

SUSTAINABLE FACADES

By Mitrex & Cladify





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OUR STORY

WHO WE ARE

We are a developer and manufacturer of advanced cladding systems, evolved from almost 20 years of perfecting the art and science of cladding with an **ultra lightweight, strong, and highly integrated system**. Integrated solar cladding is the natural evolution of these facade materials that focuses on sustainability, energy-generation, and beauty.

Our sustainable facades are designed to expedite construction schedules, reduce construction costs, and improve building performance by offering high-performance external envelope assemblies with thermal efficiency, improved fire safety performance criteria, increased design/application versatility, and even energy generation for new construction, renovation, and retrofits.

OUR EVOLUTION



SUSTAINABLE FACADES

- ☑ SMART CORE TECHNOLOGY
- ☑ INTERCHANGEABLE FACING
- ☑ VERSATILE SOLUTIONS

+ ENERGY GENERATION

Our sustainable facades are a truly integrated cladding solution with active and non-active options designed to meet the needs of any application.

The composite cladding is a precision-made and engineered system designed to revolutionize the way materials can be used as cladding. With our product engineering and design capabilities, there are virtually no applications in which one would choose conventional cladding over our composite panels.

The solution is a highly integrated cladding system designed to lower costs, improve performance, and increase design/versatility for any application. This high-quality cladding system allows architects, designers, builders, engineers, and contractors to improve design aesthetics and marketability of their commercial, institutional, residential, or

multi-residential projects.

Our sustainable facades offer different types of solutions depending on your requirements. Each panel can be attached through one of three systems—rainscreen system, pre-panelized system, or unitized facades, depending on the application and underlying material.

The panels can be supplied and installed on both vertical and horizontal surfaces for a fraction of the cost of alternative panels on the market. They provide remarkable savings in terms of transportation, installation time, installation skill required, labour costs, and structural requirements.

These panels are strong, ultra lightweight, low cost, easy-to-install, impact and crack resistant, fire and heat resistant, waterproof, environmentally sustainable, and can be made from many materials in virtually any pattern, shape, or size imagined. Complete with an exceptional warranty, this beautiful composite panel is the cladding system of choice for transformational design, as

well as tight construction budgets.

NON-ACTIVE PANELS




Offered by the Cladify branch, our non-active panels feature interchangeable facing materials over an ultra-lightweight advanced backing system consisting of an aluminum honeycomb network between solid aluminum sheaths. The cladding system has endless material options, from porcelain to stone, coated aluminum, and brick. Combining that with a versatile backing system, our non-active panels are perfect for any application.

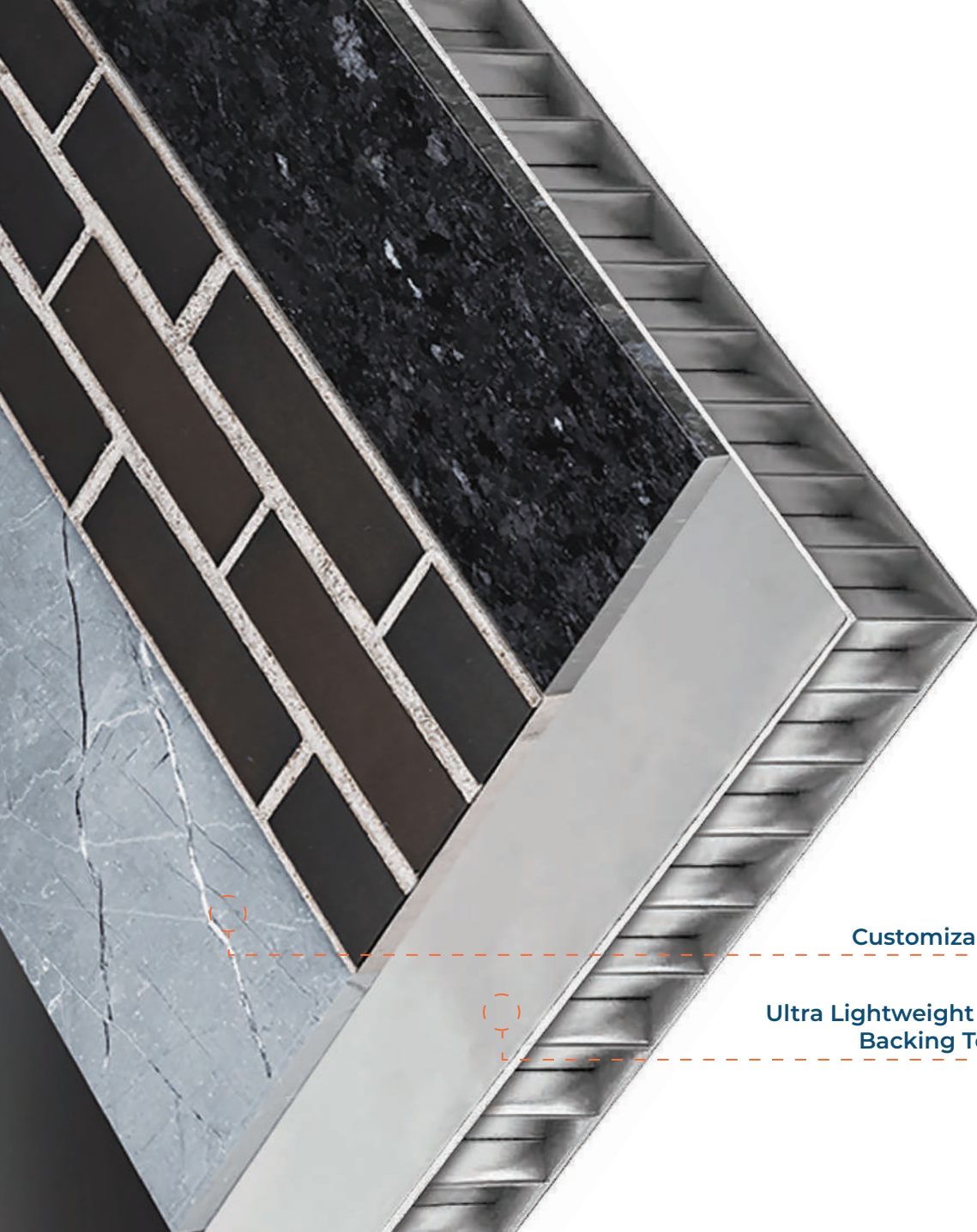
⚡ ACTIVE PANELS

Our active panels by Mitrex feature integrated solar technology (BIPVs) that allow for seamless energy generation without sacrificing aesthetics. The panels generate energy and supply it back to the structure while saving energy costs and reducing carbon emissions. Available in any pattern or color imaginable, our active solar cladding allows architects, building owners, and developers to incorporate solar technology into any project.



NON-ACTIVE PANEL

-  Ultra lightweight aluminum honeycomb core technology.
-  Interchangeable, multi-facing materials such as stone, porcelain, glass, brick, or coated aluminum surfaces.
-  Mix and match different facings without altering the installation.



Customizable Facing

Ultra Lightweight Advanced Backing Technology

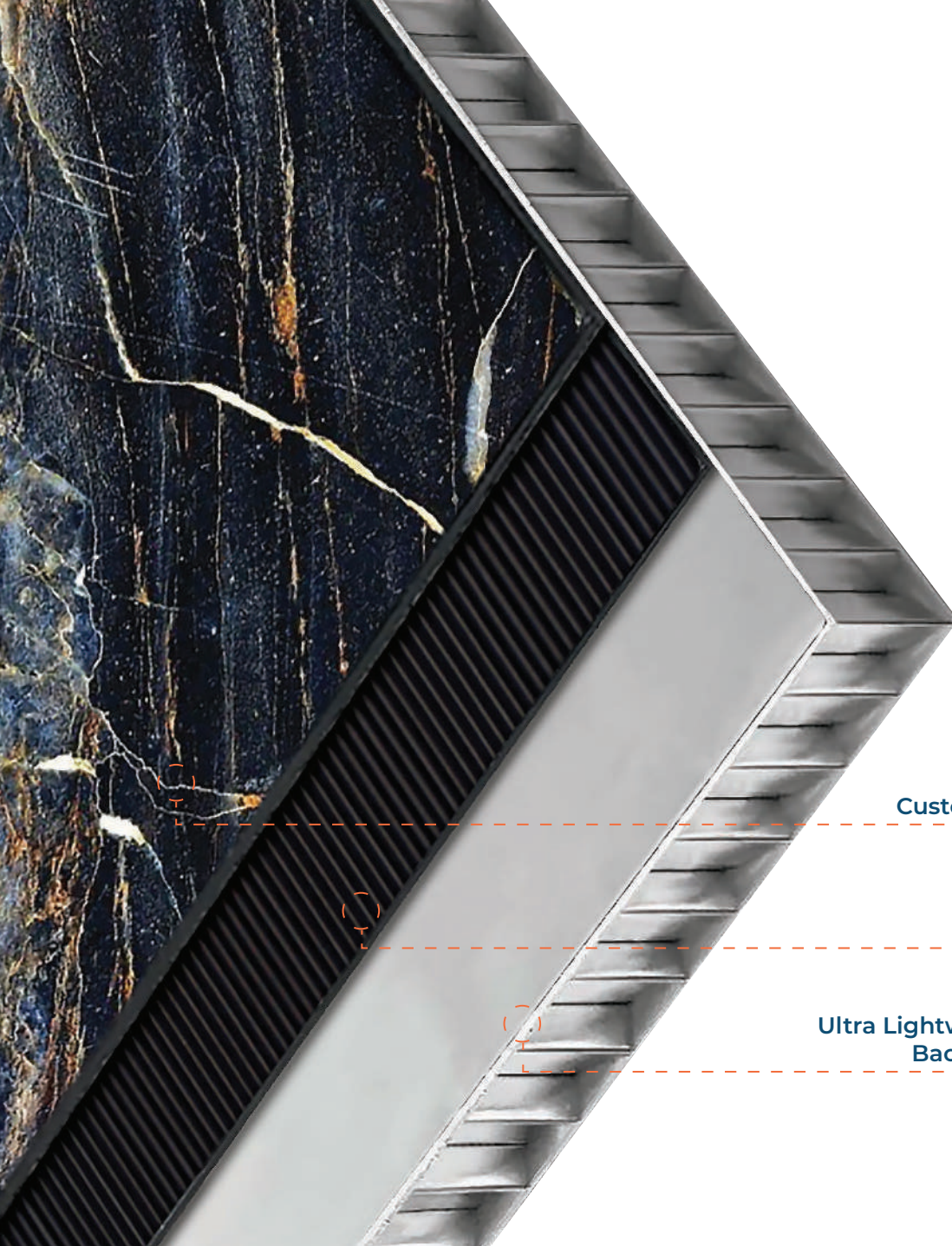
 Porcelain

 Wood




 Brick

 Stone

 Coated Aluminum



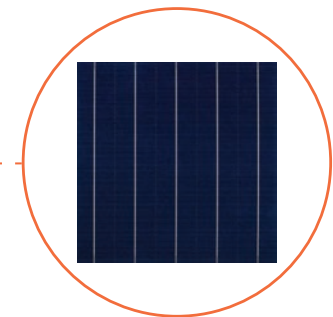
⚡ ACTIVE PANEL

-  Sustainable, energy generating facades at no extra cost.
-  Energy-efficient solution for both existing and new facades.
-  Endless surface design options.

Customizable Facing

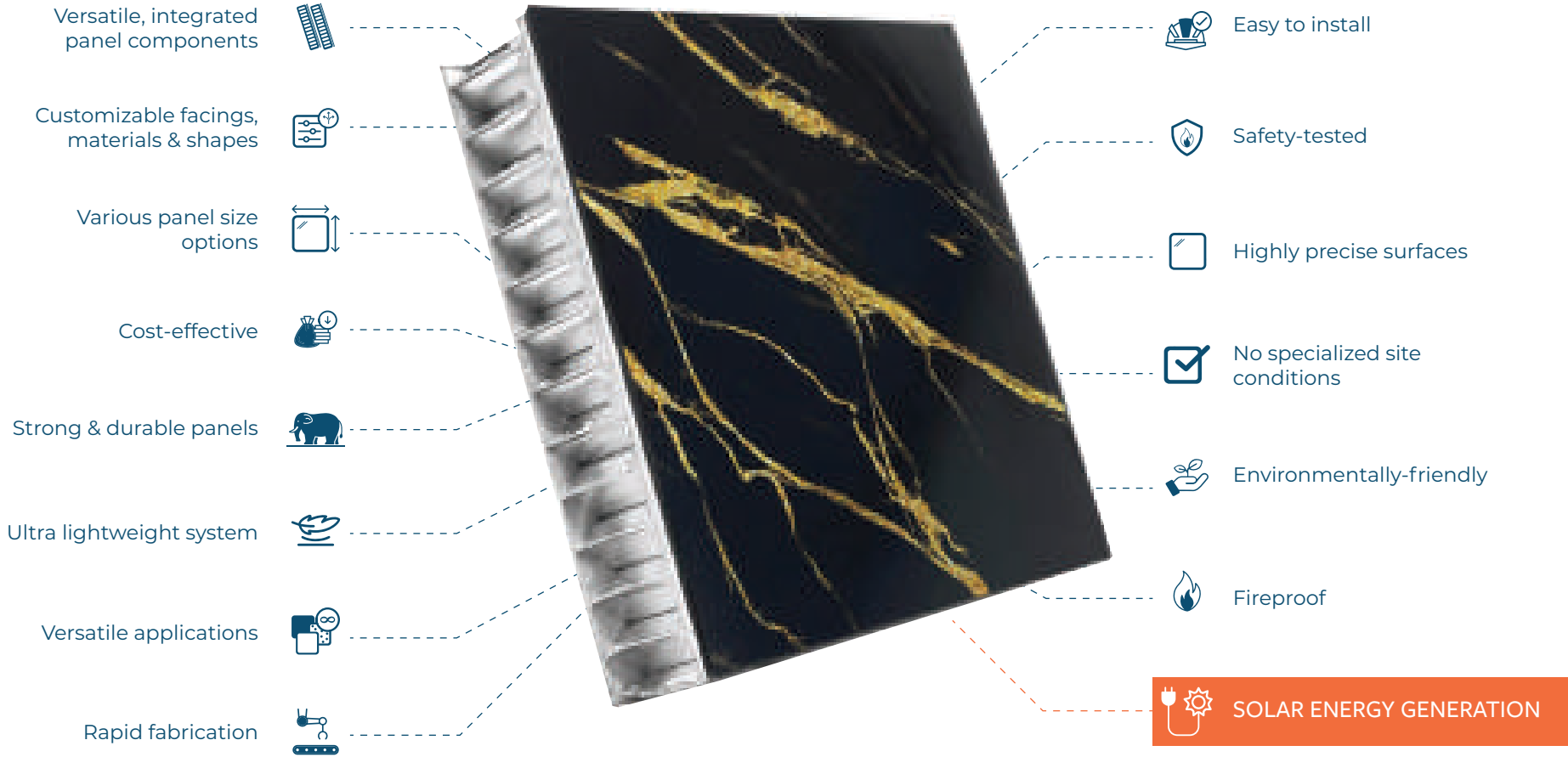
⚡ Solar Cell

Ultra Lightweight Advanced Backing Technology

















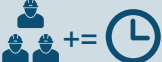











⚡ 22.5% Cell Efficiency

SUSTAINABLE FACADE BENEFITS



CONVENTIONAL MATERIAL VS SUSTAINABLE FACADES

	Conventional Material	Sustainable Facades		Conventional Material	Sustainable Facades
1 Panel Size	 32" x 16"	 48" x 96"	5 Site Condition	 Average scrap, waste debris left behind with 1000 SQFT	 Average scrap, waste debris left behind with 1000 SQFT
2 Panel Strength			6 Full Condition	 Standard construction projects	 Almost any project
3 Panel Weight	 1000 SQFT = 10 Skid	 1000 SQFT = 1 Skid	7 General Cost	  60 Panels (1000 SQFT) = 	  60 Panels (1000 SQFT) = 
4 Installation Speed	  15 Panels (250 SQFT)	  60 Panels (1000 SQFT)	8 Environmentally Friendly	 Transportation Cost +  Volume of scrap +  Extraction Costs	 Transportation Cost +  Volume of scrap +  Extraction Costs



BENEFITS

WHY US

Our sustainable facades have numerous benefits over traditional cladding systems.

