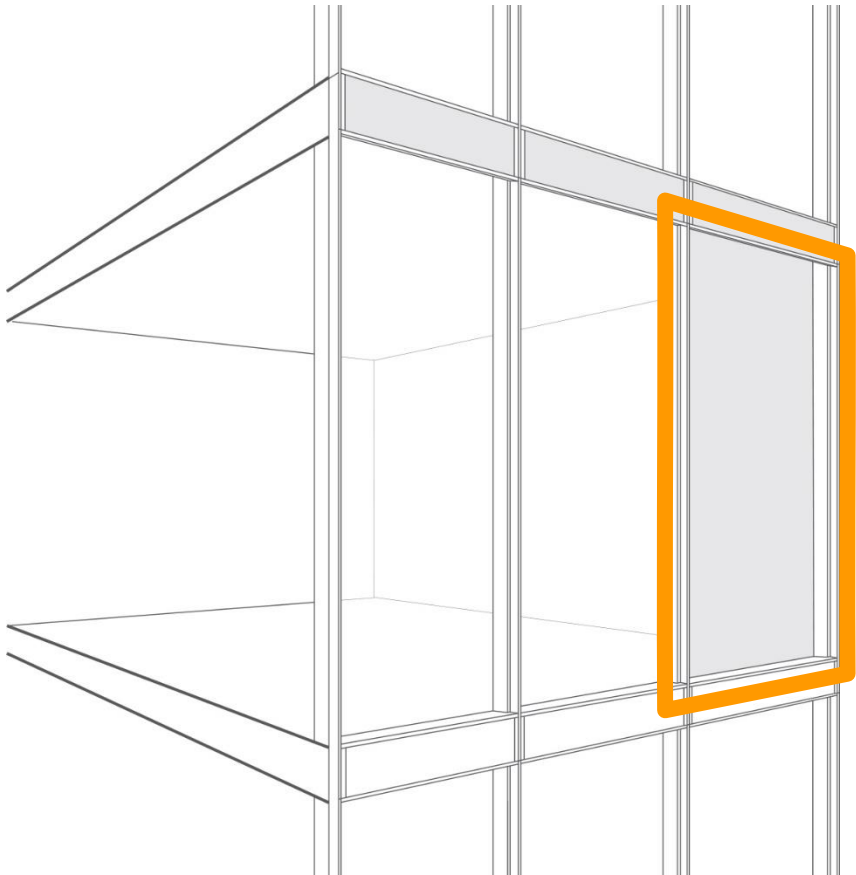
OPAQUE AREAS

R-8.1
SLAB BYPASS

WINDOW WALL

OPAQUE AREAS

R-16.2
METAL BACKPAN



MORE GLAZING AREA

ALUMINUM WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 35 kWh/m²
TEUI - 111 kWh/m²



FIBERGLASS WINDOW WALL

65%

WINDOW-TO-WALL RATIO

TEDI - 30 kWh/m²
TEUI - 109 kWh/m²



A low-angle photograph of a modern building with a grid of large windows. The building is light-colored, and the windows are dark-framed. The sky is a clear, pale blue. On the left side, there is a large orange rectangular overlay with a subtle geometric pattern.

KEY TAKE AWAYS



KEY TAKE AWAYS

WINDOWS HAVE HUGE IMPACT

Type | Location | Installation

Often the weakest link in a building's envelope, a little extra attention on windows can have large overall impact

PAY ATTENTION TO PRODUCT DETAILS

Material | Modeled vs Real-World

Ensure you're verifying general product details and performance within the context of your project

HIGH-PERFORMANCE = HIGH FLEXIBILITY

Line Items vs End Goal

Use a whole-building approach to the high-performance to save costs and increase project flexibility.

