

Designing for Sustainability in the Glass & Glazing Industry

Course Number: **EL301a** | Thursday June 21, 2018 10:30am-11:30am

Course Number: **EL301b** | Thursday June 21, 2018 4:00pm-5:00pm

Course Number: **EL301c** | Friday, June 22, 2018 10:30am-11:30am

Learning Units: **1 HSW LU**

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Acknowledgements/Credits

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Speakers List



Jenelle Sams, PMP, LEED Green Associate

Sustainability Specialist
Kawneer Company, Inc.

Presentation(s):

- (EL301a) Designing for Sustainability in the Glass & Glazing Industry
6/21/2018 10:30 AM - 11:30 AM
- (EL301b) Designing for Sustainability in the Glass & Glazing Industry
6/21/2018 4:00 PM - 5:00 PM
- (EL301c) Designing for Sustainability in the Glass & Glazing Industry
6/22/2018 10:30 AM - 11:30 AM



Donnie Hunter

Director of Global Product Management,
Kawneer Company, Inc.

Course / Learning Objectives

- Learn how a framing system's energy performance impacts whole-building sustainability performance.
- Understand how architectural aluminum-framing systems can be used to create a sustainable green building regardless of the certification.
- Evaluate strategies for daylighting, views, shading, and sound transmission in relation to their impact on sustainability performance.
- Explore the human health benefits of utilizing aluminum framing systems.

Designing for Sustainability

Architectural aluminum-framing systems can be used to create a high-performance sustainable building.

Three main characteristics that impact whole-building performance:

- Energy Efficiency
- Material Utilization
- Occupant Wellbeing



Green Building Certifications

LEED® v4 BD+C

LBC v3.1

WELL v1.0

CHPS

Energy Efficiency

1. Optimizing Performance
2. Incorporating Renewables



Lindsey-Flanigan Courthouse
LEED® Gold

Green Building Certifications	Category
LEED v4 BD+C	Energy & Atmosphere
LBC v3.1	Energy Petal
WELL v1.0	X
CHPS	Energy

Energy Efficiency

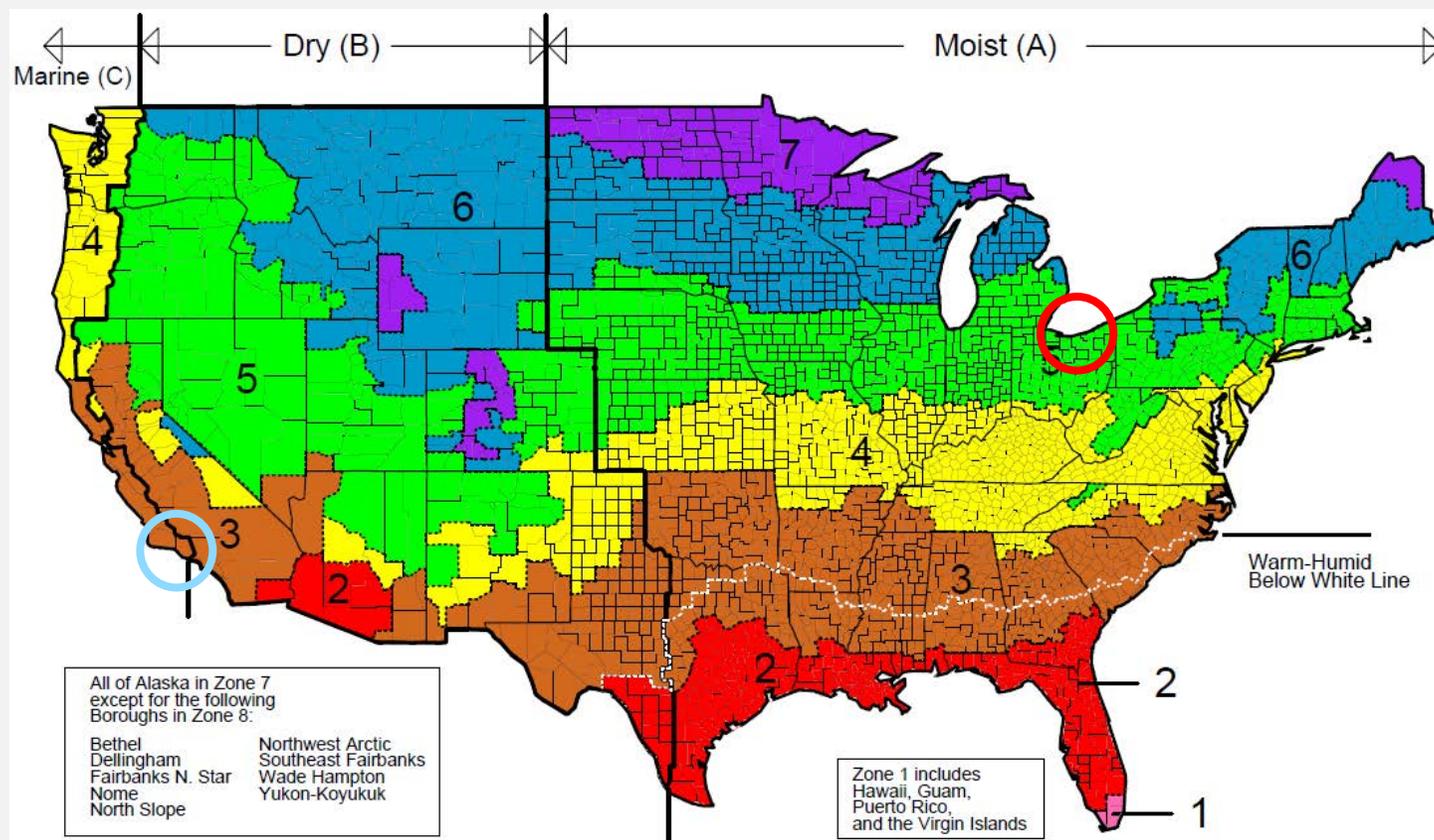
1. Optimizing Performance

- Establish baseline energy model
- ANSI/ASHRAE/IESNA 90.1

2. Incorporating Renewables

Green Building Certifications	Category
LEED v4 BD+C	•EA - Optimize Energy Performance
LBC v3.1	•Imperative 06 - Net Positive Energy
WELL v1.0	X
CHPS	•EE 1.0 Energy Performance •EE1.1 Superior Energy Performance

Energy Efficiency



Energy Efficiency

	Los Angeles				Cleveland				
Climate Zone	1	2	3	4 except Marine	5 and Marine 4	6	7	8	
Nonmetal framing	1.20	0.75	0.65	0.40	0.35	0.35	0.35	0.35	ASHRAE 90.1-2010
	0.50	0.40	0.35	0.35	0.32	0.32	0.32	0.32	ASHRAE 90.1-2013
	IECC removed separate nonmetal category – now same as metal framing fixed or operable								2012 IECC
Metal framing, fixed	1.20	0.70	0.60	0.50	0.45	0.45	0.40	0.40	ASHRAE 90.1-2010
	0.57	0.57	0.50	0.42	0.42	0.42	0.38	0.38	ASHRAE 90.1-2013
	0.50	0.50	0.46	0.38	0.38	0.36	0.29	0.29	2012 IECC
Metal framing, operable	1.20	0.75	0.65	0.55	0.55	0.55	0.45	0.45	ASHRAE 90.1-2010
	0.65	0.65	0.60	0.50	0.50	0.50	0.40	0.40	ASHRAE 90.1-2013
	0.65	0.65	0.60	0.45	0.45	0.43	0.37	0.37	2012 IECC
Metal framing, entrance door	1.20	1.10	0.90	0.85	0.80	0.80	0.80	0.80	ASHRAE 90.1-2010
	1.10	0.83	0.77	0.77	0.77	0.77	0.77	0.77	ASHRAE 90.1-2013
	1.10	0.83	0.77	0.77	0.77	0.77	0.77	0.77	2012 IECC

Energy Efficiency



Three Methods Of Heat Transfer:

1. **Conduction:** Molecule to Molecule
2. **Convection:** Via Rotation
3. **Radiation:** Electromagnetic Waves