Our cladding is highly engineered and manufactured to exceedingly precise levels of quality and finishing.

ACTIVE & NON-ACTIVE PANEL OPTIONS

We offer our sustainable facade solutions in two options: active solar cladding that can generate energy with integrated solar technology and non-active cladding with limitless facing material options. The option of energy-generating active facade products can allow any structure to become a micro powerplant without altering aesthetics or increasing costs.

INTERCHANGEABLE MATERIALS

The panels can be engineered with virtually any facing material in the world! From brick to stone, porcelain, glass, metal or even solar, our products can conform to any design need. The interchangeable facings allow for easy and seamless incorporation into any project and offer truly versatile solutions.

CUSTOM TEXTURES, SHAPES, & SIZES

Not only can our panels be made with almost any material available, but there are custom options to suit various textures, finishes, shapes, and sizes.

VERSATILE APPLICATIONS

Ideal for new, out-of-the-box design

ideas because they can be fabricated into virtually any shape, size, or pattern required. Perfect for exterior or interior applications on any surface in new construction, renovations, and retrofits for any building type.

EXTREMELY STRONG

Our cladding panels have exceptional crush strength and stiffness, constant crush strength, structural integrity, and fatigue resistance. Thicker honeycomb cores will provide even greater strength and spans.

THIN & LIGHTWEIGHT

Up to 80% lighter than traditional stone, steel, wood, or common partitioning materials. They are typically only 1" thick, leaving more room for insulation and floor space. This also means greater ease-of-use and significantly lower costs for transportation, handling, and installation.

HIGHLY INTEGRATED PANEL COMPONENTS

A building envelope composed of both typical cladding and solar cladding is possible with Cladify and Mitrex panels,

allowing for fully integrated energy generation. The various types of panels are engineered in such a way that they seamlessly integrate with one another for virtually any cladding application imagined.

RAPID FABRICATION

Our panels can be fabricated in a relatively short time frame at our fully automated facility. Panels can be constructed as work progresses and delivered on-site according to your schedule, ready to install. As a single-source supplier, the scheduling and production staff can help to keep client project schedules on track.

YEAR-ROUND INSTALLATION

The panels are fabricated under factory-controlled conditions, and they can be installed year-round. Harsh winter weather and rain will have minimal impact on the production and installation schedules.

RAPID INSTALLATION SPEED

With its high-strength and low-weight density of approximately 3.2 lbs/ft²,



installers can quickly and easily install our panels. Lightweight panels allow smaller crews to install and cover more area faster than with conventional materials. A faster erection will lessen the contractor's risks and costs associated with weather and material damage during construction.

QUICKER & LOWER COST DESIGN

Our system takes less time to design than conventional brick, masonry, or traditional cladding systems. It offers designers and engineers pre-engineered strength capabilities and pre-designed anchoring systems. This eliminates the multiple variables of conventional cladding materials that can slow down the design and engineering process.

LOW COST

The panels are much lower in cost when you compare the costs of purchase, transportation, handling, and installation of alternative cladding options.

HIGHLY PRECISE & FLAT SURFACE

Our panels can achieve highly flat surfaces, creating a seamless building

envelope. Accurate and trouble-free installations allow us to achieve precise surfaces in any project.

EXCELLENT FIRE RESISTANCE

The aluminum honeycomb panels are highly fire-resistant compared to wood, PVC, insulation, drywall, and other sheathing materials. They are composed of non-combustible materials and are rated UBC Class 1 for fire and are self-extinguishing.

GOOD SOUND PROOFING & DAMPENING

The hollow, honeycomb core is highly absorbent to sound and can be used in numerous sound damping and soundproofing applications.

BLAST, EARTHQUAKE, & IMPACT RESISTANT

Our panels are remarkably impact- and crack-resistant because they flex without breaking. They can withstand 60 times more impact than a 1 3/4" solid granite panel when tested with a large missile impact test. That means that they are blast and earthquake-resistant when

used as an exterior envelope.

IMPERVIOUS TO MOISTURE PENETRATION

The panels are impervious to moisture penetration which can cause mold or mildew.

APPLICATION SOLUTION CONSULTING

As architects, engineers, and experienced field technologists, we know how to specify and apply our products to solve real-world design and construction problems. Everything from complex design challenges to never-been-done-before design concepts, to achieving demanding construction budgets, are all within our reach. With more than 20+ years of application experience, we know how to develop creative and elegant solutions to meet your needs.

AN EXCEPTIONAL WARRANTY

Our panels are guaranteed not to delaminate for the life of the structure, provided that they are installed properly using certified installers. For our solar facades, the warranty ensures the hardware will last for 25 years and

guarantees that after 25 years the minimum efficiency will be 80% of the original energy generation.

ENERGY GENERATION

With our solar cladding, there is an added benefit of energy generation with the integrated solar components in the cladding product. The solar technology produces power on the building envelope and supplies the energy directly back to the structure.

LOW CARBON EMBODIMENT

Sustainability is at the core of our facades. For Mitrex, the integrated solar panels generate enough green energy to offset production-related carbon emissions, unlike traditional materials. On average, our Solar Facades can offset the carbon needed to make them in 4.5 years and remove 557.75 kg of CO² in 30 years.

ENVIRONMENTAL IMPACT

With our solar cladding, just 2 M² can produce 6,192 kWh of electricity, offsetting 4.4 metric tonnes of CO² over 30 years. Equating to: Powering 1 single-family home, planting 2,690 trees, removing 1 gasoline powered car off of the road, and charging 62 electric vehicles.

CONTRIBUTES TO LEED CERTIFICATION

Our solutions can meaningfully contribute to LEED designations for new builds and retrofits. Cladify panels can contribute up to 33 points toward LEED certification, and Mitrex can contribute up to 40 points with energy generating panels.



TECHNOLOGY

OUR CORE TECHNOLOGY

At the foundation of our product is our ultra lightweight smart core technology—a series of aerospace wafer cores that have been adapted for use in the creation of composite cladding panels for the construction industry.

ULTRA LIGHTWEIGHT ADVANCED BACKING TECHNOLOGY

Our panels are constructed using a unique, laminated, composite material structure for extreme strength, low-weight, and ductility. The panels are made from 3003 aluminum alloy foil in the form of a honeycomb cell core sandwiched between two continuous layers of solid aluminum sheathing. On top of the honeycomb core is 1-5mm (0.04-0.20") of facing material bonded with a special form of aviation epoxy adhesive. This epoxy was chosen for its ability to withstand 300 mile/ hr winds, very high sheering forces, tensile forces, and a wide range of temperature extremes... all without delamination or losing any structural integrity.

WHY USE A 100% ALUMINUM HONEYCOMB CORE?

The key to the unique properties of our Composite Honeycomb Panel Technology is the design of the aluminum honeycomb cell core. Not all cladding manufacturers use an aluminum honeycomb core coupled with aluminum sheathing on either side. Using aluminum throughout the core allows the composite panel to achieve its

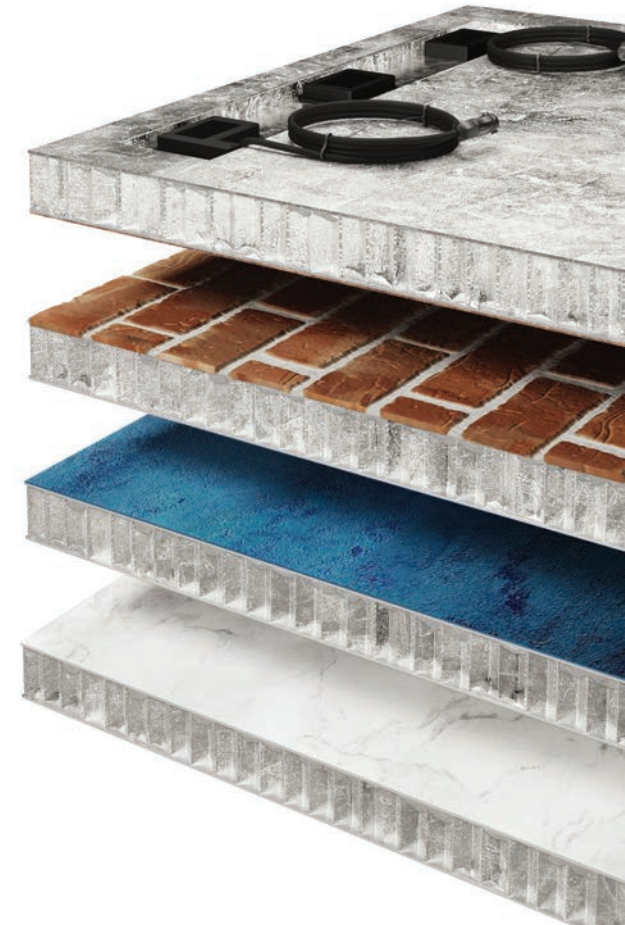
incredible performance characteristics, such as its ability to sustain a large missile impact of more than 4,000 lbs/ft².

CUSTOMIZATION OF STRENGTH CHARACTERISTICS

The honeycomb core can vary in cell size and in thickness to achieve the desired strength characteristics depending on the application. Generally, exterior applications require thicker cores with larger cells than interior applications.

ALUMINUM HONEYCOMB PANEL EDGE CLOSURE DESIGN

Exposed edge areas are a source of potential weakness in the design as they may be susceptible to local impact or environmental damage. Edge closures are also important because they may also provide localized reinforcement, attachment points, or simply meeting aesthetic requirements. We have several edging solutions available depending on the application required.





STONE



⚡ SOLAR

DESIGN

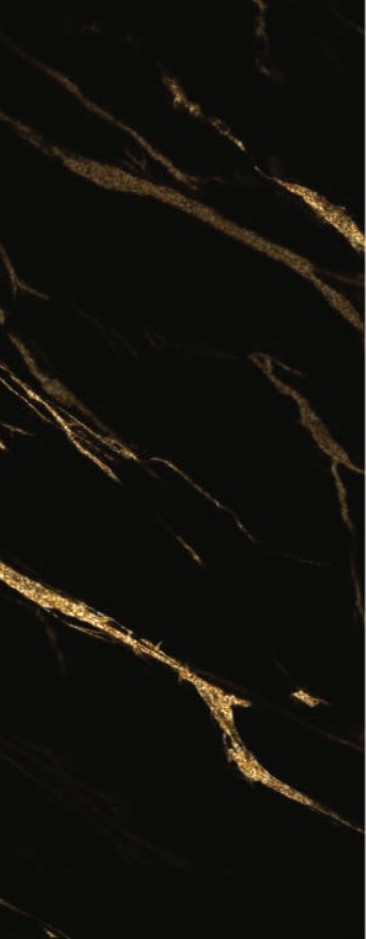
ENDLESS MATERIAL OPTIONS

We offer an endless variety of active and non-active materials, colours, textures, and finishes of cladding facing, suitable for any application. Options can be tailored to the needs of the customer and the project.