COMMON QUESTIONS



FREE WEBINARS FOR LEARNING CREDITS



PASSIVE HOUSE WINDOWS



FIBERGLASS THERMAL SPACER



BUILDING ENERGY PERFORMANCE STANDARDS

REGISTER AT [CASCADIAWINDOWS.COM/SUPPORT/WEBINARS](https://cascadiawindows.com/support/webinars)

OUR PRODUCTS



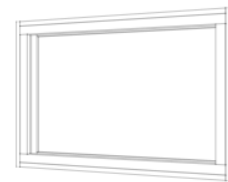
FIBERGLASS PUNCH & STRIP WINDOWS



OUR PRODUCTS



FIBERGLASS PUNCH & STRIP WINDOWS



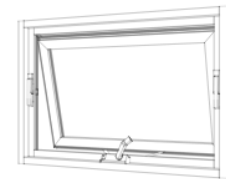
FIXED WINDOW



TILT & TURN



CASEMENT - INSWING & OUTSWING



AWNING



HOPPER

OUR PRODUCTS

FIBERGLASS SWING DOORS

INSWING & OUTSWING



OUR PRODUCTS

FIBERGLASS SLIDING DOORS

TILT & SLIDE + LIFT & SLIDE (COMING SOON!)



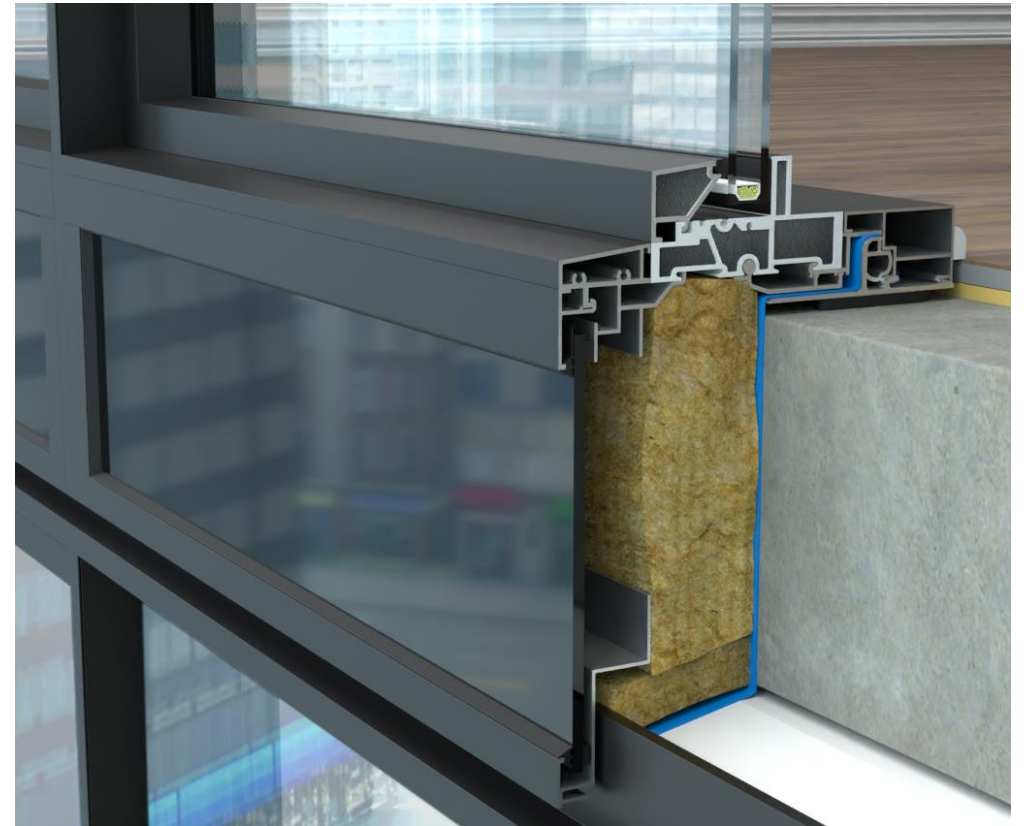
OUR PRODUCTS

FIBERGLASS STOREFRONT GLAZING



OUR PRODUCTS

FIBERGLASS WINDOW WALL



OUR PRODUCTS

FIBERGLASS THERMAL SPACER – CASCADIA CLIP®



DESIGN ACHIEVEMENTS

PASSIVE HOUSE – CERTIFIED & RECOGNIZED

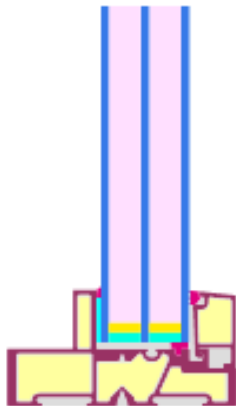


Report - Certified Passive House Component

Passive House Institute

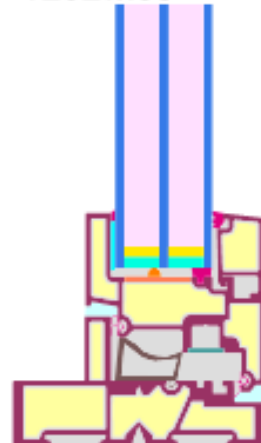