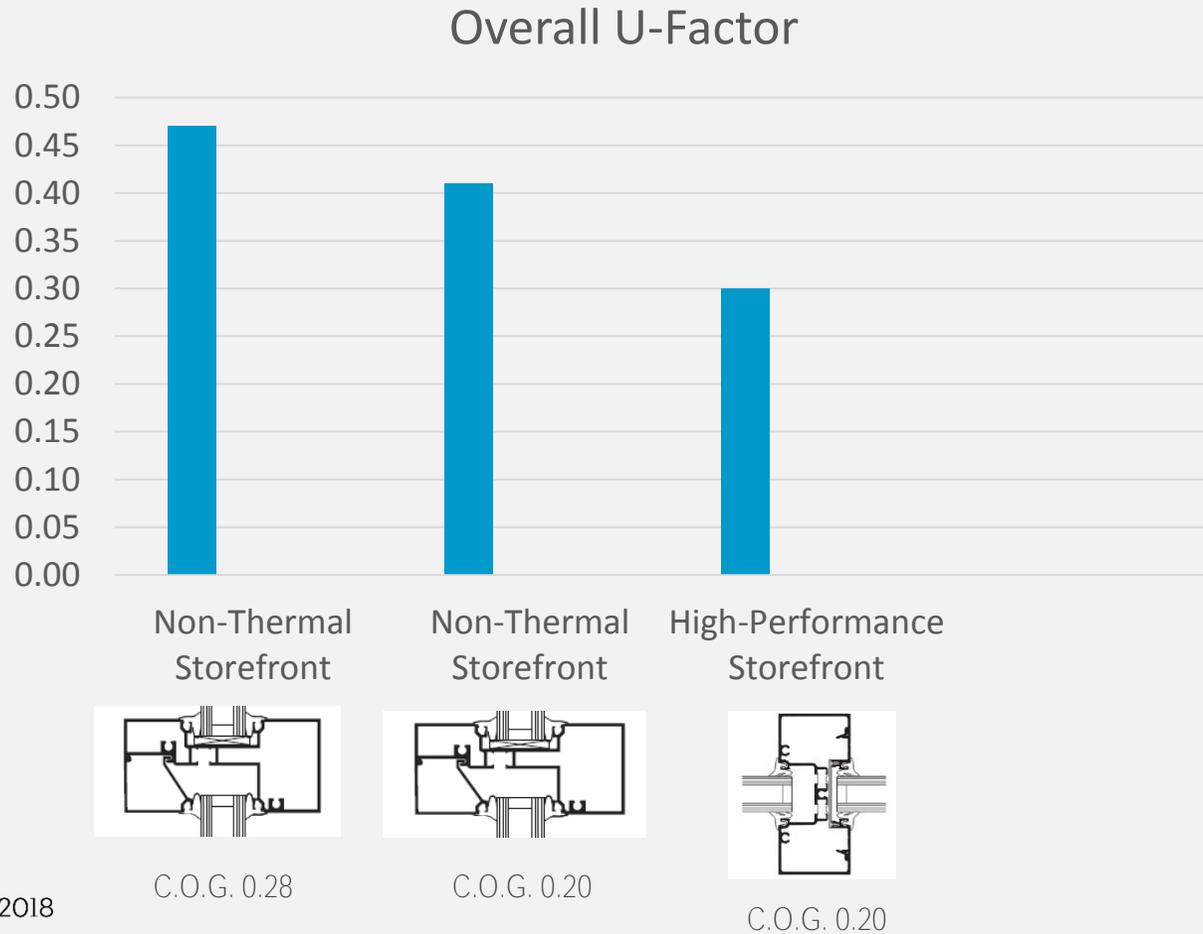
Energy Efficiency



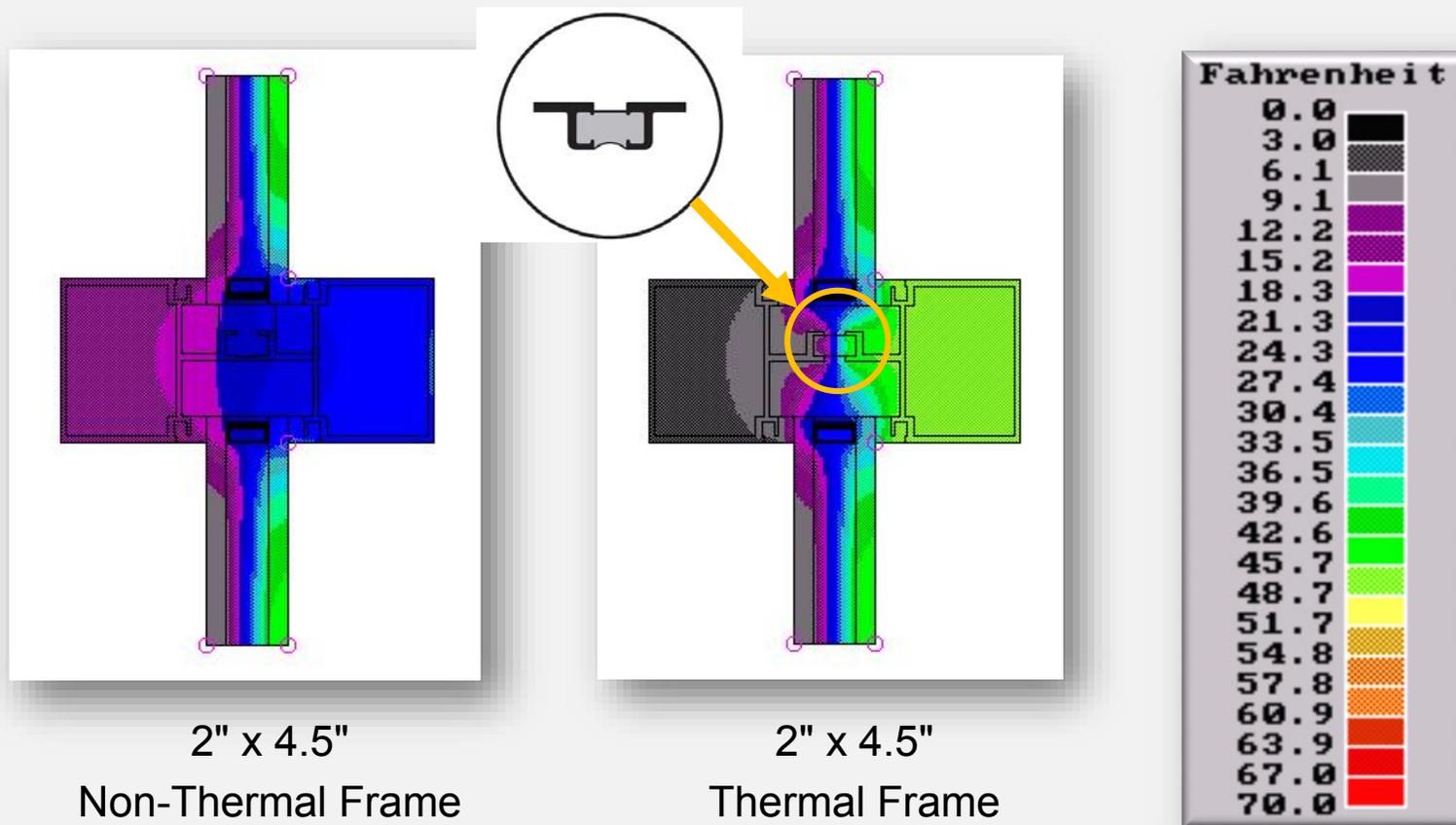
Three Methods Of Heat Transfer:

- 1. Conduction:** Molecule to Molecule
- 2. Convection:** Via Rotation
- 3. Radiation:** Electromagnetic Waves