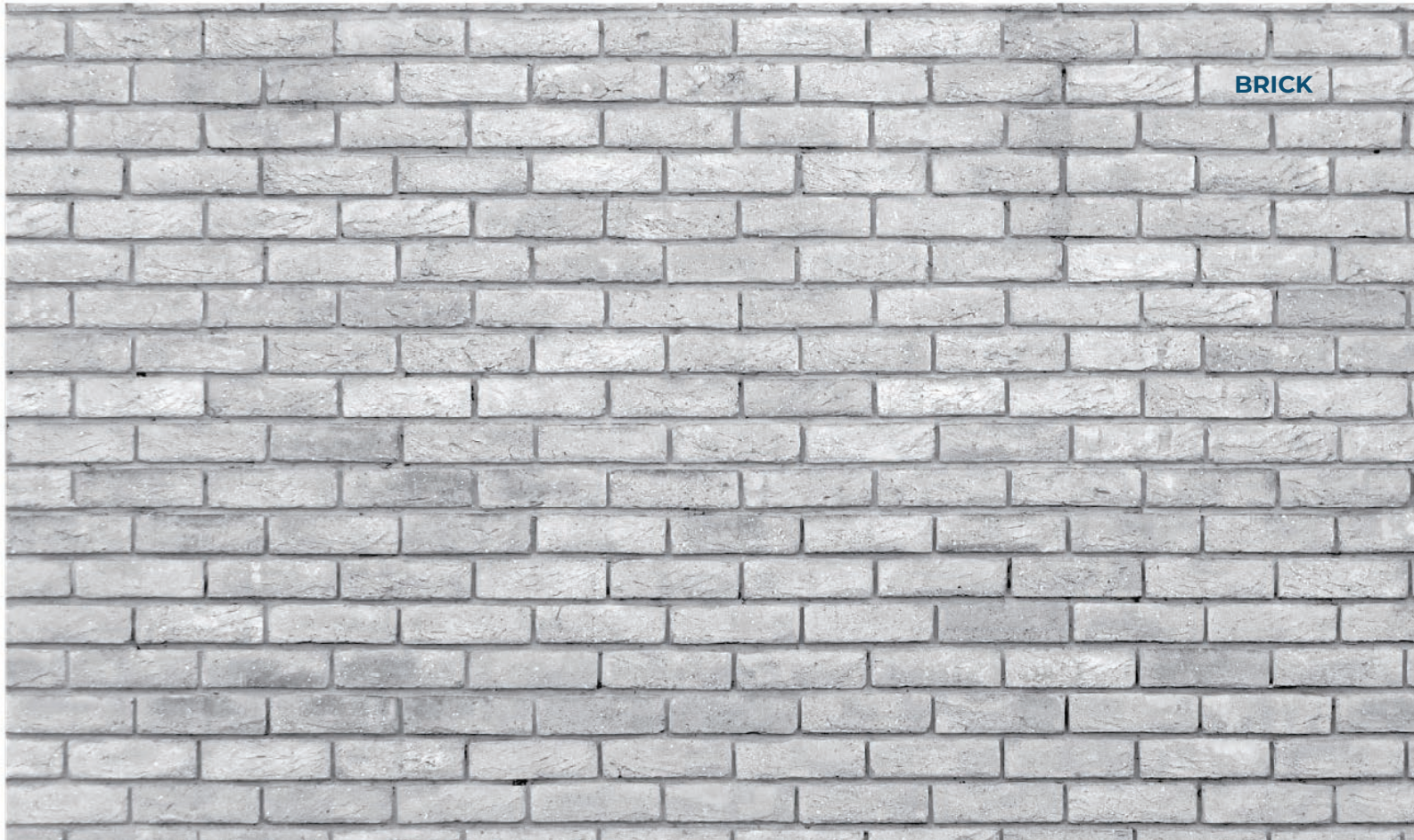


PORCELAIN

ALUMINUM PVDF



BRICK



GRANITE



STONE FACING

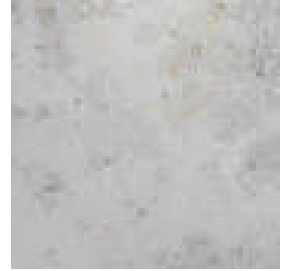
NON-ACTIVE



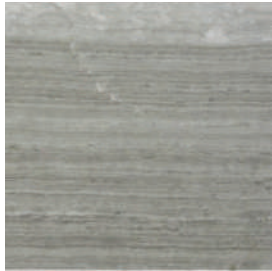
ANGOLA BLACK



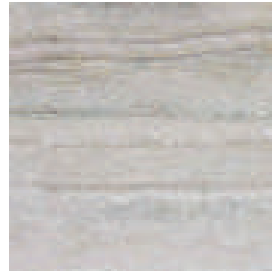
SILVER-STAR



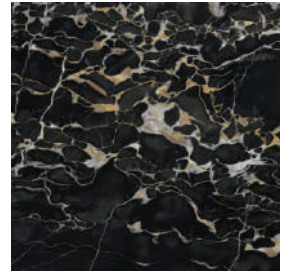
JURA LIMESTONE



ADAIR VEIN CUT



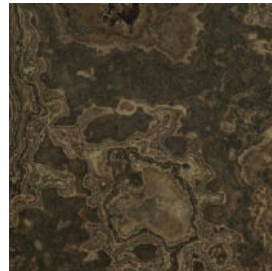
TRAVERTINO SILVER



PORTORO



CALACATTA MICHELANGELO



ERAMOSA CROSS CUT



AND MANY MORE...

PORCELAIN FACING

NON-ACTIVE



CREMITA



LOTO PERLA



SUPERFICIE GRAFITE



CLOSIUM BROWN



FLUSSO BLACK



TAN BROWN



KERAMOS



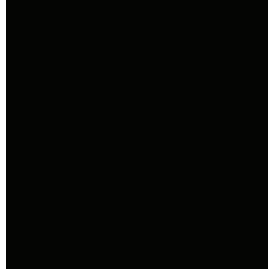
ALFEIOS ROSA



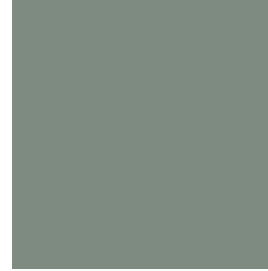
AND MANY MORE...

COATED ALUMINUM FACING

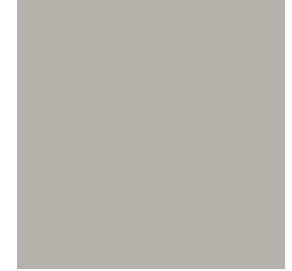
NON-ACTIVE



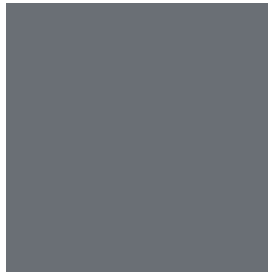
DEEP BLACK



DOLPHIN GREY



SILVER FOIL



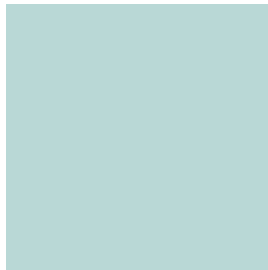
NICKEL



BEAVER



FADING ONYX



JET STREAM



ROMAN SILVER



AND MANY MORE...

BRICK FACING

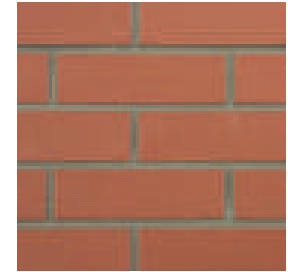
NON-ACTIVE



SPICE WHITE GLAZED



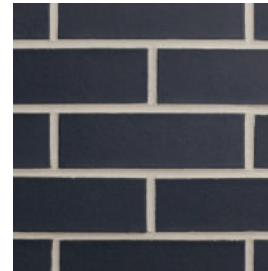
QUAKER BLEND



RIVERDALE SMOOTH



SEA GRAY SMOOTH



CHARCOAL



CARBON BLACK



BLACK GLAZED



GORRI



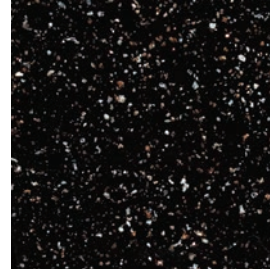
AND MANY MORE...

⚡ SOLAR FACING

ACTIVE



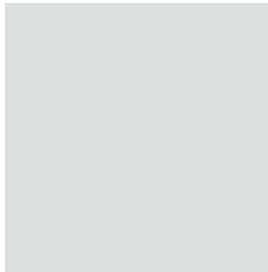
VENULA
⚡ Solar Stone



GALAXIAS
⚡ Solar Stone



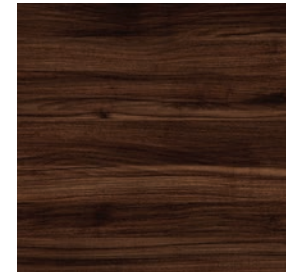
LIMUNADA
⚡ Solar Solid Colour



POLARIS
⚡ Solar Solid Colour



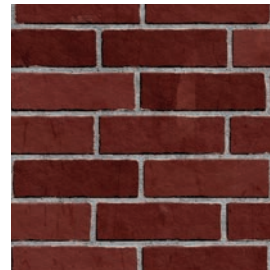
MANDORLA
⚡ Solar Wood



CASTANEA
⚡ Solar Wood



MONTANEA
⚡ Solar Slate



RUBRICA
⚡ Solar Brick



AND MANY MORE...



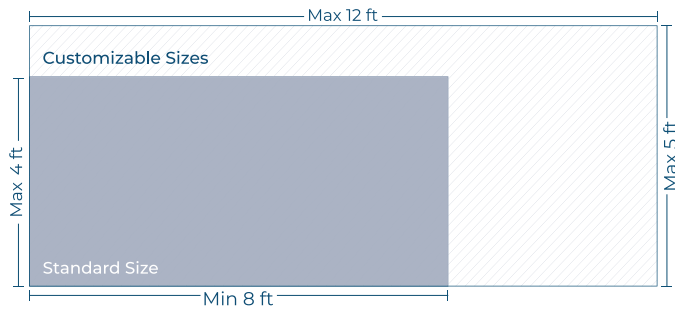
FABRICATION

ENDLESS FABRICATION OPTIONS

Our panels can be produced with curved or angular shapes, grooves, and in virtually any size. Our advanced manufacturing process ensures panels are completely customizable in terms of shapes, designs, and sizes within the maximum dimensions.

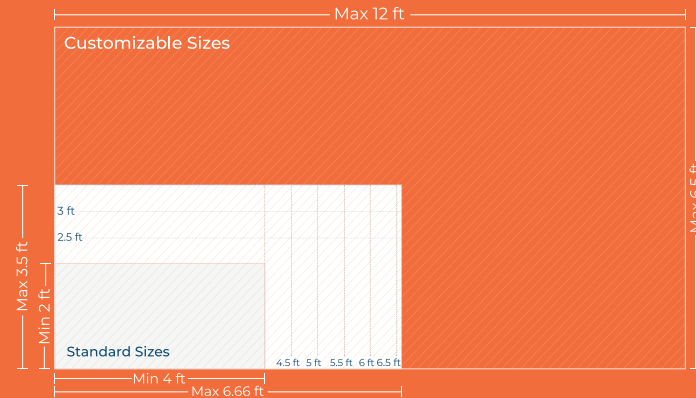
ADAPTABLE PANEL SIZES

NON-ACTIVE PANELS



Non-active standard sized panel is 4ft by 8ft, with a maximum of 5ft by 12ft. We can also cut-to size custom square or rectangular shapes, cut-outs in panels, and other angular and curved shapes depending on your needs. In a nutshell, we can do almost anything that you can conceive or require.

ACTIVE PANELS

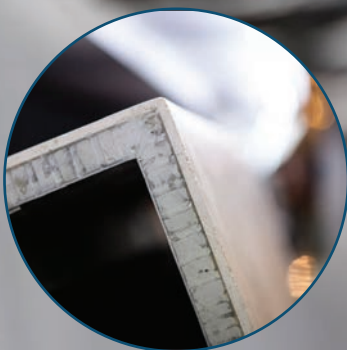


Active Solar Facade panels are available in virtually any size. Our standard panel sizes range from 2-3.5 ft by 4-6.66 ft. When larger panels are needed, we also offer customized panels that can be a maximum of 6.5 ft by 12 ft.

Our panels can be provided in varying thicknesses starting from 9/16 in. (14 mm) and weigh only 3.2 lbs/ft² (15.6 kg /m²).

CUSTOMIZABLE ELEMENTS

Our panels can be embedded with names, emblems, logos, signs, or other custom designs through CNC machines. This is perfect for exterior or interior retail and commercial applications.





VERSATILE SOLUTIONS

INSTALLATION SYSTEMS

Our solutions are truly versatile and only limited by the imagination in terms of use or application. We offer various installation systems to suit any project need. Our sustainable facades can be used in place of any other cladding product, including applications where solid dimensional stone is specified or as an alternative when dimensional stone is too heavy to be used economically. Applications include new exterior and interior applications and renovations and retrofits.



INSTALLATION PRINCIPLES



RAINSCREEN SYSTEM
Stick-Build & Pre-Assembled



PRE-FAB WALL SYSTEM



PRE-CAST WALL SYSTEM

RAINSCREEN SYSTEM

An air pressurized cavity wall system designed to eliminate water penetration and allow ventilation.

This system consists of two options: **stick-build cladding** where installation is panel by panel, and **pre-assembled cladding** where the panels are prefabricated and installed as a single unit. This results in faster installation and minimizes connection points to substrate.

- ☑ Continuous insulation and AWB.
- ☑ Achieves irregular designs.
- ☑ Precise installation.
- ☑ Stick-build requires a backup wall, whereas preassembled requires structural slabs only.
- ☑ Panels can span floor to floor and be attached to slabs only.
- ☑ Pre-Assembled has faster installation since the panels are prefabricated and installed as one unit.
- ☑ Less connection points allow for reduced thermal bridging.

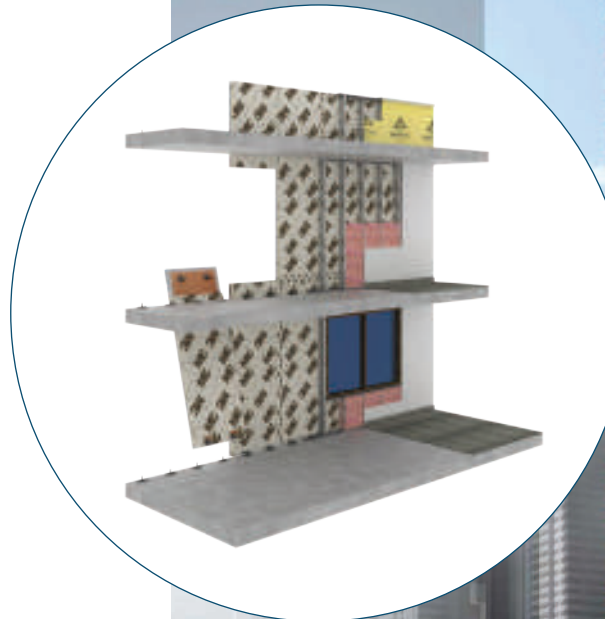


PRE-FAB WALL SYSTEM

The system is a hybrid of window wall and precast architectural wall panels, spanning slab to slab and transferring all the component loads to the building structure.

☑ Installation from inside.