Window frame
Fensterrahmen

1256fx03



Window frame
Fensterrahmen

1202wi03



Sliding door
Schiebetüre


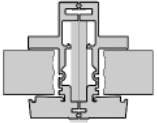
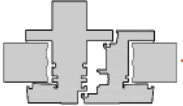
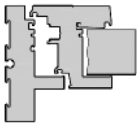


1260sl03

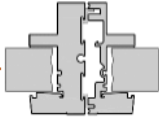
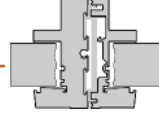

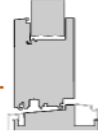
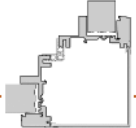
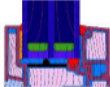


Entrance door
Eingangstür



ADDITIONAL PRODUCT PHI INFORMATION

UNREINFORCED MULLION		PG. 4
COUPLER WITH REINFORCEMENT		PG. 5
WINDOW SASH AND MULLION		PG. 6
WINDOW SASH OUTSWING WINDOW		PG. 7
DOOR TO WINDOW COUPLER		PG. 8
DOOR TO WINDOW COUPLER (REINFORCED)		PG. 9

FRAME AND COUPLER		PG. 10
FRAME AND COUPLER (REINFORCED)		PG. 11
DOOR SASH AND ASTRAGAL		PG. 12
OUTSWING DOOR SILL		PG. 13
CORNER POST		PG. 14
PSI VALUE MODELLING FOR STAINLESS STEEL SPACER IN TRIPLE GLAZED UNITS		PG. 15

CASCADIA WINDOWS & DOORS

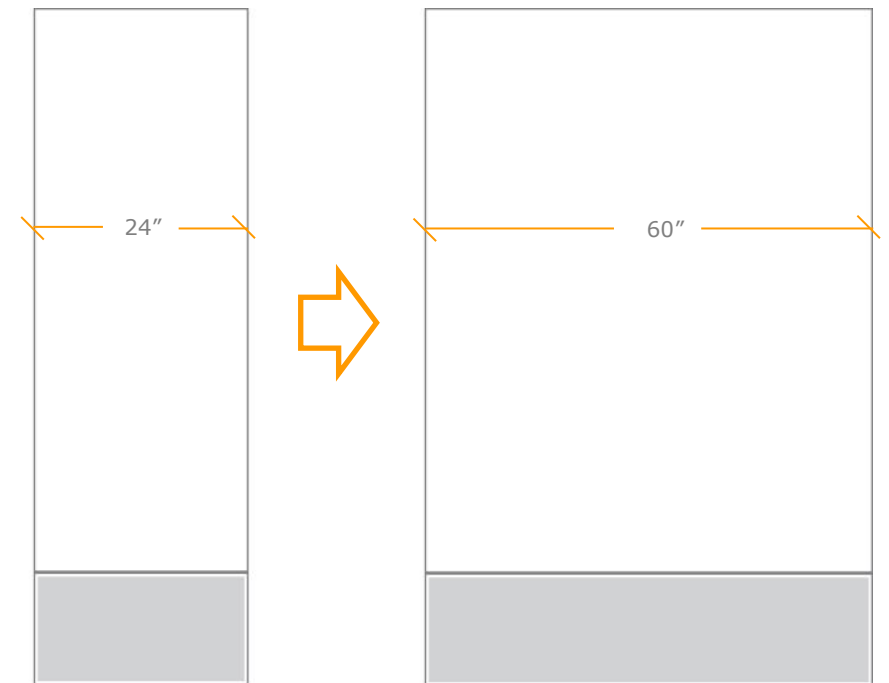
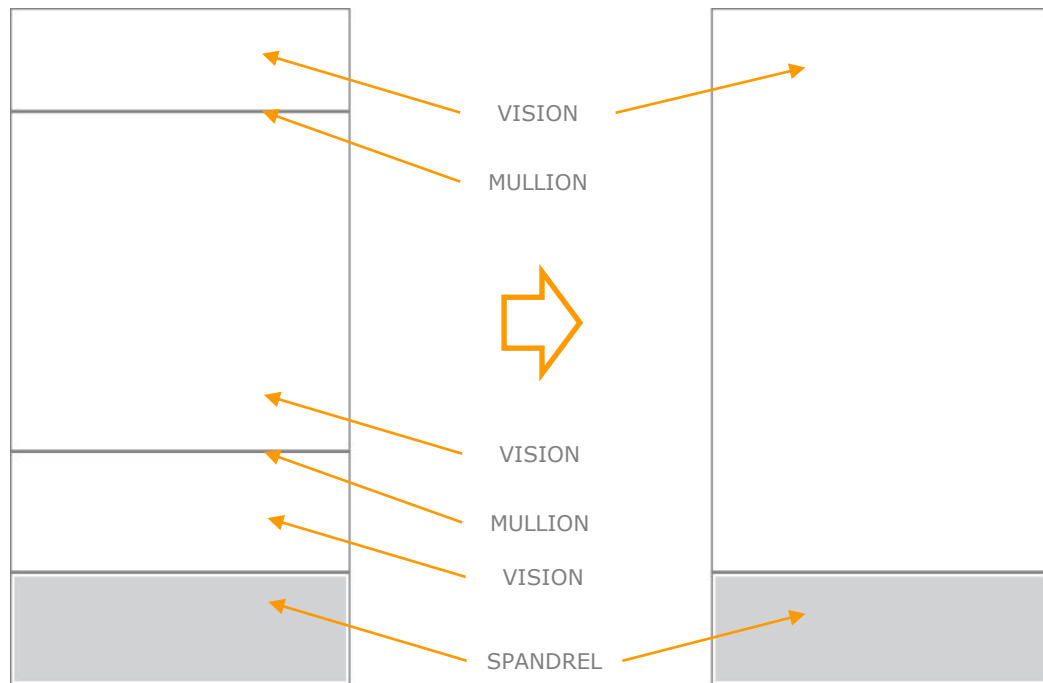
KEY AWARDS & CERTIFICATIONS