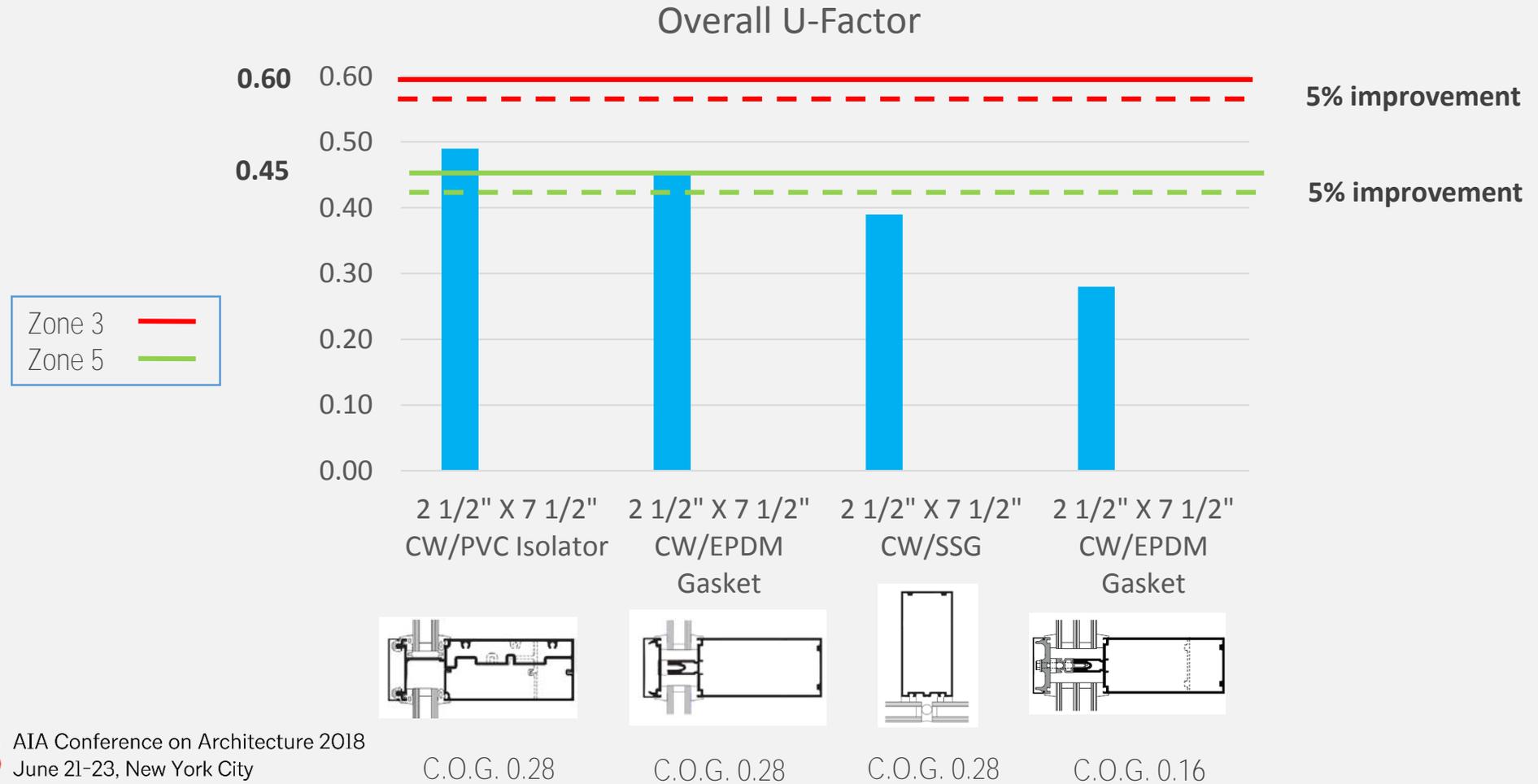
Energy Efficiency



Energy Efficiency



Energy Efficiency



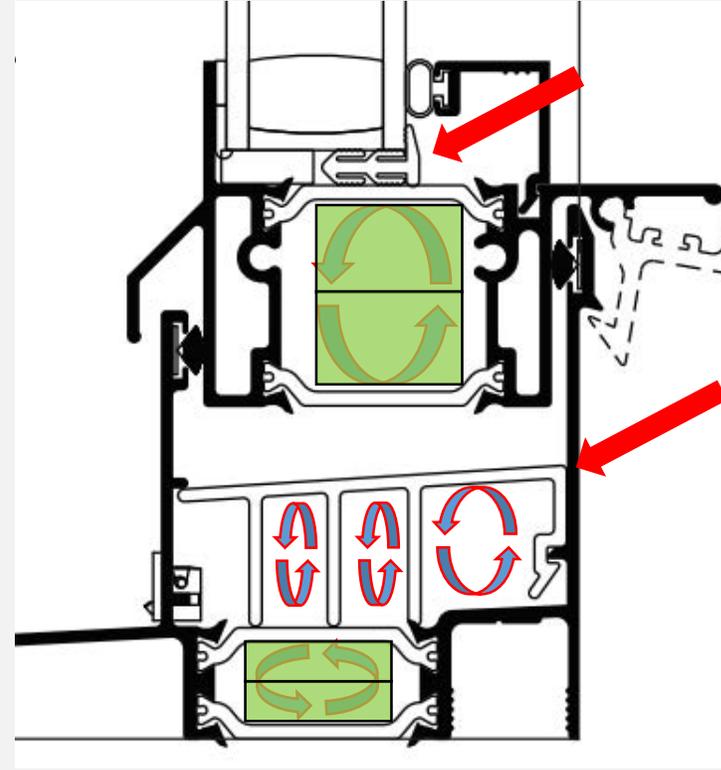
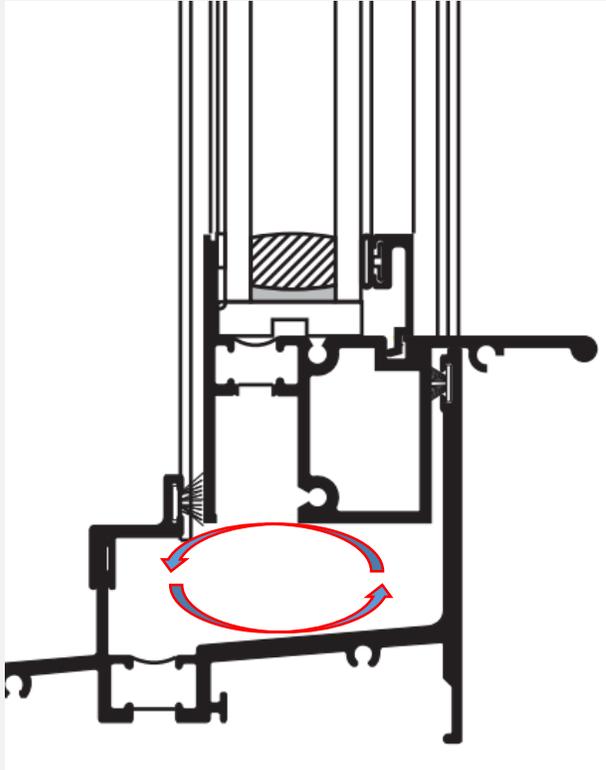
Energy Efficiency



Three Methods Of Heat Transfer:

1. **Conduction:** Molecule to Molecule
2. **Convection:** Via Rotation
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Energy Efficiency



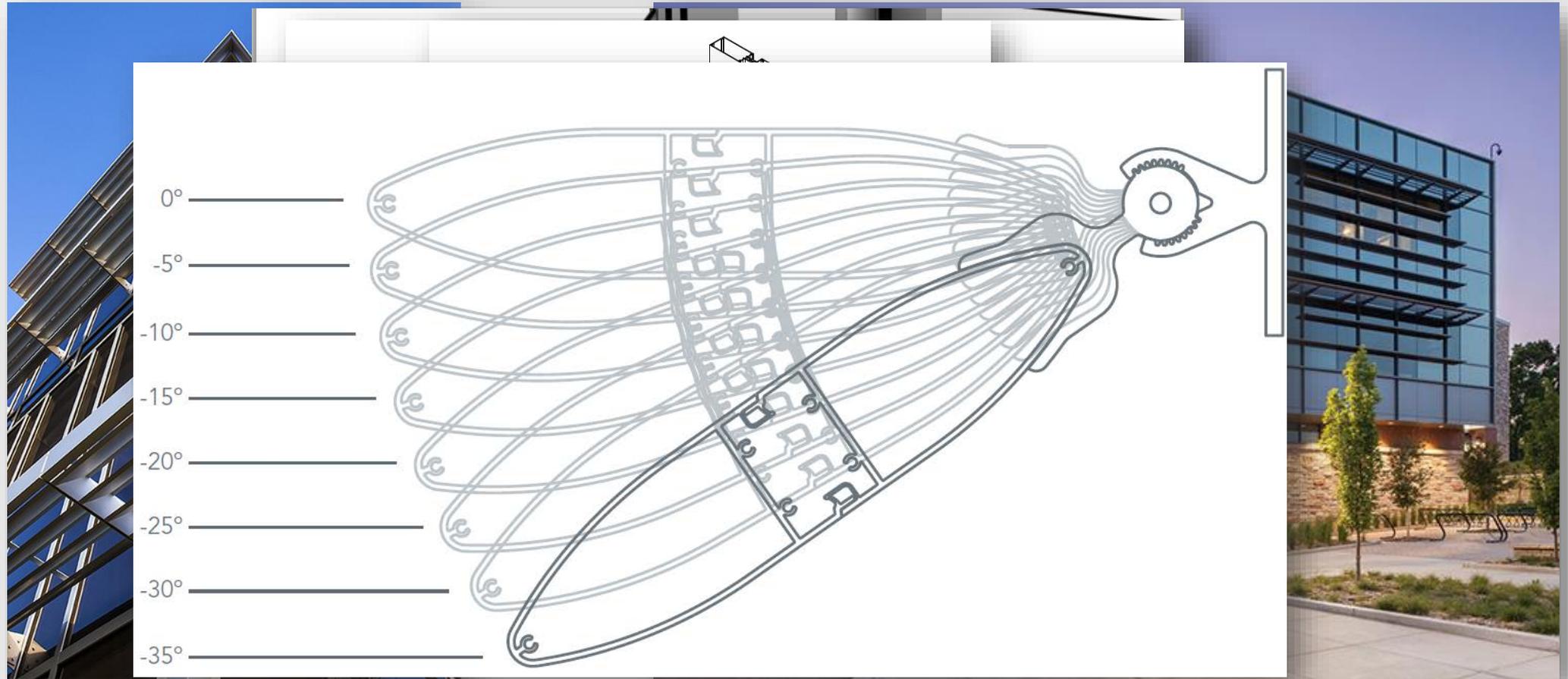
Energy Efficiency



Three Methods Of Heat Transfer:

1. **Conduction:** Molecule to Molecule
2. **Convection:** Via Rotation
3. **Radiation:** Electromagnetic Waves