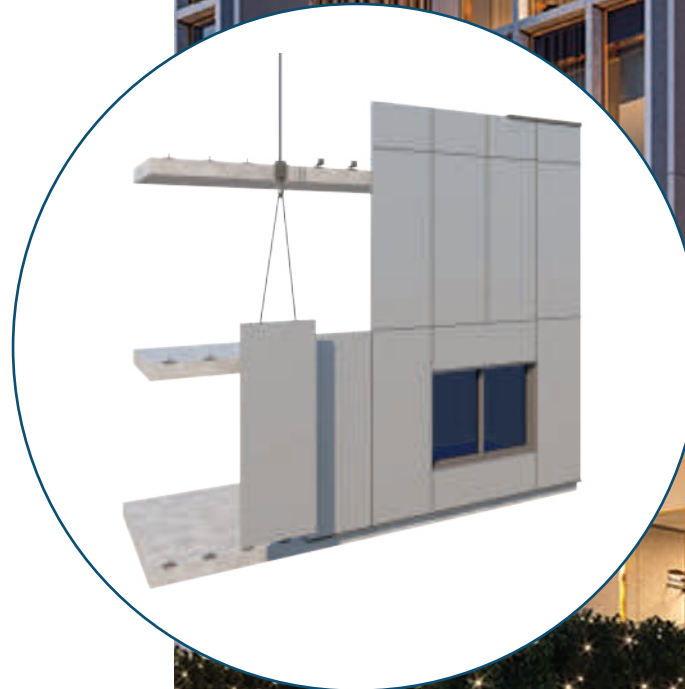
- ☑ Rapid, year-round installation.
- ☑ Slab to slab panel sizes.
- ☑ Reduced costs for design, transportation & installation.
- ☑ No need for structural backup of the wall.
- ☑ Lightweight panel system (no tower crane & concrete embeds needed).



PRE-CAST WALL SYSTEM

The precast system is a lightweight, versatile installation system designed to reduce costs and increase installation speed.

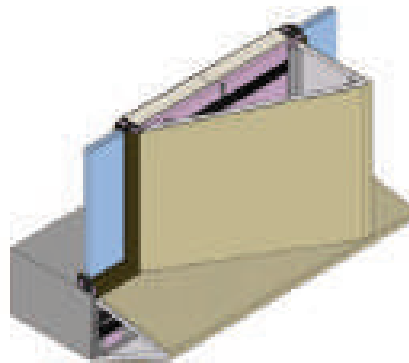
- ☑ Lightweight panel system and reduced structural loads.
- ☑ Improved building energy efficiency.
- ☑ Fast installation, easy transportation, reduced construction time.
- ☑ Option to install from outside by crane/equipment or from inside with manpower.
- ☑ Reduced costs for design, transportation & installation.
- ☑ Multi-facing options such as Stone, Porcelain, Aluminum, or BIPV.
- ☑ Durable & weather resistant (UV radiation, chemicals, etc).
- ☑ Reduced maintenance.



CUSTOMIZABLE INTEGRATIONS & SPECIAL PROJECTS

Our active and non-active cladding panels can be incorporated into any pre-set custom framing system or a new system can be developed as per any requirement.

- ☑ Custom shapes are achieved through prefabricated panel assemblies.
- ☑ Compatible with manual or automated movable panel system, which can be an added benefit for active panels.
- ☑ With the combination of active, non-active panels & voids in between, the essence of a perforated facade can be captured.





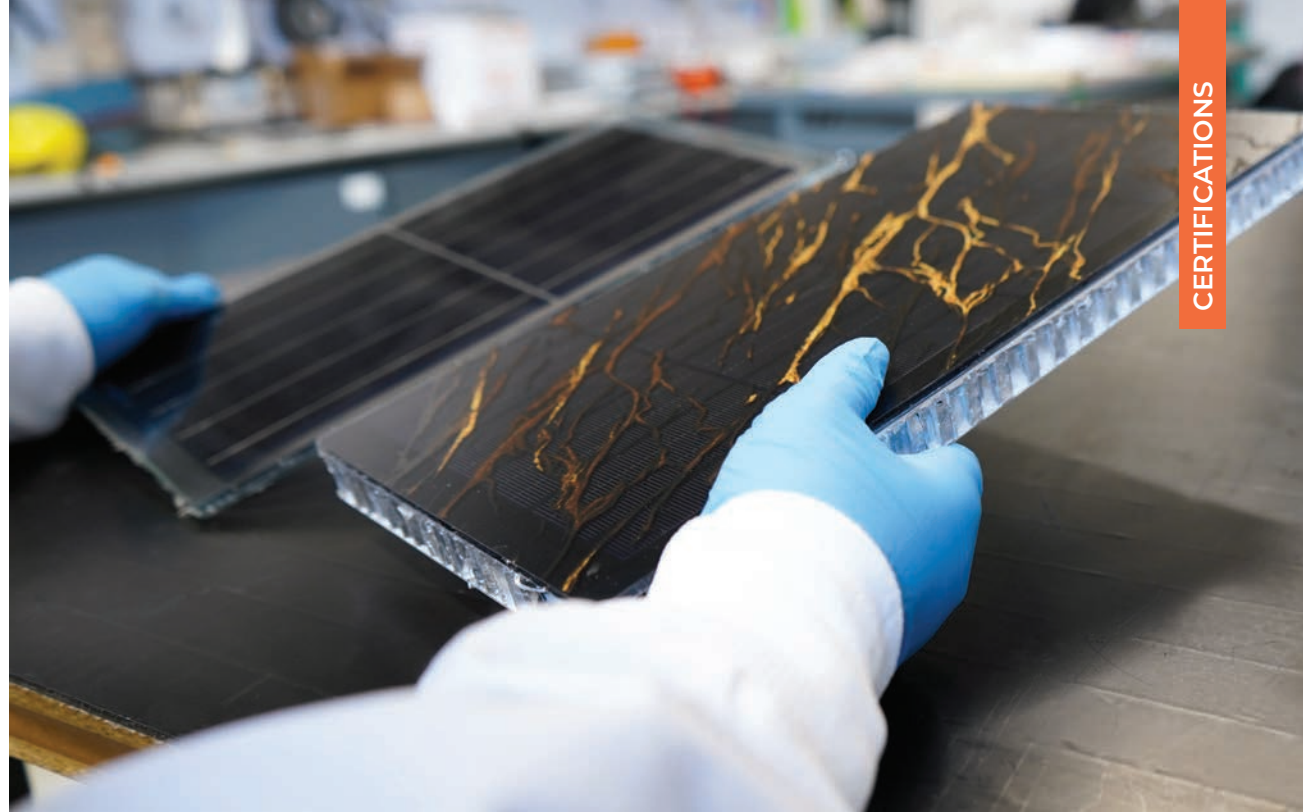
CERTIFICATIONS

TESTING & CERTIFICATIONS

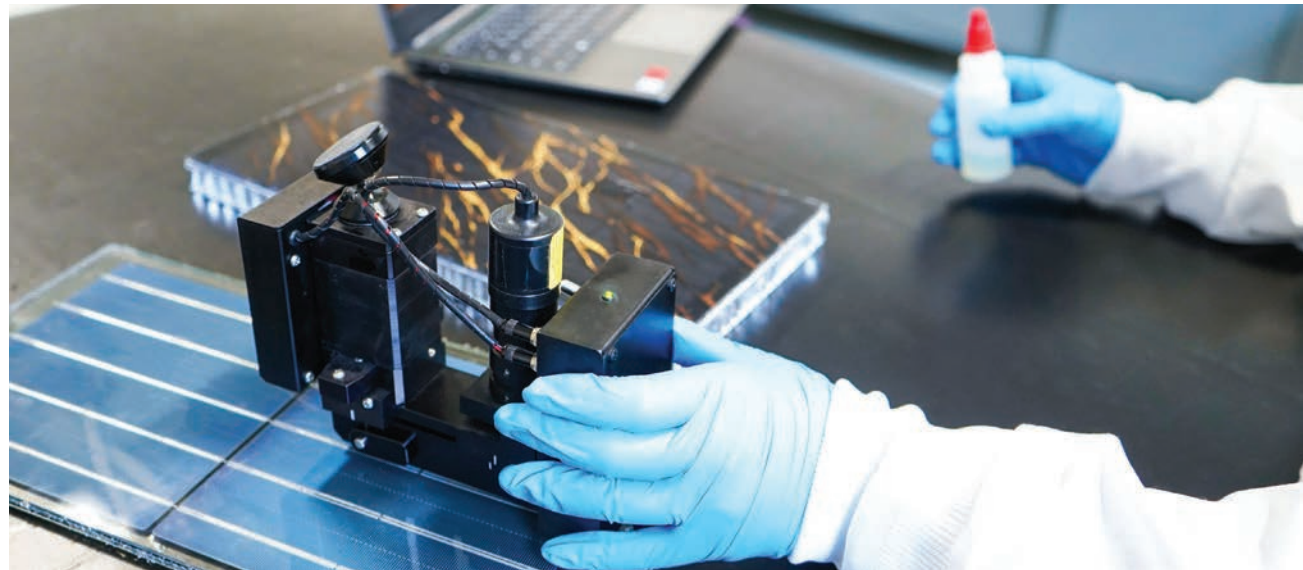
Our sustainable facades product testing and results are above and beyond the minimums required by building and PV codes, and our sustainable facades provide LEED points.

TESTING

We are committed to producing the finest quality panels available and observe rigorous quality control procedures and testing. Architects, designers, specifiers, and end-users receive the peace of mind that comes from knowing that the panels have been subjected to testing well beyond the minimum codes. For more information, see the Appendix.



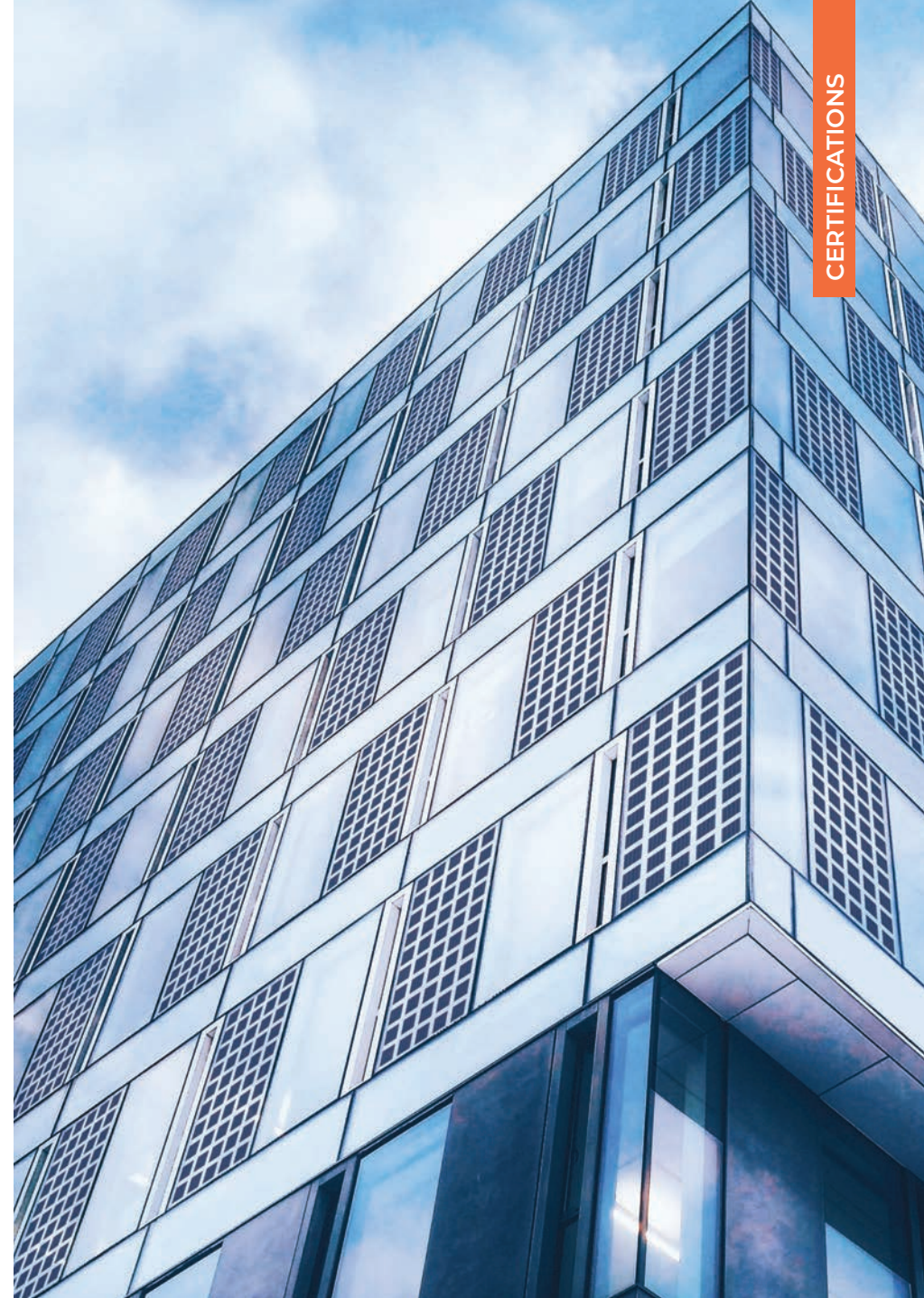
CERTIFICATIONS



LEED CERTIFICATES

LEED (Leadership in Energy and Environmental Design) is the most widely used green building rating system in the world. Available for virtually all building types, LEED provides a framework for healthy, highly efficient, and cost-effective green buildings. LEED certification is a globally recognized symbol of sustainability achievement and leadership.

Our solutions can meaningfully contribute to new builds and retrofits gaining top LEED designations. Our cladding system allows buildings to have outstanding energy efficiency. Cladify can contribute to a possible 33 points for a project, while Mitrex can contribute up to 40 points.



A photograph of a modern building with a white facade and vertical columns. The building has large windows and a prominent entrance. The scene is set outdoors with trees and a lawn. A blue overlay box is positioned in the lower-left corner, containing text.

BEYOND THE PRODUCT

SERVICES & WARRANTIES

We are not just about products – we will work with architects, engineers, and field technologists to understand our products and use them to solve real-world design or construction problems. Further, an exceptional warranty guarantees our facades will last for years.

CONSULTING SERVICES

We can help you with everything from complex design challenges to never-been-done-before concepts to achieving demanding construction budgets. With more than 20+ years of application experience, we can help you with planning, budgets, application, and project management.

PLANNING STAGES

- Materials planning.
- Detailed scheduling.
- Construction drawing support.
- Material specifications.

BUDGET ASSESSMENT

- Budget review.
- Ways to reduce cost.
- Detailed scheduling.

APPLICATION SOLUTIONS

- Installation methods and analysis.
- Materials solutions.
- Performance quality and analysis.

PROJECT / CONSTRUCTION MANAGEMENT

- Plan, assess, and report all aspects of the project until completion.
- Oversee the project from the beginning stages until it is completed.

EXCEPTIONAL WARRANTY

Our panels feature an exceptional warranty. The panels have a lifetime guarantee and will not delaminate for the life of the structure, provided that they are installed properly using certified installers. For our solar facades, the warranty ensures the hardware will last for 25 years and guarantees that after 25 years the minimum efficiency will be 80% of the original energy generation.