- Innovation & Aesthetics – Passive House International (China, 2019)
- CaGBC Green Building Product of the Year (2018)
- Most Innovative Product: Crystal Achievement Award – Window & Door Magazine (2017)
- Globe Environnemental Excellence: Technology Innovation & Application (2013)
- BC Export Award – (2012)
- Most Efficient Product – Energy Star 2021
- Declare Red List Free
- Passive House Institute & PHIUS certified



COMMON QUESTIONS

Cost savings options when designing window configurations?



COMMON QUESTIONS

What color options exist for fiberglass windows?

- Unlimited custom color options
- 10 standard colors
- AAMA 625 performance
- Dual color frames available
- Non-toxic, waterborne paint manufactured in North America

STANDARD WINDOW COLORS

Update 2020

 200 CASCADIA BLACK	 872 COMMERCIAL BROWN	 310 LIGHT GREY	 335 SLATE GREY	 303 ANTHRACITE
 173 CLAY	 341 CHAMPAGNE	 591 WINEBERRY	 511 LIGHTHOUSE RED	 102 RAINWARE WHITE

COMMON QUESTIONS

What's the relative cost compared to aluminum & vinyl windows?



PHOTO CREDIT: EUROLINE WINDOWS

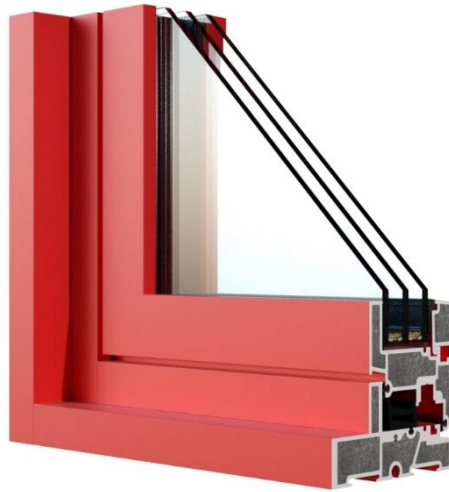


PHOTO CREDIT: CASCADIA WINDOWS & DOORS



PHOTO CREDIT: GLO EUROPEAN WINDOWS



CASCADIA

WINDOWS & DOORS

CASCADIAWINDOWS.COM