Energy Efficiency



Energy Efficiency

10' Curtain Wall in Denver

Scenario #1:

30" Projecting Sun Shade
12" Below Head

Scenario #2:

36" Projecting Sun Shade
12" Below Head

Unit System: **US unit** ▼

Room Dimensions and Orientation:
Facade Orientation: **South** ▼
Room Height: **15** ft
Room Fenestration Width: **50** ft
Room Depth: **30** ft

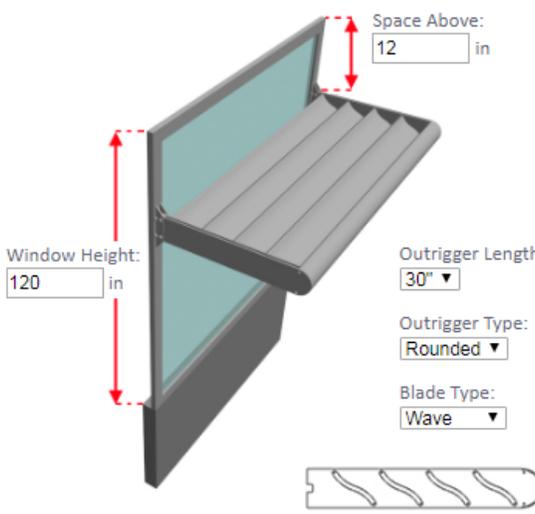
Location:
State/Province: **CO** ▼
City: **Denver Intl Ap** ▼

Glazing Properties:
Glazing System SHGC: **0.26** ▼
Glazing System U-factor: **0.28** ▼ Btu/h-ft²·°F
Glazing System VT: **0.64** ▼

Scenario 1

Shading Type: **Outrigger System** ▼
Facade Framing: **Curtain Wall** ▼
Frame Type: **1600 SS** ▼
Glass Percentage: **0.88** ▼

With Lightshelf?



Space Above: **12** in

Window Height: **120** in

Outrigger Length: **30"** ▼

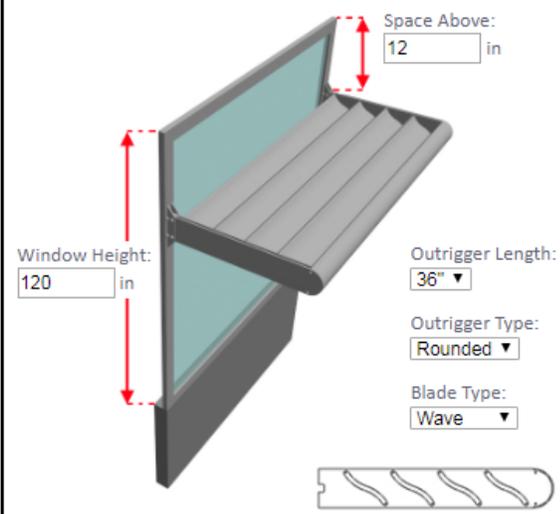
Outrigger Type: **Rounded** ▼

Blade Type: **Wave** ▼

Scenario 2

Shading Type: **Outrigger System** ▼
Facade Framing: **Curtain Wall** ▼
Frame Type: **1600 SS** ▼
Glass Percentage: **0.88** ▼

With Lightshelf?



Space Above: **12** in

Window Height: **120** in

Outrigger Length: **36"** ▼

Outrigger Type: **Rounded** ▼

Blade Type: **Wave** ▼

Energy Efficiency

10' Curtain Wall in Key West

Scenario #1:

30" Projecting Sun Shade
12" Below Head

Scenario #2:

36" Projecting Sun Shade
12" Below Head

Unit System: **US unit** ▼

Room Dimensions and Orientation:
Facade Orientation: **South** ▼
Room Height: **15** ft
Room Fenestration Width: **50** ft
Room Depth: **30** ft

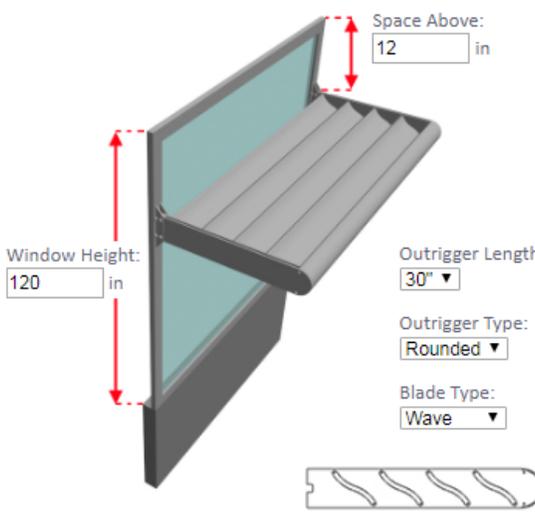
Location:
State/Province: **FL** ▼
City: **Key West Nas** ▼

Glazing Properties:
Glazing System SHGC: **0.26** ▼
Glazing System U-factor: **0.28** ▼ Btu/h-ft²·°F
Glazing System VT: **0.64** ▼

Scenario 1

Shading Type: **Outrigger System** ▼
Facade Framing: **Curtain Wall** ▼
Frame Type: **1600 SS** ▼
Glass Percentage: **0.88** ▼

With Lightshelf?



Space Above: **12** in

Window Height: **120** in

Outrigger Length: **30"** ▼

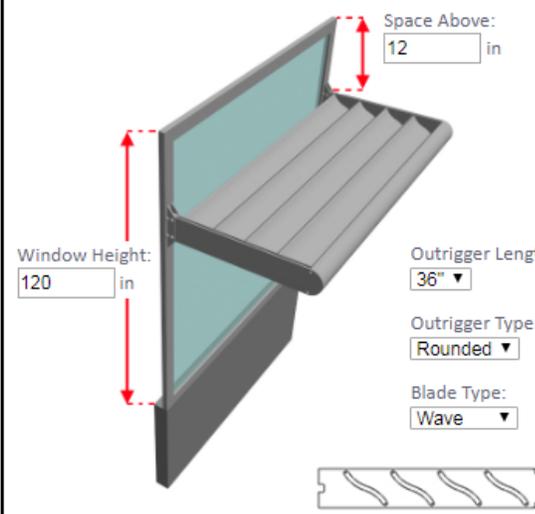
Outrigger Type: **Rounded** ▼

Blade Type: **Wave** ▼

Scenario 2

Shading Type: **Outrigger System** ▼
Facade Framing: **Curtain Wall** ▼
Frame Type: **1600 SS** ▼
Glass Percentage: **0.88** ▼

With Lightshelf?



Space Above: **12** in

Window Height: **120** in

Outrigger Length: **36"** ▼

Outrigger Type: **Rounded** ▼

Blade Type: **Wave** ▼

Energy Efficiency

10' Curtain Wall in Denver

Scenario #1:

30" Projecting Sun Shade

12" Below Head

Scenario #2:

42" Projecting Power Shade

12" Below Head

Unit System: **US unit** ▼

Room Dimensions and Orientation:
Facade Orientation: **South** ▼
Room Height: **15** ft
Room Fenestration Width: **50** ft
Room Depth: **30** ft

Location:
State/Province: **CO** ▼
City: **Denver Intl Ap** ▼

Glazing Properties:
Glazing System SHGC: **0.26** ▼
Glazing System U-factor: **0.28** ▼ Btu/h·ft²·°F
Glazing System VT: **0.64** ▼

Scenario 1

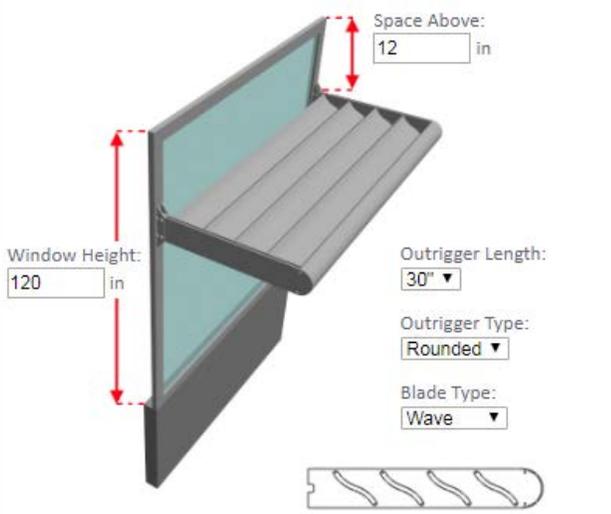
Shading Type: **Outrigger System** ▼

Facade Framing: **Curtain Wall** ▼

Frame Type: **1600 SS** ▼

Glass Percentage: **0.88** ▼

With Lightshelf?