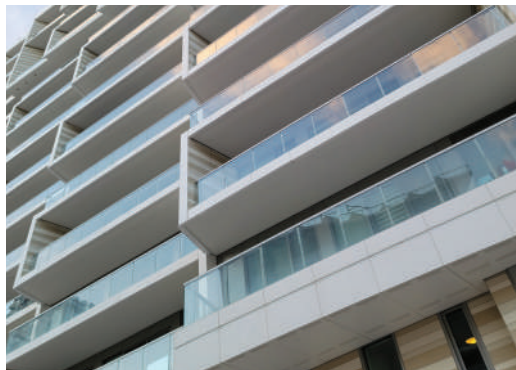




PROJECTS

PROJECTS

Take a look at our existing and in development projects.



NON-ACTIVE AQUABELLA



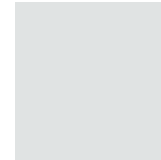
BIANCO BEIGE
Porcelain



CLOSIUM CREAM
Porcelain



PUNTI MARRONI
Porcelain



PURE WHITE
Porcelain

DEVELOPER:
Tridel, Hines
ARCHITECT:
3XN, Kirkor Architects and Planners
BUILDING TYPE:
Condo, Retail





⚡ ACTIVE
**SOLAR BRICK
FACADE**

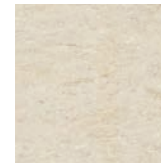


RUBRICA
⚡ Solar Brick

PROJECT SIZE:
4,000 SQFT
POWER OUTCOME:
59kW System
BUILDING TYPE:
Industrial



NON-ACTIVE
ONE RAINSFORD



MOCA CREAM LIMESTONE
Natural Stone

DEVELOPER:
The Riedel Group
ARCHITECT:
Richard Ziegler
BUILDING TYPE:
Condo, Retail





⚡ ACTIVE

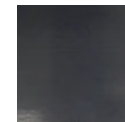
INDUSTRIAL BIPV WALL



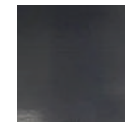
WHITE
⚡ Solar Solid Color



CUSTOM GREY
⚡ Solar Solid Color

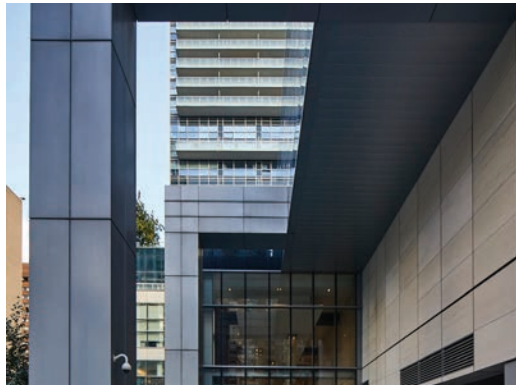


CUSTOM MIDDLE GREY
⚡ Solar Solid Color



CUSTOM DARK GREY
⚡ Solar Solid Color

PROJECT SIZE:
10,000 SQFT
POWER OUTCOME:
80 kW System
BUILDING TYPE:
Industrial



NON-ACTIVE AURA CONDOS



CUSTOM COLOUR
Coated Aluminum



PORTUGUESE LIMESTONE
Natural Stone

DEVELOPER:
Canderel Residential
ARCHITECT:
Graziani + Corazza Architects Inc.
BUILDING TYPE:
Condo, Retail





NON-ACTIVE & ⚡ACTIVE
**MITREX & CLADIFY
 HEADQUARTERS**



POLARIS
 ⚡Solar Solid Colour



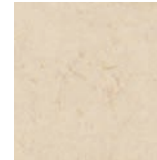
BIANCO THASSOS
 Porcelain

PROJECT SIZE:
Total: 20,000 SQFT
Active: 6,000 SQFT
 POWER OUTCOME:
60kW System
 BUILDING TYPE:
Office





NON-ACTIVE THE MONTGOMERY



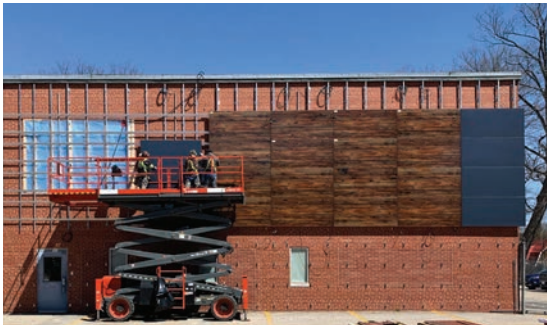
INDIANA LIMESTONE
Natural Stone



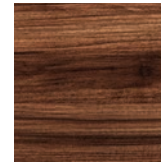
CUSTOM COLOUR
Coated Aluminum

DEVELOPER:
**Rockspot Group, Woodbourne
Canada Management, Inc.**
ARCHITECT:
Raw Design, ERA Architects
BUILDING TYPE:
Rental, Retail





⚡ ACTIVE
**MIDLAND
COURTHOUSE**



NOCCIOLA
⚡ Solar Wood



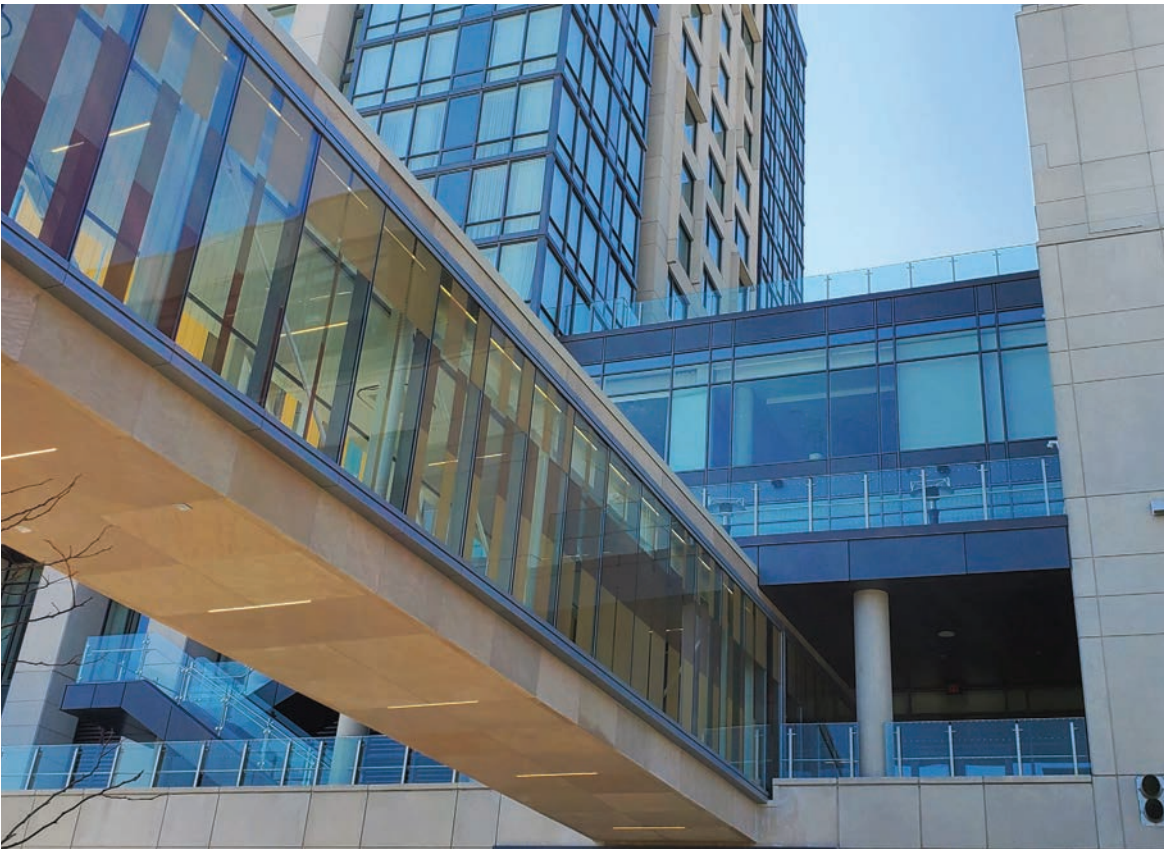
CUSTOM COLOUR
⚡ Solar Solid Colour

PROJECT SIZE:
10,000 SQFT
POWER OUTCOME:
280kW
BUILDING TYPE:
Government



NON-ACTIVE

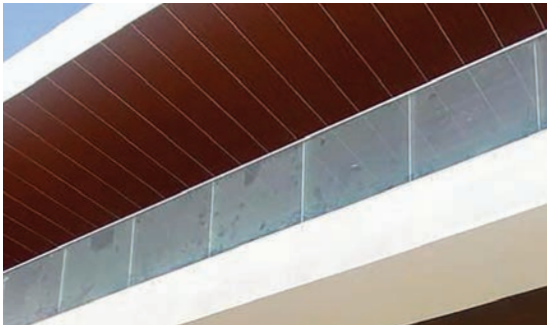
BEANFIELD CENTRE-HOTEL X PEDESTRIAN BRIDGE



INDIANA LIMESTONE
Natural Stone

DEVELOPER:
EllisDon
ARCHITECT:
NORR Architects
BUILDING TYPE:
Architectural Feature





⚡ ACTIVE
**THE SEE INSTITUTE,
DUBAI**



CUSTOM DESIGN
⚡ Solar Metal



POLARIS
⚡ Solar Solid Colour

PROJECT SIZE:
1,500 SQFT
POWER OUTCOME:
20kW
BUILDING TYPE:
Institutional

DIAMOND
DEVELOPERS



NON-ACTIVE

THE SHOPS AT LANSDOWNE PARK



WALLACE CREEK
Natural Stone



ABERDEEN
Brick

DEVELOPER:
Trinity Development Group
ARCHITECT:
Petroff Partnership Architects
BUILDING TYPE:
Commercial





⚡ ACTIVE

591 FINCH WEST



CUSTOM COLOUR

⚡ Solar Solid Colour

PROJECT SIZE:

Solar Cladding: 44,483 SQFT

Solar Railing: 655 LFT

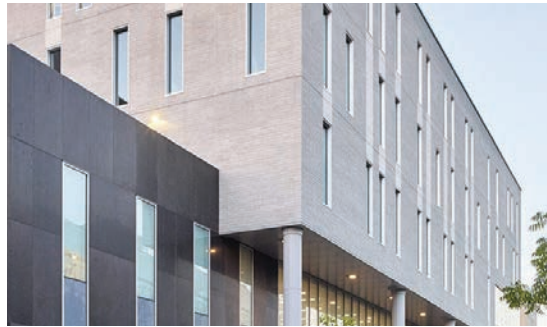
POWER OUTCOME:

375kW

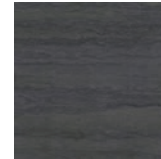
BUILDING TYPE:

Residential

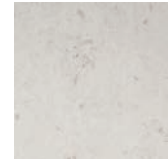
PRIME
design build



NON-ACTIVE
**COLLABORATIVE
HEALTH EDUCATION
BUILDING (CHEB)**



WALLACE CREEK
Natural Stone



PERLATO EUROPA
Natural Stone

DEVELOPER:
Dalhousie University
ARCHITECT:
**Moriyama & Teshima
Architects**
BUILDING TYPE:
Institutional



MORIYAMA & TESHIMA
ARCHITECTS






















APPENDIX

BACKING PERFORMANCE

Our composite panels with honeycomb technology perform exceptionally well in several areas core strength, impact resistance, and versatility.


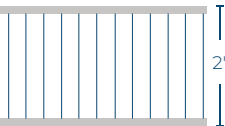
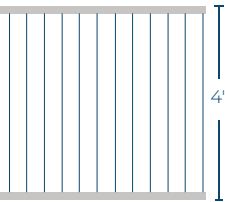
SUSTAINABLE FACADE PANELS VS. ALTERNATIVES

Our sustainable facade panels perform very well when compared to traditional options on the market including masonry and natural stone, ACM/ACP, and precast concrete. Check out the table to see how our panels compare regarding mechanical properties and performance.

	SUSTAINABLE FACADE PANELS	MASONRY & NATURAL STONE	ACM	PRECAST CONCRETE
ACOUSTIC PROPERTIES	 MED	 MED	 LOW	 MED
CHEMICAL & CORROSION RESISTANCE	 HIGH	 LOW	 HIGH	 LOW
COMPRESSION STRENGTH	 HIGH	 HIGH	 LOW	 HIGH
FIRE RESISTANCE	 HIGH	 VERY HIGH	 LOW	 VERY HIGH
FLATNESS DEFLECTION, STIFFNESS	 VERY HIGH	 LOW	 MED	 LOW
IMPACT RESISTANCE	 VERY HIGH	 MED	 LOW	 VERY HIGH
THERMAL EFFICIENCY	 HIGH	 MED	 LOW	 MED
WATER & MOISTURE RESISTANCE	 HIGH	 LOW	 HIGH	 MED

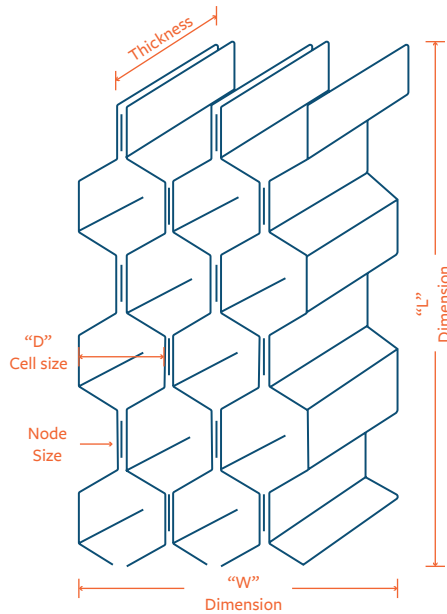
ALUMINUM HONEYCOMB SANDWICH

The aluminum honeycomb core ensures high strength and low weight of the panels. With varying thicknesses, any of your building and design needs are met.