Space Above: **12** in

Window Height: **120** in

Outrigger Length: **30"** ▼

Outrigger Type: **Rounded** ▼

Blade Type: **Wave** ▼

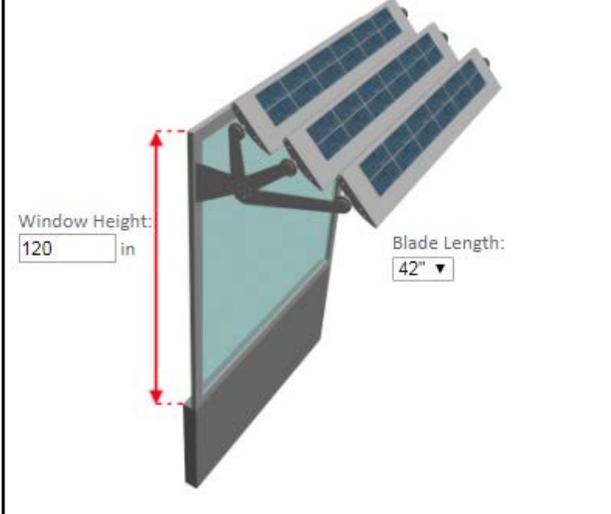
Scenario 2

Shading Type: **Power Shade System** ▼

Facade Framing: **Curtain Wall** ▼

Frame Type: **1600 System 1** ▼

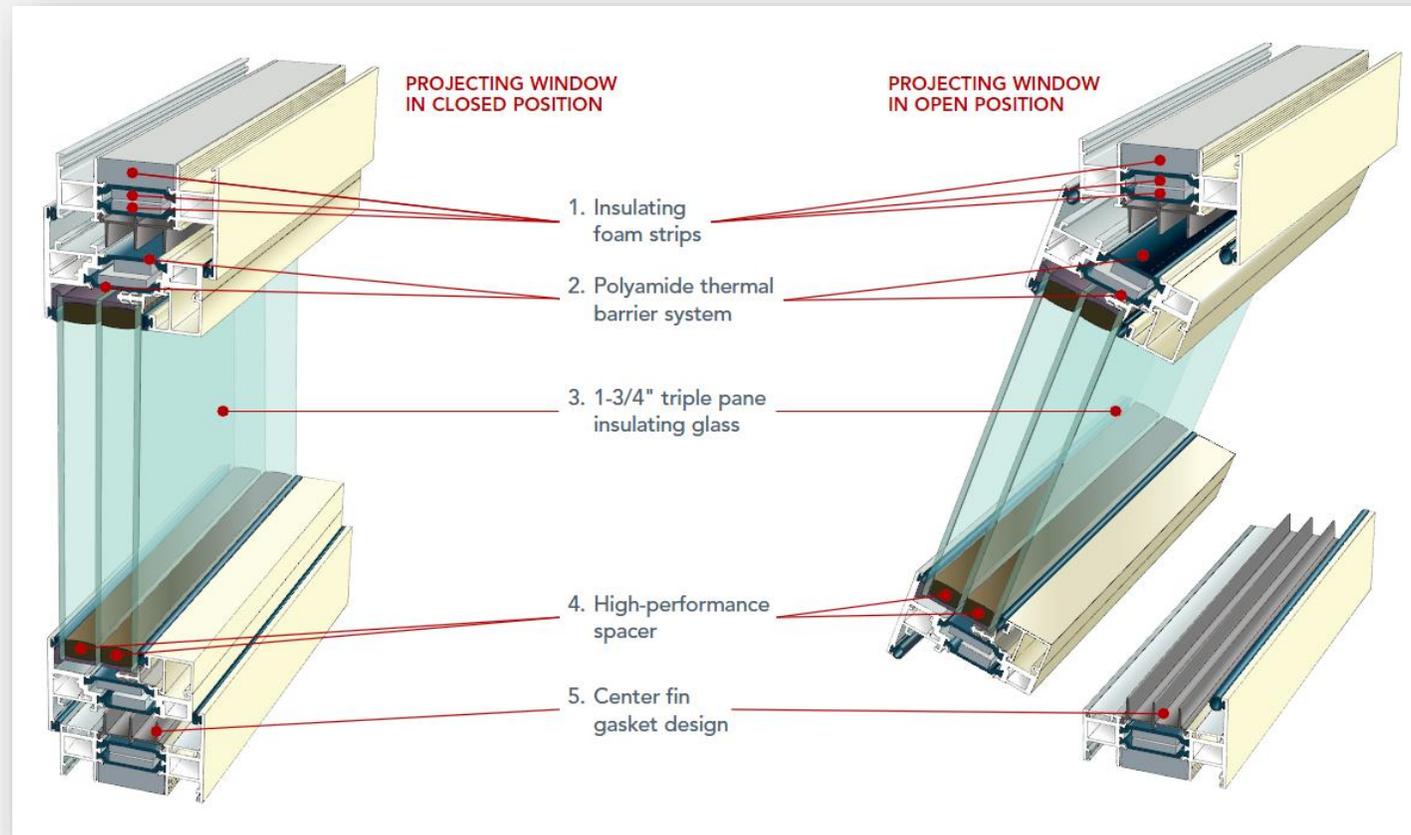
Glass Percentage: **0.88** ▼



Window Height: **120** in

Blade Length: **42"** ▼

Energy Efficiency



Energy Efficiency

1. Optimizing Performance
2. Incorporating Renewables
- BIPV

Green Building Certifications	Category
LEED v4 BD+C	•EA - Renewable Energy Production
LBC v3.1	•Imperative 06 - Net Positive Energy
WELL v1.0	X
CHPS	•EE 2.1 Zero Net Energy (ZNE) Bonus

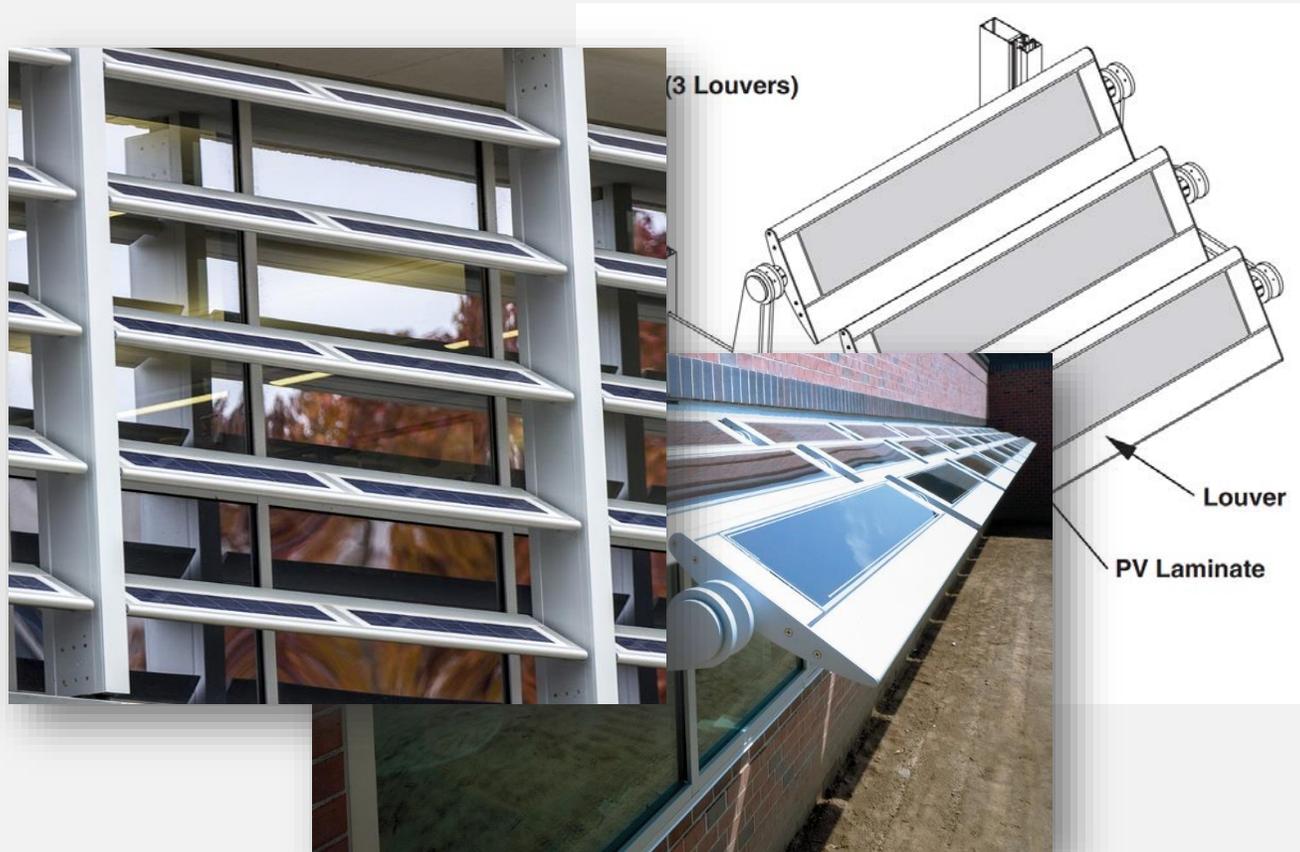
Energy Efficiency



Aluminum Frames used as a Platform for Building Integrated Photovoltaics



Energy Efficiency



Aluminum Frames used as a Platform
for Building Integrated Photovoltaics



Material Utilization

1. Environmental Impact
2. Circular Economy
3. Responsible Production

Green Building Certifications	Category
LEED v4 BD+C	Materials & Resources
LBC v3.1	Materials Petal
WELL v1.0	Air Mind
CHPS	Materials & Waste Management

Material Utilization

1. Environmental Impact
 - Environmental Product Declarations (EPDs)
2. Circular Economy
3. Responsible Production

Green Building Certifications	Category
LEED v4 BD+C	•MR BPDO – Environmental Product Declarations
LBC v3.1	X
WELL v1.0	X
CHPS	•MW 7.1 Multi-Attribute Material Selection

Material Utilization



EPD Transparency Summary

COMPANY NAME [REDACTED]

PRODUCT TYPE ALUMINUM STOREFRONT FRAMING SYSTEMS

PRODUCT NAME TRIFAB™ FRAMING SYSTEMS AND STOREFRONT FRAMING SYSTEMS

PRODUCT DEFINITION The Kanewer Trifab™ Framing System platform and Storefront Framing Systems are designed to add increased thermal performance and value. The Trifab™ Framing System platform and Storefront Framing Systems give you more flexibility, more thermal options, and more design choices and are flexible enough for a wide range of building projects.

PRODUCT CATEGORY RULE (PCR) Earthcare, "Cradle to Gate Window Product Category Rule, September 2015.

CERTIFICATION PERIOD November 16, 2015 - November 16, 2020

DECLARATION NUMBER 47868332121.104.1



LIFECYCLE IMPACT CATEGORIES

The environmental impacts listed below were assessed throughout the product's lifecycle – including raw material extraction, transportation, manufacturing, packaging, use, and disposal at end of life.

	ATMOSPHERE		WATER		EARTH		
							
	Global Warming Potential refers to long-term changes in global weather patterns – including temperature and precipitation – that are caused by increased concentrations of greenhouse gases in the atmosphere.	Ozone Depletion Potential is the destruction of the stratospheric ozone layer, which shields the earth from ultraviolet radiation that's harmful to life, caused by human-made air pollution.	Photochemical Ozone Creation Potential happens when sunlight reacts with hydrocarbons, nitrogen oxides, and volatile organic compounds, to produce a type of air pollution known as smog.	Acidification Potential is the result of human-made emissions and refers to the decrease in pH and increase in acidity of oceans, lakes, rivers, and streams – a phenomenon that pollutes groundwater and harms aquatic life.	Eutrophication Potential occurs when excessive nutrients cause increased algae growth in lakes, blocking the underwater penetration of sunlight needed to produce oxygen and resulting in the loss of aquatic life.	Depletion of Abiotic Resources (Elements) refers to the reduction of available non-renewable resources, such as metals and gases, that are found on the periodic table of elements, due to human activity.	Depletion of Abiotic Resources (Fossil Fuels) refers to the decreasing availability of non-renewable carbon-based compounds, such as oil and coal, due to human activity.
ENV. IMPACT	1.77E+02 kg CO2 equivalent	4.36E-08 kg CFC-11 equivalent	9.04E+00 kg CO2 equivalent	1.09E+00 kg SO2 equivalent	2.80E-02 kg N equivalent	NA	
ENV. LIMIT							
FUNCTIONAL UNIT	per 1m2, Manufacturing impact (cradle to gate)						

Environment

ATMOSPHERE





WATER




EARTH




Material Utilization

1. Environmental Impact
2. Circular Economy
 - Sourcing
 - Waste Minimization
3. Responsible Production

Green Building Certifications	Category
LEED v4 BD+C	<ul style="list-style-type: none">•MR BPDO – Sourcing of Raw Materials•MR Construction and Demolition Waste Mgmt.
LBC v3.1	<ul style="list-style-type: none">•Living Economy Sourcing (Imp 13)•Net Positive Waste (Imp 14)
WELL v1.0	X
CHPS	<ul style="list-style-type: none">•MW 2.1 Construction Site Waste Management•MW 3.1 Single Attribute Recycled Content

Material Utilization



LEED Materials Reporting Form
 The LEED Green Building Rating System (LEED v4) and Building Materials (MR, Credit 5)

Project Name: Redwood City Transit Center
 Project Location: Redwood, NJ
 Date Prepared: 11 August 2016

Customer: ABC Green Company
 Prepared By: Jane Doe

Product	ISO #	Manufacturer	Product Code (USG Hocking Table)	Total Product Weight (lbs)	Recycled Content (%)	Manufacturer's Recycled Content (%)	Manufacturer's Location (City, State)	Product Recycled (%)
ANSWER ETRIMMER	12345	ANSWER COMPANY, INC.	1234	1000	100	100	SPRINGFIELD, AR	100
ANSWER ETRIMMER	54321	ANSWER COMPANY, INC.	5432	2000	50	50	CHICAGO, IL	50
ANSWER ETRIMMER	98765	ANSWER COMPANY, INC.	9876	3000	20	20	MEMPHIS, TN	20

Notes:
 1. Manufacturer and Product Name must be listed in the LEED Green Building Rating System (LEED v4) Green Building Reference Manual, 2009 Edition.
 2. Rate of Recycled Content must be the location of the material, not the primary recycled content source.
 3. Rate of Recycled Content must be the percentage of material, whether recycled or virgin, in the product.

Manufacturer's Certification:
 The undersigned does hereby certify that the material information contained herein is an accurate representation of the material provided by Answer Company, Inc.

Signature of Manufacturer Representative: _____

The LEED green building rating system – developed and administered by the U.S. Green Building Council, a Washington, D.C.-based, nonprofit coalition of building industry leaders – is designed to promote design and construction practices that increase profitability while reducing the negative environmental impacts of building and improving occupant health and well-being.

FORM 603
 AUGUST 2016
 EC 99000-010

Recycled Content = Post-Consumer + Pre-Consumer

2

Material Utilization



***Unitized Systems:
Fabricated off-site and
delivered in pre-
assembled modules***

Material Utilization



Material Utilization

1. Environmental Impact
2. Circular Economy
3. Responsible Production
 - Corporate Responsibility
 - Product Health

Green Building Certifications	Category
LEED v4 BD+C	<ul style="list-style-type: none">•MR BPDO – Material Ingredients•MR PBT Source Reduction
LBC v3.1	<ul style="list-style-type: none">•Red List (Imp 10)•Responsible Industry (Imp 12)
WELL v1.0	<ul style="list-style-type: none">•01 Air Quality Standards•04 VOC Reduction•25 Toxic Material Reduction•26 Enhanced Material Safety•97 Material Transparency•98 Organizational Transparency
CHPS	<ul style="list-style-type: none">•MW 10.1 Health Product Related Information

Material Utilization



Material Utilization

CRADLE TO CRADLE PRODUCTS INNOVATION INSTITUTE

Material Health SILVER

1600 Wall System™ 1 Curtain Wall and System™ 2 Curtain Wall

EXPIRES 13 November 2017

CRADLE TO CRADLE PRODUCTS INNOVATION INSTITUTE

THE LICENSED MARKS IDENTIFIED ABOVE MAY BE LICENSED TO:

FOR THE BELOW LISTED CERTIFIED PRODUCTS ASSOCIATED WITH THE NAME: 1600 Wall System™ 1 Curtain Wall and System™ 2 Curtain Wall

Only the following products are considered Certified Products within the scope of this certification and the associated Trademark License Agreement:

Kevin B. Parker
Cradle to Cradle Products Innovation Institute

LEAD ASSESSMENT BODY: MBDC

PRODUCT OPTIMIZATION: 17

96.51-98.51% GREY or X-assessed chemicals
96.51-98.51% GREY or X-assessed
A or B 19 HOMOGENEOUS MATERIALS

Declare.