	RELATIVE STIFFNESS	RELATIVE STRENGTH	RELATIVE WEIGHT
<p>SOLID METAL BLOCK</p>  <p>1"</p>	100	100	100
<p>HONEYCOMB SANDWICH</p>  <p>2"</p>	700 7X Stiffer	350 3.5X Stronger	103 3% Weight Increase
<p>THICKER SANDWICH</p>  <p>4"</p>	3700 37X Stiffer	925 9.25X Stronger	106 6% Weight Increase

ALUMINUM HONEYCOMB CORE

ALUMINUM HONEYCOMB NODE & CELL SIZE



MAXIMUM STRETCHED SIZE OF NODES									
NODE (A) (MM)	4	5	6	7.5	10	12	15	20	30
CELL SIZE (D) (MM)	1/4	1/3	3/8	1/2	3/4	4/5	1	1	2
ALUMINUM FOIL THICKNESS (MM)	0.04 - 0.06	0.04 - 0.06	0.04 - 0.06	0.04 - 0.06	0.04 - 0.06	0.04 - 0.06	0.04 - 0.06	0.04 - 0.06	0.04 - 0.08

COMPRESSIVE & SHEAR STRENGTH - ROOM TEMPERATURE

PRODUCT		COMPRESSION		SHEAR			
DENSITY	CELL SIZE (D)	STABILIZED		PARALLEL TO GLUE L DIRECTION		W DIRECTION	
KG/M ³ (LB/FT ³)	MM (IN)	STRENGTH (MPa)	MODULUS (MPa)	STRENGTH (MPa)	MODULUS (MPa)	STRENGTH (MPa)	MODULUS (MPa)
29 (1.8)	19 (3/4)	0.9	165	0.65	110	0.4	55
37 (2.3)	9.5 (3/8)	1.4	240	1.4	190	0.45	90
42 (2.6)	12.7 (1/2)	1.5	275	1.5	220	0.5	100
54 (3.4)	6.35 (1/4)	2.5	540	2.5	260	0.85	130
59 (3.7)	9.5 (3/8)	2.6	630	2.6	280	0.9	140
83 (5.2)	6.35 (1/4)	4.6	1000	4.6	440	1.5	220



APPENDIX

LEED RATINGS

Our solutions can meaningfully contribute to new builds and retrofits gaining top LEED designations. Our cladding system allows buildings to have outstanding energy efficiency.

NON-ACTIVE PANELS LEED POINTS

Non-active panels can contribute to a possible 33 points for a project.

CATEGORY	DESCRIPTION	MAXIMUM POINTS AVAILABLE IN CATEGORY	HOW MANY POINTS CAN CLADIFY CONTRIBUTE
ENERGY & ATMOSPHERE	The Energy and Atmosphere (EA) category is about designing a building that uses as little energy as possible through conservation, efficiency, and the use of alternative renewable energy sources.	17	UP TO 10
		Optimize Energy Performance On-Site Renewable Energy Enhanced Commissioning Enhanced Refrigerant Management Measurement and Verification Green Power	Optimize energy performance
MATERIALS AND RESOURCES	The Materials and Resources (MR) category is about minimizing the energy and environmental impacts associated with the extraction, processing, transport, maintenance, and disposal of building materials. A full life cycle approach is taken with materials, vs a one-time consideration.	14	UP TO 11
		Storage and Collection of Recyclables Building Reuse: Maintain Existing Walls, Floors, and Roof Building Reuse: Maintain Interior Non-Structural Elements Construction Waste Management Materials Reuse Recycled Content Regional Materials Rapidly Renewable Materials Certified Wood	Recycled Content Regional Materials Building Reuse Construction Waste Management Material Reuse
INDOOR ENVIRONMENTAL QUALITY	The Indoor Environmental Quality (EQ) category addresses indoor air quality and thermal, visual, and acoustic comfort. This comfort has been shown to enhance productivity, decrease absenteeism, and improve the building's value.	15	UP TO 7
		Minimum Indoor Air Quality Performance Required Environmental Tobacco Smoke (ETS) Outdoor Air Delivery Monitoring Increased Ventilation Construction Indoor Air Quality Management Plan: During Construction Construction Indoor Air Quality Management Plan: Before Occupancy Low-Emitting Materials: Adhesives and Sealants Low-Emitting Materials: Paints and Coatings Low-Emitting Materials: Flooring Systems Low-Emitting Materials: Composite Wood and Agrifibre Products Indoor Chemical and Pollutant Source Control Controllability of System: Lighting Controllability of System: Thermal Comfort Thermal Comfort: Design Thermal Comfort: Verification Daylight and Views: Daylight Daylight and Views: Views	Thermal Comfort Design Thermal Comfort Verification Indoor Air Quality Low Emitting Materials
INNOVATION IN DESIGN	The Innovation and Design Process (IN) category is about finding new, innovative features for buildings, and going above and beyond sustainable building practices and strategies.	6	UP TO 5
		Innovation in Design LEED® Accredited Professional	Innovation in Design

⚡ ACTIVE PANELS LEED POINTS

Active panels can contribute up to 40 LEED points for a project.

CATEGORY	DESCRIPTION	MAXIMUM POINTS AVAILABLE IN CATEGORY	HOW MANY POINTS CAN MITREX CONTRIBUTE
ENERGY AND ATMOSPHERE	The Energy and Atmosphere (EA) category is about designing a building that uses as little energy as possible through conservation, efficiency, and the use of alternative renewable energy sources.	35	UP TO 28
		Optimize Energy Performance On-Site Renewable Energy Enhanced Commissioning Enhanced Refrigerant Management Measurement and Verification Green Power	Optimize Energy Performance On-Site Renewable Energy Enhanced Green Power
MATERIALS AND RESOURCES	The Materials and Resources (MR) category is about minimizing the energy and environmental impacts associated with the extraction, processing, transport, maintenance, and disposal of building materials. A full life cycle approach is taken with materials, vs a one-time consideration.	14	UP TO 5
		Storage and Collection of Recyclables Building Reuse: Maintain Existing Walls, Floors, and Roof Building Reuse: Maintain Interior Non-Structural Elements Construction Waste Management Materials Reuse Recycled Content Regional Materials Rapidly Renewable Materials Certified Wood	Recycled Content Regional Materials Rapidly Renewable
INDOOR ENVIRONMENTAL QUALITY	The Indoor Environmental Quality (EQ) category addresses indoor air quality and thermal, visual, and acoustic comfort. This comfort has been shown to enhance productivity, decrease absenteeism, and improve the building's value.	15	UP TO 2
		Minimum Indoor Air Quality Performance Required Environmental Tobacco Smoke (ETS) Outdoor Air Delivery Monitoring Increased Ventilation Construction Indoor Air Quality Management Plan: During Construction Construction Indoor Air Quality Management Plan: Before Occupancy Low-Emitting Materials: Adhesives and Sealants Low-Emitting Materials: Paints and Coatings Low-Emitting Materials: Flooring Systems Low-Emitting Materials: Composite Wood and Agrifibre Products Indoor Chemical and Pollutant Source Control Controllability of System: Lighting Controllability of System: Thermal Comfort Thermal Comfort: Design Thermal Comfort: Verification Daylight and Views: Daylight Daylight and Views: Views	Thermal Comfort Design Thermal Comfort Verification
INNOVATION IN DESIGN	The Innovation and Design Process (IN) category is about finding new, innovative features for buildings, and going above and beyond sustainable building practices and strategies.	6	UP TO 5
		Innovation in Design LEED® Accredited Professional	Innovation in Design

A close-up photograph of several composite honeycomb panels. The panels are arranged in a row, showing their layered structure and the hexagonal honeycomb core. The top surfaces of the panels are smooth and have different finishes: one is dark grey, another is light grey, and a third is a light tan color. The panels are resting on a dark, textured surface. A blue semi-transparent rectangular box is overlaid on the left side of the image, containing white text.

APPENDIX

UNIQUE PERFORMANCE CHARACTERISTICS

As one of the world leaders in composite honeycomb panels, our products observe rigorous quality control procedures and testing well beyond the minimum codes. The large missile impact test is just an example.

LARGE MISSILE IMPACT

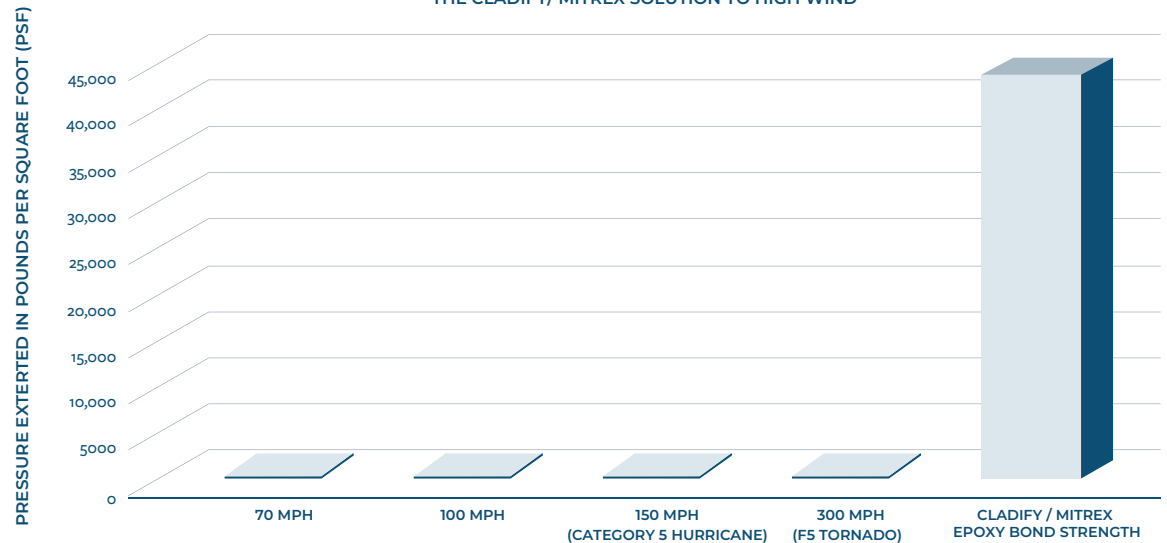
Our sustainable facades, unlike solid stone, stand up exceptionally well to the ASTM large missile impact test.

With an impact resistance of up to 60 times greater than 1.5" dimensional granite, it holds up to flying debris. You can see that a 2" x 4" x 8' wood stud literally bounces off the panel without shattering it.

The panels derive their strength from the aluminum honeycomb core bonded to the facing material with high performance aviation epoxy. Both components are used on aircraft fuselages whose surfaces experience wind speeds of thousands of miles per hour.

STRENGTH	PER SQUARE FOOT (lb/ft ²) PRESSURE EXERTED IN POUNDS
70 MPH	12.544
100 MPH	25.6
150 MPH (CATEGORY 5 HURRICANE)	57.6
300 MPH (F5 TORNADO)	230.4
CLADIFY / MITREX EPOXY BOND STRENGTH	44000

THE CLADIFY/ MITREX SOLUTION TO HIGH WIND





APPENDIX

TESTING

Buildings encapsulated in an envelope of flexible and ductile composite honeycomb panels have fire resistant properties, thoroughly protecting structures from multiple hazards.

PROTECTING BUILDINGS & PEOPLE

The superior all-aluminum honeycomb panel core can catch flying debris resulting from hurricane force winds. And with a blast-resistant curtain wall and glazing, the blast-resistant cladding can mitigate the danger to life and property from blast events.

NON-ACTIVE PANELS GENERAL TESTING

TEST	SPECIFICATION	METHODOLOGY	RESULT
Salt Spray Resistance	ASTM B117 - 16	1000 Hours of exposure.	No deleterious effects.
Specific Gravity and Water Absorption	ASTM C97 / C97M - 15	Limestone was tested.	0.992 @ 23 °C and 0.4% Respectively.
Compressive Strength	ASTM C170 / C170M - 17	Limestone was tested.	1.57 MPa (228psi).
Density of Sandwich Core	ASTM C271 / C271M - 16	12" x 12" x 0.6".	327 kg/m ³ (20.42 lbm / ft ³).
Shear Stress and Shear Modulus	ASTM C273 / C273M - 18	Compressive force applied until rupture.	Ultimate Core Shear Strength = 1.01 MPa (147 psi). Core Shear Modulus = 10.9MPa (1583 psi).
Flatwise Tensile Bond Strength	ASTM C297 / C297M - 16	Load was applied to the top and bottom layers of the composite panel.	1.52 MPa (220 psi).
Edgewise Compressive Strength	ASTM C364 / C364M - 16	Compressive load was applied at the rate of 0.02 in/min.	Ultimate Compressive Strength = 37.85 MPa (5490 psi).
Flatwise Compressive Strength	ASTM C365	Speed of testing – 2mm/min.	1.92 MPa (278 psi).
Shear Strength by Beam Flexure	ASTM C393 / C393M - 16	Loaded in flexure with stone facing side in tension at a cross head speed of 0.025 in/min.	Maximum Core Shear Strength = 0.94 MPa (137 psi). Facing Bending Stress = 8.14 MPa (1180 psi).
Flexure Creep Evaluation	ASTM C480 / C480M - 16	Midspan loading setup was used with stone facing side in tension at cross head speed of 0.025 in/min, until the target load of 400 lbf was achieved.	Net Creep (in/day) stone facing - 0.029.
Laboratory Aging of Sandwich Construction	ASTM C481 - 99 (Reapproved 2016)	Procedure A, for six repetitions of following load cycle is applied: Immerse in water at 50°C for 1h. Spray with steam at 95°C for 3h. Store at -12°C for 20h. Heat at 100°C for 3h. Spray with steam at 95° for 3h. Heat in dry air at 100 °C for 18h.	ASTM C273; C297, C364; C393 tests were reconduted after aging: The variation was +1.39%; -5-90%; +2.55%; -7.95% Note: +ve variation indicates decrease in strength after aging.
Resistance of Rapid Freezing and Thawing	ASTM C666 / C666M - 15	200 Cycles of rapid freeze and thaw (4°C to - 18°C).	No visible change to stone, aluminum, or adhesive.
Flexural Strength	ASTM C880 / C880M - 15	Tested a composite panel with granite stone.	18.13 MPa (2630 psi).
Tensile Properties of Adhesive Bond	ASTM D897 - 08 (2016)	The adhesive bond never failed.	No Failure.
Screw Withdrawal test	ASTM D1761	Testing Speed: 2.5 mm/min.	2046 N.
Damage Resistance Testing Sandwich Constructions	ASTM D7766 / D7766M - 16	Load was applied at the specimen midpoint through a 0.5 in. diameter hemispherical steel indenter at a constant rate of 0.01 in/min until a drop-in load was observed.	No panel deformation.

NON-ACTIVE PANELS GENERAL TESTING

When designing for a single hazard such as a blast event, it is important to consider how the material selected for blast-resistance may conflict with protection from other hazards. It is good to know that our panels perform very well against all five of what the American FEMA Agency considers “extreme hazards”.