190/350/500 Standard Entrances

Final Assembly: Austell, GA, USA
Life Expectancy: 40+ Years
End of Life Options: Recyclable (90-95%), Landfill (5-10%)

Ingredients:

Door and Frame: Anodized Aluminum ; Hardware: Stainless Steel, Iron, Zinc, Chromium, Nickel, Manganese, Silicon, Molybdenum, Carbon, Copper, Metallic Coating, Ceramic, Ethyl Cellulose; Thermal and Weathering: Ethylene Propylene Diene Terpolymer, Carbon Black, Ethylene Propylene Copolymer, Fluorinated Propylene, Polyamide (PA 6), Glass Oxide Chemicals, Calcium Carbonate, Polyurethane, Kaolin, Dicumyl Peroxide, Zinc Oxide, Calcium Oxide, Calcium Carbonate, Polyethylene, Zinc Sulfide (ZnS)

Living Building Challenge Criteria:

KAW-0021 Exp: 01 JUL 2018
VOC Content: N/A VOC Emissions: N/A
Declaration Status: LBC Red List Free
 LBC Compliant
 Declared

INTERNATIONAL LIVING FUTURE INSTITUTE™ declareproducts.com

Trifab™ 451UT and 601UT Framing Systems

Material Transparency Summary (MTS)

Kawneer's commitment to social and environmental responsibility is rooted in high performing, sustainable solutions that extend beyond energy efficiency to elements like daylighting, acoustical efficiency, recyclability, occupant security and occupant comfort. Our extrusions use a minimum of 50% recycled content achieved through a combination of pre- and post-consumer recycled content. We also have Environmental Product Declarations (EPDs) that when coupled with this Material Transparency Summary (MTS) gives a full sustainable product overview. Sustainability information on this product as well as our entire portfolio can be found on the [Sustainability page at www.kawneer.com](http://www.kawneer.com)

Material Inventory

The material inventory below discloses the known ingredients within this product at a concentration level of 100 PPM (0.01%) and higher, the Chemical Abstract Services Registration Number (CAS#), role and percent by weight within the product. This inventory list meets the guidelines for LEED v4 MR Credit: Building Disclosure and Optimization - Material Ingredients - Option 1 and LBC Materials Portal H0-2 Supporting Data and has no LBC Red List Materials.* This product is manufactured at one of our five North American locations: Bloomsburg, PA; Cranberry, PA; Leithridge, Canada; Springdale, AR and Visalia, CA.

Class	Role	Common Material	Alternate	CAS#	Percent by Weight
Thermal & Weathering	Polyurethane Resin	4,4'-Diphenylmethane Diisocyanate	1,4'-Diphenylmethane Diisocyanate	149-90-3	0.04
		4,4'-Diphenylmethane Diisocyanate	4,4'-Diphenylmethane Diisocyanate	149-90-3	0.04
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	1.3
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	1.3
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	1.3
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	1.3
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	1.3
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	1.3
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	1.3
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	1.3
EPDM Compound	Carbon Black	Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
ABS Compound	Carbon Black	Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03
		Diethylene Glycol Dibutyl Adipate	Diethylene Glycol Dibutyl Adipate	131-44-8	0.03

* For optional material configurations, refer to parts 451TC001, 451TC002, and 601TC001 through 601TC004. All other material configurations are not listed.

MTS000000

EC 0516-028

A'18 AIA Conference on Architecture 2018
June 21-23, New York City

***"Declare" is a registered trademark of the International Living Future Institute (ILFI).
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Material Utilization



Occupant Wellbeing

1. Air Controllability
2. Natural Connection
3. Interior Comfort

Green Building Certifications	Category
LEED v4 BD+C	Indoor Environmental Quality
LBC v3.1	Health & Happiness Petal Equity Petal
WELL v1.0	Air Lighting Comfort
CHPS	Indoor Environmental Quality

Occupant Wellbeing

1. Air Controllability

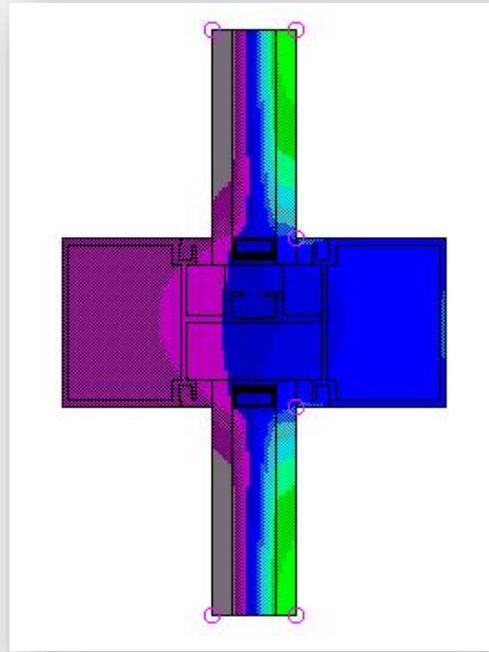
- Thermal Comfort
- Ventilation

2. Natural Connection

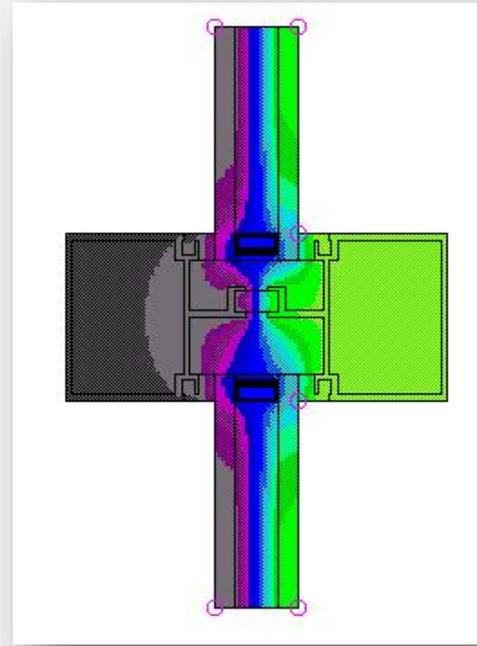
3. Interior Comfort

Green Building Certifications	Category
LEED v4 BD+C	• IEQ Thermal Comfort
LBC v3.1	• Civilized Env. (Imp 07) • Healthy Interior Env. (Imp 08)
WELL v1.0	• 03 Ventilation Effectiveness • 08 Healthy Entrance • 12 Moisture Mgmt. • 14 Air Infiltration Mgmt. • 15 Increased Ventilation • 19 Operable Windows • 28 Cleanable Env. • 76 Thermal Comfort
CHPS	• EQ 9.1 Thermal Comfort • EQ 10.2 Controllability of Systems • EE 6.1 Natural Ventilation

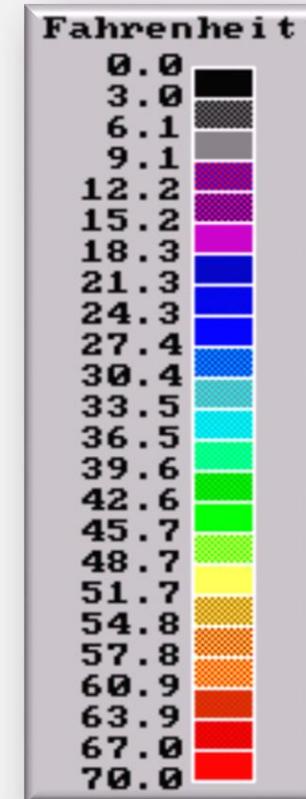
Occupant Wellbeing



2" x 4.5"
Non-Thermal Frame



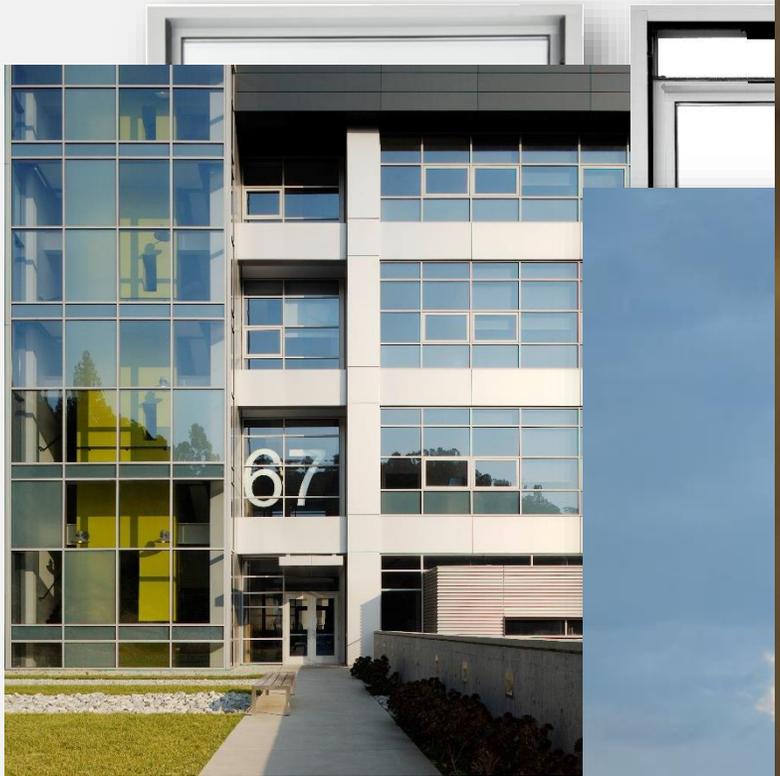
2" x 4.5"
Thermal Frame



Occupant Wellbeing



Occupant Wellbeing



Occupant Wellbeing

1. Air Controllability
2. Natural Connection
 - Daylighting
 - Views
3. Interior Comfort

Green Building Certifications	Category
LEED v4 BD+C	<ul style="list-style-type: none">• IEQ Daylighting• IEQ Quality Views
LBC v3.1	<ul style="list-style-type: none">• Civilized Env (Imp 07)• Biophilic Env (Imp 09)
WELL v1.0	<ul style="list-style-type: none">• 54 Circadian Lighting Design• 56 Solar Glare Control• 61 Right to Light• 62 Daylight Modeling• 63 Daylighting Fenestration
CHPS	<ul style="list-style-type: none">• EQ 12.1 Views• EQ 11.0 Daylighting