TEST	SPECIFICATION	METHODOLOGY	RESULT
Air Leakage Resistance	ASTM E283 - 04 (2012)	Air infiltration and exfiltration tests were performed using test pressure of 75 Pa (1.57 psf). The maximum air leakage rate was calculated and compared to the allowable air leakage.	Passed the test. Infiltration rate = 0.00 L/sm ² (0 cfm/ft ²) & exfiltration rate = 0.01 L/sm ² (0.002/ft ²) at 75 Pa test pressure.
Static Pressure	ASTM E330-00 (2016)	The test specimen was also tested to failure with both positive and negative loads. The specimen only showed a permanent deflection of 0.10mm with a test a load of + 5760 Pa (120psf). The specimen failed at -5006 Pa, the rivets at the backside of the specimen failed.	All the panels tested met or exceeded requirements.
Uniform Static Deflection	ASTM E330-02	The test specimen was tested to ±3840 Pa (80.2 psf) to examine the deflection of 2440mm panel, the specimen showed a maximum net deflection of 4.14mm under positive test pressure and 4.93 mm under negative load.	No failure or permanent damage.
Large Missile Impact Test	ASTM E1996 - 14a	Standard Specification for performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.	Passed the test. A weighted 2x4 was fired at the Cladify panel at 50 fps.
Fluorescent Ultraviolet Radiation Exposure	ASTM G154 - 16	2000 Hours of UV exposure.	No visible change to stone, aluminum, or adhesive.
Thermal Resistance	ASTM 1363 - 11	Thermal Performance of Building Materials and Envelope Assemblies by Means of Hot Box Apparatus.	0.20 m ² °C/W (1.12hr - ft ² - °F/BTU).
Linear Thermal Expansion	ISO 10545 - 8	Tested from room temperature to 100°C.	12.53 X 10 - 6 per °C.
Cyclic Pressure Loading	ASTM E1886 - 13a	Standard test method for performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic pressure differentials.	Passed the test. Over 3,500 positive and negative pressure cycles were applied at ±2880 Pa (60psf), equivalent wind of 165 mph.
Water Penetration Resistance	ASTM E331 - 00 (2016)	During the 15 - minute test period, using a pressure differential of 720 Pa (15.0 psf), there was no water leakage observed.	No water leakage.

NON-ACTIVE PANELS FIRE TESTING

Non-active composite panels are inherently flame resistant. They are composed of non-combustible materials that have passed the CAN/ULC S114 test. Non-active panels have a CAN/ULC S102 flame spread index of 0 and a smoke contribution of 40. The “smoke contribution” is primarily water vapour and can vary. This gives the panels a Class A rating under the NFPA standard or Class 1 rating under the UBC standard.

NON-ACTIVE PANELS SPECIFIC TESTING

TEST	METHOD	RESULT
ACCELERATED WEATHERING IN ACID BATH	100 cycles of freeze + heat -10 to 170 °F while partially submerged in a 4ph sulphurous acid solution	Less than 11% reduction in flexural strength. No significant difference in load deflection of exposed vs. not exposed specimens
TEMPERATURE CYCLING	Panel 42" by 58" exposed to 130 cycles rapid heating and cooling from 140 to 65 °F	No damage or browning Recorded 272 psi tensile bond strength
FASTENER PULL OUT STRENGTH	Self-drilling #8 screws by 1/2" long	97 lbs. average per screw
DEFLECTION	Panel 24" by 34" center loaded with 1,600 lbs Supports placed at 34"	Deflection less than 0.032

NON-ACTIVE PANELS FIRE TESTING

TEST	METHOD	RESULT
TUNNEL TEST	ASTM E84	Sample passed the test with Flame Spread Index = 0; Smoke developed index = 0.
SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIAL	CAN/ULC S102	The panel received the Flame Spread Rating = 0 & Smoke Developed Classification = 40.
NON-COMBUSTIBILITY IN BUILDING MATERIALS	CAN/ULC S114	The Cladify material passed the test requirements. The observations were, there was no visible smoke or flame. The sample did not have a maximum temperature rise of more than 36 °C on the indicating thermocouple. The sample did not lose more than 20% of their original mass.
EVALUATION OF FIRE PROPAGATION CHARACTERISTICS OF EXTERIOR WALL ASSEMBLIES	NFPA 285	Passed.
MULTI-STORY FIRE TEST	CAN / ULC S134	Passed.
FIRE ENDURANCE TESTS OF BUILDING CONSTRUCTION AND MATERIALS	CAN / ULC S101	1 hr Fire Exposure - The Cladify material did not affect rated wall assembly.

⚡ ACTIVE PANELS GENERAL TESTING

Active panels testing and results are above and beyond the minimums required by building and PV codes. Testing is performed by independent laboratories and universities as well as our research and manufacturing facility.

⚡ ACTIVE PANELS GENERAL TESTING

TEST	SPECIFICATION	METHODOLOGY	RESULT
Salt Spray Resistance	ASTM B117-16	1000 Hours of exposure	No deleterious effects
Density of Sandwich Core	ASTM C271/C271M-16	12" X 12" X 0.6"	327 kg/m ³ (20.42 lbf/ft ³)
Shear Stress and Shear Modulus	ASTM C273/C273M-18	Compressive force applied until rupture	Ultimate Core shear strength = 1.01 MPa (147 psi) Core shear Modulus = 10.9 MPa (1583 psi)
Flatwise Tensile Bond Strength	ASTM C297/C297M-16	Load was applied to the top and bottom layers of the composite panel	1.52 MPa (220 psi)
Edgewise Compressive Strength	ASTM C364/C364M-16	Compressive load was applied at a rate of 0.02 in/min	Ultimate Compressive Strength = 37.85 MPa (5490 psi)
Flatwise Tensile Bond Strength	ASTM C365	Load was applied to the top and bottom layers of the composite panel	1.52 MPa (220 psi)
Shear Strength by Beam Flexure	ASTM C393/C393M-16	Loaded in flexure with facing side in tension at a cross head speed of 0.025 in/min.	Maximum Core Shear Strength = 0.94 MPa (137 psi) Facing Bending Stress = 8.14 MPa (1180 psi)
Flexure Creep Evaluation	ASTM C480/C480M-16	Midspan loading setup was used with facing side in tension at a cross head speed of 0.025 in/min. until achieved.	Net Creep (in/day) Facing - 0.029.
Laboratory Aging of Sandwich Construction	ASTM C481-99 (Reapproved 2016)	Procedure A, for six repetitions of following load cycle is applied: Immerse in water at 50 °C for 1h Spray with steam at 95 °C for 3h Store at -12 °C for 20h Heated at 100 °C for 3h Spray with steam at 95 °C for 3h Heat in dry air at 100 °C for 18h	ASTM C273; C297; C364; C393 tests were reconducted after aging: the variation was +1.36 %, -5.90%; +2.55%; -7.95% Note: Positive variation indicates no decrease in strength after aging.
Resistance to Rapid Freezing and Thawing	ASTM C666/C666M-15	200 cycles of rapid freeze and thaw (4 °C to -18 °C)	No visible change to facing, aluminum, or adhesive
Flexural Strength	ASTM C880/C880M-15	Tested a Composite panel with Mitrex panel	22.83 MPa (3311.21 psi)
Tensile Properties of Adhesive Bond	ASTM C897-08 (2016)	The adhesive bond never failed	No Failure

⚡ ACTIVE PANELS GENERAL TESTING

A few of our mechanical tests include ASTM E1996-14a Missile Impact Testing, ASTM E331-00 Water Penetration Testing, ASTM E1886-13a Pressure Cycling Testing, and more.

TEST	SPECIFICATION	METHODOLOGY	RESULT
Tensile Properties of Adhesive Bond	ASTM C897-08 (2016)	The adhesive bond never failed	No Failure
Screw Withdrawal Test	ASTM D1761	Testing Speed: 2.5 mm/min	2124 N
Damage Resistance Testing of Sandwich Constructions	ASTM D7766/D7766M-16	Load was applied at the specimen midpoint through a 0.5 in. diameter hemispherical steel indenter at a constant rate of 0.01 in/min until a drop-in load was observed.	No panel deformation
Air Leakage Resistance	ASTM E283-04 (2012)	Air infiltration and exfiltration tests were performed using test pressure of 75 Pa (1.57 psf). The maximum air leakage rate was calculated and compared to the allowable air leakage.	Passed the test infiltration rate = 0.00 L/s.m ² (0 cfm/ft ²) & exfiltration rate = 0.01 L/s.m ² (0.002 cfm/ft ²) at 75 Pa test pressure
Static Pressure	ASTM E330-00 (2016)	The test specimen was also tested to failure with both positive and negative loads. The specimen only showed a permanent deflection of 0.10 mm with a test load of +5760 Pa (120 psf). The specimen failed at -5006 Pa, the rivets at the backside of the specimen failed.	All the panels tested met or exceeded requirements
Uniform Static Deflection	ASTM E330-02	The test specimen was tested to ±3840 Pa (80.2 spf) to examine the deflection of 2440 mm panel, the specimen showed a maximum net deflection of 4.14 mm under positive test pressure and 4.93 mm under negative load.	No failure or permanent damage
Large Missile Impact Test	ASTM E1996-14a	Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.	Passed the test. A weighted 2×4 was fired at the Mitrex panel at 50 fps.
Fluorescent Ultraviolet Radiation Exposure	ASTM G154 -16	2000 hours of UV exposure	No visible change to Glass, aluminum, or adhesive

⚡ ACTIVE PANELS GENERAL TESTING

The active panels meet all fire safety certifications to ensure our PV products are code compliant. The fire tests include but are not limited to: CAN/ULC S134-92 Standard Method of Fire Test of Exterior Wall Assemblies, CAN/ULC S102:2018 Surface Burning Characteristics of Building Materials, CAN/ULC S114 Determination of Non-Combustibility, and ASTM E119 Fire Rating Test.

TEST	SPECIFICATION	METHODOLOGY	RESULT
Thermal Resistance	ASTM 1363-11	Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus	0.20 m2 oC/W (1.12 hr-ft2-oF/BTU)
Cyclic Pressure Loading	ASTM E1886-13a	Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials	Passed the test. Over 3,500 positive and negative pressure cycles were applied at ± 2880 Pa (60 psf), equivalent wind load of 165 mph.
Water Penetration Resistance	ASTM E331-00(2016)	During the 15-minute test period, using a pressure differential of 720 Pa (15.0 psf), there was no water leakage observed.	No water leakage

⚡ ACTIVE PANELS FIRE TESTING

TEST	SPECIFICATION	RESULT
Tunnel Test	ASTM E84	Sample passed the test with Flame Spread Index = 0; smoke developed index = 0.
Non-Combustibility in Building Materials	ASTM E136	Mitrex sample passed the test requirements. There was no visible smoke or flame. The sample did not have a maximum temperature rise of more than 96.8°C on the indicating thermocouple. The samples did not loose more than 20% of their original mass.
Standard Method Fire Test of Exterior Wall Assemblies	S134	Passed.
Multi-Story Fire Test	NFPA 285	Passed.
Fire Endurance Tests of Building Construction and Materials	ASTM E119	1 hr Fire Exposure - The Mitrex Material did not affect the fire rated wall assembly.
Fire Classification of Construction Products and Building Elements	EN13501	Rating: A2-s1,d0

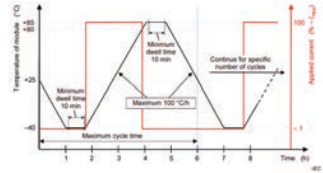
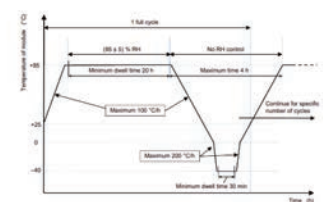
⚡ ACTIVE PANELS SOLAR QUALITY TESTING IEC 61215

The certifications for PV modules include CSA, UL, and IEC. These certifications are based on numerous standards, some being: UL 61215, UL 61730, CSA C22.2 No. 61730, CSA C22.2 No. 61215, IEC 61215, and IEC 61730.

TEST	DESCRIPTION
MQT 01 Visual Inspection	<p>To detect any visual defects in module:</p> <ul style="list-style-type: none"> · Broken, cracked, or torn external surfaces. · Bent or misaligned external surfaces, including superstrates, substrates, frames and junction boxes to the extent that the operation of the PV module would be impaired. · Bubbles or delaminations forming a continuous path between electric circuit and the edge of the module. · If the mechanical integrity depends on lamination or other means of adhesion, the sum of the area of all bubbles shall not exceed 1% of the total module area. · Evidence of any molten or burned encapsulant, backsheet, front sheet, diode or active PV component. · Loss of mechanical integrity to the extent that the installation and operation of the module would be impaired. · Cracked/broken cells which can remove more than 10% of the cell's photovoltaic active area from the electrical circuit of the PV module. · Voids in, or visible corrosion of any of the layers of the active (live circuitry of the module extending over more than 10% of any cell. · Broken interconnections, joints or terminals. · Any short-circuited live parts or exposed live electrical parts. · Module markings (label) are no longer attached, or the information is unreadable.
MQT 02 Maximum Power Determination	Checking the functionality of module and maximum power by checking the I-V curve.
MQT 03 Insulation Test	HiPot test with voltage of 3000V for PV modules with voltage system of 1000V for 1 min. again another HiPot test for 2 min with 1000V (system voltage).
MQT 04 Measurement of Temperature Coefficients	Determining temperature coefficients of current, voltage and peak power from module measurement.
MQT 05 Measurement of Nominal Module Operating Temperature (NMOT)	Determining the solar module characteristics (Voc, Isc and Pmax) in 800 W/m ² , 20 degree and wind speed of 1m/s.
MQT 06 Performance at STC and NMOT	Checking the short circuit current (Isc) and open circuit voltage (Voc) and IV-curve and comparing with the rating with tolerances for both STC (1000 W/m ² , 25 degree and AM = 1.5) and NMOT (800 W/m ² , 20 degree and wind speed of 1 m/s) conditions.
MQT 07 Performance at Low Irradiance	Determining the current-voltage characteristics of module at 25 degree and low irradiance of 200 W/m ² and having IV curve result.
MQT 08 Outdoor Exposure Test	Installing the module outdoor with load around its maximum power for at least 60 kWh/m ² . No defect should be found.
MQT 09 Hot-Spot Endurance Test	Determining ability of module against hot-spot effects like solder melting or deterioration caused by faulty cells, mismatched cells, shadowing, or soiling. Using I-V curve tracer and IR scan to check the hot-spot by making shadow for every single cell.

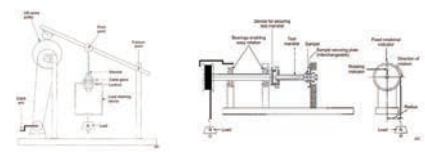
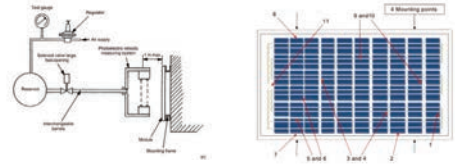
⚡ ACTIVE PANELS SOLAR QUALITY TESTING IEC 61215

Check out the certifications for IEC 61215– focused on ensuring the quality of PV modules.

TEST	DESCRIPTION
MQT 10 UV Preconditioning Test	Install the module in a chamber with only UV light (between 280nm to 320 wavelength and 320 to 400nm) with maximum 50W/m2 and short-circuited module (or with load in maximum power) at the 60 degree temperature. Subject the module to total UV irradiance of at least 15kWh/m2 in the wavelength range between 280 to 400nm.
MQT 11 Thermal Cycling Test	<p>Testing the module by changing the temperature repeatedly. Module to be installed in the chamber with temperature sensor attached to its middle. The temperature should change with no more than 100 degree per hour and stay at -40 and 85 for at least 10 min. during the test, module will carry the current when temperature increasing from -40 to 80 degree only. Below process will be taken 50 or 200 times.</p> 
MQT 12 Humidity Freeze Test	<p>Testing the module in high temperature and humidity followed by sub-zero temperature. Temperature will arise to 85 degree at maximum 100 degree per hour and keep the module for 20h in humidity of RH 85%. Then cool down to zero and then -40 degree by the speed of max 100 and 200 degree per hour. And keep for 30 min. do this process for 10 cycles.</p> 
MQT 13 Damp Heat Test	Testing the ability of module for long term humid environment. The module will be at 85-degree temperature and 85 percent relative humidity and keep it there for 1000 h (or 200 h for another test) and no defect should be found.
MQT 14 Robustness of Terminations	<p>Checking capability of withstanding of cables and termination attachments against stresses. Force of 40N for 10s in different direction will be applied to junction box to test its retention on module surface. Cable will be pulled 50 times for 1s in the direction or the axis and then torque test will be applied for 1 min.</p>

⚡ ACTIVE PANELS SOLAR QUALITY TESTING IEC 61215

IEC 61215 ensures the modules meet the requirements for the design qualification and that they are suitable for long-term operation in general open-air climates. Our solar cladding panels met the test requirements guaranteeing the quality of our modules.

TEST	DESCRIPTION
	
MQT 15 Wet Leakage Current test	Putting module in the tank of required solution to a depth sufficient to cover all surfaces (except junction box not designed for immersion). Then doing HiPot test for 2 min at system voltage (1000V).
MQT 16 Static Mechanical Load Test	Testing ability of withstanding with minimum static load. During the test electrical continuity of internal circuit should be monitored. Fixing the module on mounting base and applying 1 hour of 1.5 times of design load (per manufacturer) in front and back of the module respectively for three cycles.
MQT 17 Hail Test	Testing the effect of hitting hail on the module surface (different location). Module will be installed on 90 degree tilt and room temperature. 11 hail ball at the diameter of minimum 25mm and speed of minimum 23 m/s will be fired through launcher. No major defect should be found. 
MQT 18 Bypass Diode Testing	Checking the forward voltage of diode with short circuit current in 30, 50, 70 and 90 degree Celsius, then keep the current 100% and 125% of short circuit current for one hour and check the forward voltage at 75 degree. Then checking the functionality of diode after test. It could be done by successive IV-Curve tracer at maximum power by having shaded the strings to turn the diode ON or connecting the IV-Curve tracer in reverse polarity to turn the diode ON.
MQT 19 Stabilization	Checking the power of module to make sure it is stabilized electrically. The power testing on three consecutive should follow below relation: $(P_{max} - P_{min}) / P_{average} < x$ Stabilization will be done in the beginning to check the label of each module and at the end of test to make sure degradation did not affect on the modules.

⚡ ACTIVE PANELS SOLAR QUALITY TESTING IEC 61215

IEC 61730 ensures the PV modules are mechanically and electrically safe and operable. Learn more about the testing below.

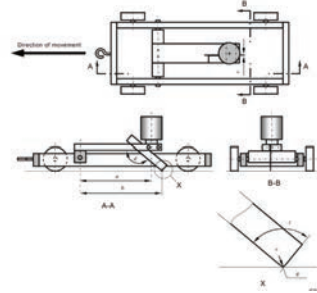
TEST	DESCRIPTION
	<p>IEC classified the tests in few categories just to have better view on all tests as follow:</p> <ul style="list-style-type: none"> · Environmental stress tests (MST 51, MST 52, MST 53, MST 54, MST 55, MST 56) · General inspection tests (MST 01, MST 02, MST 03, MST 04, MST 05, MST 06, MST 07) · Electrical shock hazard tests (MST 11, MST 12, MST 13, MST 14, MST 16, MST 17, MST 42) · Fire hazard tests (MST 21, MST 22, MST 23, MST 24, MST 25, MST 26) · Mechanical stress tests (MST 32, MST 33, MST 34, MST 35, MST 36, MST 37, MST 42)

⚡ ACTIVE PANELS SOLAR SAFETY TESTING IEC 61730

TEST	DESCRIPTION
MST 01 Visual Inspection	Checking any visual defect or change in the module; (marking, sharp edge, bubbles, crack, delamination, bent, mechanical integrity, ...)
MST 02 Performance at STC	Checking the short circuit current (Isc) and open circuit voltage (Voc) and comparing with the rating with tolerances (same as MQT 06)
MST 03 Maximum Power Determination	Checking the functionality of module and maximum power by checking the I-V curve (same as MQT 02)
MST 04 Insulation Thickness Test	Checking the thickness of insulation thin layers (backsheet) in three points as worst cases at solder connection, edge of frameless PV modules, laminator membrane indents. The measurement should be bigger than requirement (0.15mm+tolerance%)
MST 05 Durability of Marking	Checking durability and legibility of markings on the solar panels with medium pressure 15 second by hand and cloth soaked with water and again with petroleum spirits.
MST 06 Sharp Edge Test	Accessible part of solar modules should be smooth and free from sharp edges, burrs, ...
MST 07 Bypass Diode Functionality Test	Checking the functionality of diode after test. It could be done by successive IV-Curve tracer at maximum power by having shaded the strings to turn the diode ON or connecting the IV-Curve tracer in reverse polarity to turn the diode ON. (same as MQT 18.2)
MST 11 Accessibility Test	Checking the insulation resistance off all part of module that may be accessible to the live part by cylindrical test fixture at the pressure of 10N and at all time the resistance should be higher than 1MΩ.

⚡ ACTIVE PANELS SOLAR SAFETY TESTING IEC 61730

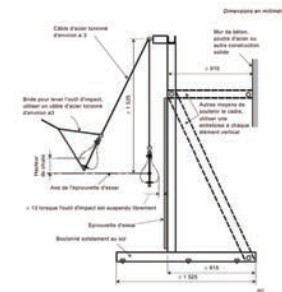
IEC 61730 ensures the PV modules are mechanically and electrically safe and operable in terms of the construction of the panels.

TEST	DESCRIPTION
MST 12 Cut susceptibility Test	<p>Testing withstanding of polymeric material surface of module with specific fixture with force of 9N.</p> 
MST 13 Continuity Test of Equipotential Bonding	<p>Verifying continuous path between accessible conductive parts. Applying 2.5 times of maximum protective device current (for example 15A x 2.5) and checking the voltage for different conductive parts. Resistive should be less than 0.1Ω.</p>
MST 14 Impulse Voltage Test	<p>Testing capability of insulation of PV module against overvoltage (from atmosphere like impulse and switching of low-voltage equipment). Module will be covered by conductive metal foil and surge voltage will be applied to module. Dielectric should not breakdown.</p>
MST 16 Insulation Test	<p>HiPot test with voltage of 6000V for PV modules with voltage system of 1000V. (same as MQT 03)</p>
MST 17 Wet Leakage Current Test	<p>Putting module in the tank of required solution to a depth sufficient to cover all surfaces (except junction box not designed for immersion). Then doing HiPot test for 2 min at system voltage (1000V). (same as MQT 15)</p>
MST 21 Temperature Test	<p>Putting module on black painted wooden platform and checking the temperature of different location of module (normalised by changing of ambient temperature) in maximum power and no wind. Normalized temperature should not reach TI/RTE/RTI. (for example 90 degree)</p>
MST 22 Hot-Spot Endurance	<p>Determining ability of module against hot-spot effects like solder melting or deterioration caused by faulty cells, mismatched cells, shadowing, or soiling. Using I-V curve tracer and IR scan to check the hot-spot by making shadow for every single cell. (same as MQT 09)</p>

⚡ ACTIVE PANELS SOLAR SAFETY TESTING IEC 61730

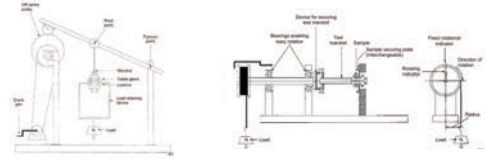
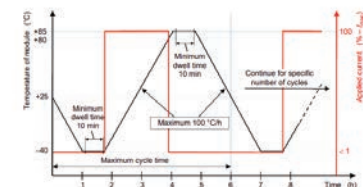
Rest assured that our facades with integrated solar components meet the utmost standards for photovoltaic equipment.

TEST	DESCRIPTION
MST 23 Fire Test	Fundamental requirements for fire safety are not internationally harmonised. Fire resistance requirements for a PV module intended for building applications are defined in local or national building codes.
MST 24 Ignitability Test	Testing ignitability of vertical mounted PV by direct small flame under zero irradiance by external heat source. All exposed combustible material will be tested (but junction boxes, cables, and connectors). Flame will be applied at least 40mm above the bottom edge of the sample for 15s.
MST 25 Bypass Diode thermal test	Checking the forward voltage of diode with short circuit current in 30, 50, 70 and 90 degree Celsius, then keep the current 100% and 125% of short circuit current for one hour and check the forward voltage at 75 degree. Then following MST 07 for checking the functionality of diode. (same as MQT 18)
MST 26 Reverse Current Overload Test	Checking the risk of fire or ignition in reverse current situation. Putting module facedown to the mounting and covered by white tissue paper. Back of module should be covered by single layer of white tissue paper. With no irradiance, 1.35 times of maximum fuse size should apply to the module in reverse direction. No glass break or flaming should happen.
MST 32 Module Breakage Test	The weight of bag is around 45.5kg. Module should be mount on the frame and bag should be max 13mm far from surface and max 50mm from the centre of module. Drop height should be 300mm, and release after stabilizing.
MST 33 Screw Connections Test	Testing screws and nuts in completely loosening and tightening (to the specified torque) for five times.
MST 34 Static Mechanical Load	Testing ability of withstanding with minimum static load. During the test electrical continuity of internal circuit should be monitored. Fixing the module on mounting base and applying 1 hour of 1.5 times of design load (per manufacturer) in front and back of the module respectively for three cycles. (same as MQT 16)

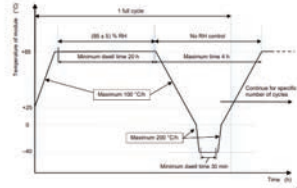


ACTIVE PANELS SOLAR SAFETY TESTING IEC 61730

Specific areas of focus for IEC 61730 include safe electrical and mechanical operation, prevention of electric shock, fire hazards, or personal injury from module handling. Read through our detailed testing documentation to learn more about our sustainable facades.

TEST	DESCRIPTION
MST 35 Peel Test	This test is only for cemented joint. Not sure this test is applicable to our product (based on the tables 3 and 4 of IEC 61730-1). But include tensile test in some adhesion part between encapsulant and back-sheet. Module should be unframed.
MST 36 Lap Shear Strength Test	Same as MST 35 but for glass/glass module tensile test.
MST 37 Material Creep Test	Checking the adhesive between different part of module (frontsheet and backsheet, FS or BS to mounting system, JB to BS) will be done in this test. Putting the module in chamber on mounting base and increasing temperature to 105 degree for 200 hours.
MST 42 Robustness of Termination Test	<p>Checking capability of withstanding of cables and termination attachments against stresses. Force of 40N for 10s in different direction will be applied to junction box to test its retention on module surface. Cable will be pulled 50 times for 1s in the direction of the axis and then torque test will be applied for 1 min. (same as MQT 14)</p> 
MST 51 Thermal Cycling Test	<p>Testing the module by changing the temperature repeatedly. Module to be installed in the chamber with temperature sensor attached to its middle. The temperature should change with no more than 100 degree per hour and stay at -40 and 85 for at least 10 min. during the test, module will carry the current when temperature increasing from -40 to 80 degree only. Below process will be taken 50 or 200 times. (same as MQT 11)</p> 

ACTIVE PANELS SOLAR SAFETY TESTING IEC 61730

TEST	DESCRIPTION
<p>MST 52 Humidity Freeze Test</p>	<p>Testing the module in high temperature and humidity followed by sub-zero temperature. Temperature will arise to 85 degree at maximum 100 degree per hour and keep the module for 20h in humidity of RH 85%. Then cool down to zero and then -40 degree by the speed of max 100 and 200 degree per hour. And keep for 30 min, do this process for 10 cycles. (same as MQT 12)</p> 
<p>MST 53 Damp Heat Test</p>	<p>Testing the ability of module for long term humid environment. The module will be at 85-degree temperature and 85 percent relative humidity and keep it there for 1000 h (or 200 h for another test) and no defect should be found. (same as MQT 13)</p>
<p>MST 54 UV Test</p>	<p>Install the module in a chamber with only UV light (between 280nm to 320 wavelength and 320 to 400nm) with maximum 250W/m2 and shortcircuited module (or with load in maximum power) at the 60 degree temperature. Subject the module to total UV irradiance of at least 15kWh/m2 or 60kWh/m2 in the wavelength range between 280 to 400nm. (same as MQT 10 for 15kWh/m2)</p>
<p>MST 55 Cold Conditioning</p>	<p>Install the module in a chamber with temperature sensor and keep it there for 48 h with -40 degree. No defect should be found.</p>
<p>MST 56 Dry Heat Conditioning</p>	<p>Install the module in a chamber with temperature sensor. Keep the module in a chamber with 105 degree and less than 50% relative humidity for 200 h. No defect should be found.</p>



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