Occupant Wellbeing



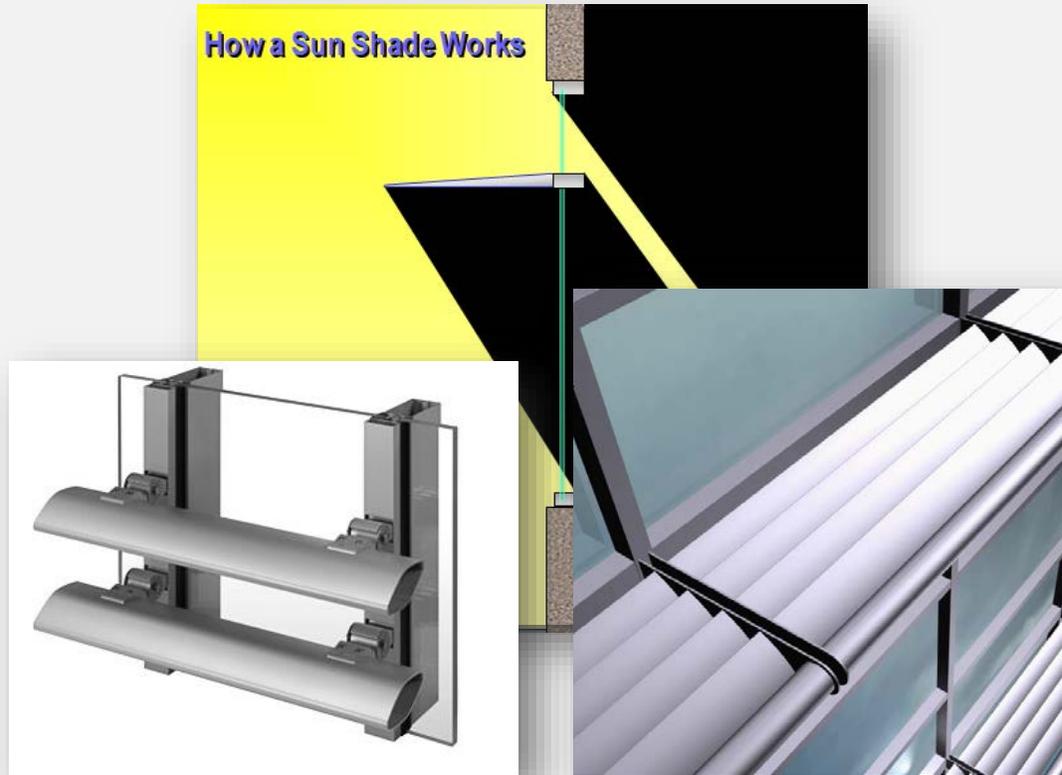
ement Home

Missouri Department of Natural
Resources
LEED® Platinum

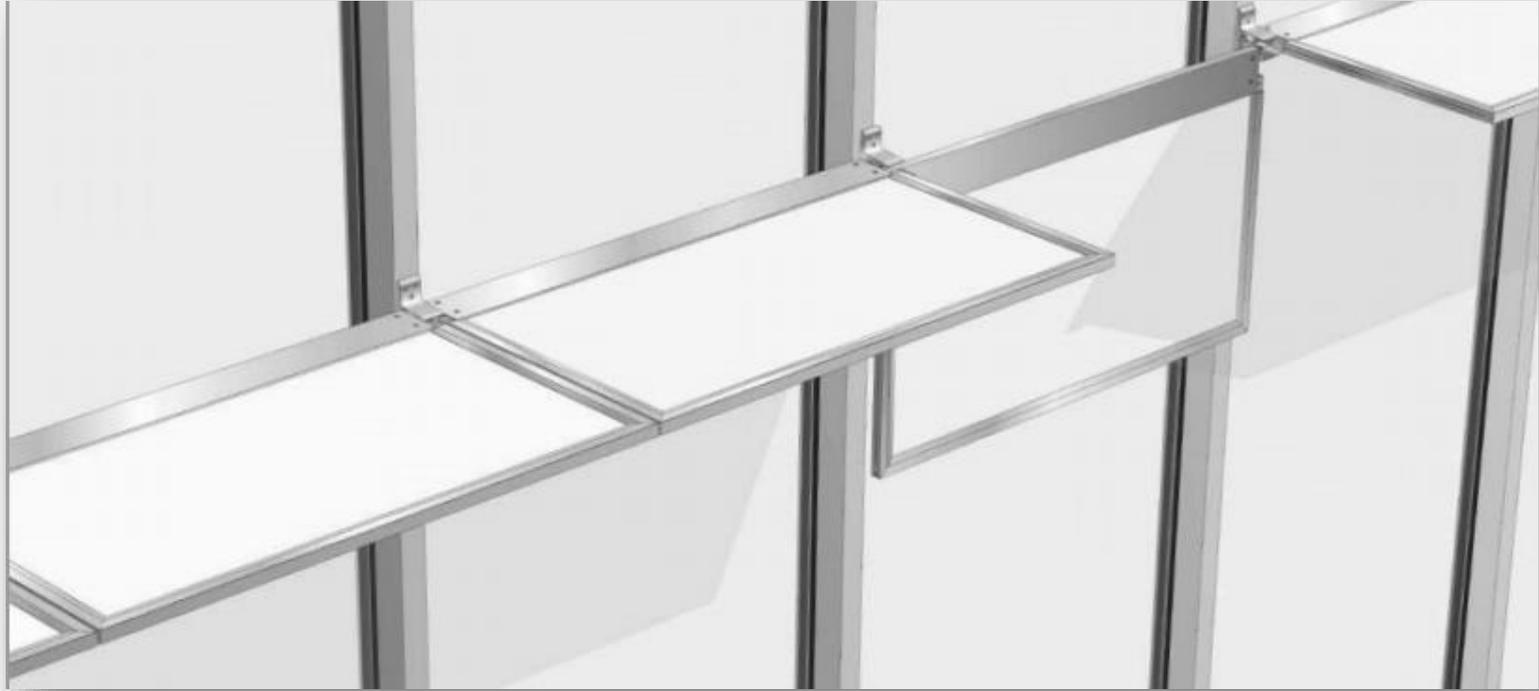
Occupant Wellbeing



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Georgia Gwinnett College Library and Learning Center
LEED® Gold



North American Headquarters
Registered with the certification goal of LEED® Silver



Ohlone Community College Newark Center for Health Sciences and Technology
LEED® Platinum

A'18 AIA Conference on Architecture 2018
June 21-23, New York City

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Occupant Wellbeing

1. Air Controllability
2. Natural Connection
3. Interior Comfort
 - Acoustic Performance
 - Accessibility

Green Building Certifications	Category
LEED v4 BD+C	• IEQ Acoustic Performance
LBC v3.1	• Universal Access (Imp 16)
WELL v1.0	• 72 Accessible Design • 74 Exterior Noise Intrusion
CHPS	• EQ 14.0 Acoustical Performance

Occupant Wellbeing



Consol Energy Center
LEED® Gold



Community College of Denver - Confluence Building
LEED® Gold



Porsche Cars North America HQ
LEED® Gold

Occupant Wellbeing

1" Overall:
1/4" glass, 1/2" air,
1/4" glass



STC: 35
OITC: 30

1 3/4" Overall
1/4" glass, 1/2" air,
1/4" glass, 1/2" air,
1/4" glass



STC: 39
OITC: 31

1 1/16" Overall:
1/4" glass, 1/2" air,
1/8" glass, 0.60 PVB 1/8"
glass



STC: 41
OITC: 32

1" Overall:
1/8" glass 0.30 PVB 1/8" glass
1/2" air,
1/8" glass 0.03 PVB 1/8" glass



STC: 42
OITC: 33

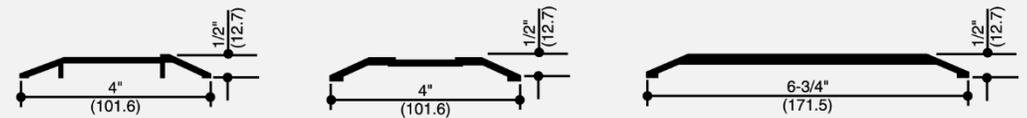
Occupant Wellbeing



Newberg Center – Portland Community College
Newberg, Oregon, U.S.



COMMON THRESHOLD EXAMPLES



Designing for Sustainability

Architectural aluminum-framing systems can impact whole-building performance:

- Energy Efficiency
- Material Utilization
- Occupant Wellbeing



Loyola University Chicago
Niehoff School of Nursing
LEED® Gold

Green Building Certifications

LEED v4 BD+C

LBC v3.1

WELL v1.0

CHPS

Questions?

Thank you for Joining Us

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Thank you!