



FLEXIBLE+ ELEGANT

LEXAPANEL™ STANDING SEAM SYSTEM TECHNICAL GUIDE



CHEMISTRY THAT MATTERS™



Introduction

LEXAPANEL™ STANDING SEAM SYSTEM

LEXAPANEL™ standing seam system from SABIC, made with polycarbonate (PC) sheet technology, can provide architects and builders exceptional flexibility to create sustainable and beautiful translucent roofing and other glazing elements such as skylights, barrel vaults, fenestrations, conservatories, and commercial buildings.

Compared with other standing seam solutions, LEXAPANEL system provides customers with far more glazing options, including choice of width, thickness, coating, color, structure and type of connection. Further, LEXAPANEL sheet delivers the strength, weatherability, clarity and thermal insulation of SABIC's renowned LEXAN™ THERMOCLEAR™ multiwall sheet. This high-performance solution demonstrates SABIC's commitment in developing sustainable solutions that promote energy conservation while providing customer focused day-lighting solutions to improve working and living environments.

SABIC's Specialty Film and Sheet business of Innovative Plastics is a leading supplier of high performance engineering sheet products, serving customers around the world in a broad spectrum of applications. Our virtually unbreakable, lightweight, fire resistant LEXAN Polycarbonate sheet portfolio includes a wide variety of structures, ranging from solid, multiwall and corrugated sheet. The company has integrated extrusion processes, surface texturing and coating technologies to provide value added solutions across a wide variety of industries.

Our portfolio is backed by advanced technical support and application development services around the world to meet our customers' global specification needs with local supply.

WHY LEXAPANEL™ STANDING SEAM SYSTEM?

LEXAPANEL™ standing seam system is an innovation that addresses many different building and construction challenges - including cost and design freedom - with one versatile concept. The standing seam product benefits architects, builders and integrators by simplifying the use of standing seam designs and encouraging integration of transparent glazing and roofing elements that admit natural light, reduce heating and cooling demands for greater energy efficiency, and add style to any building.

POTENTIAL BENEFITS

- Virtually any length and width customized to the load requirements needed for the project, providing maximum uninterrupted spans.
- Choice of structure, thickness and color of the LEXAN sheet, as well as the coating required.
- Both sides have proprietary UV protection against outdoor weathering (DIN53387 / ASTM G26).
- Reduced system costs through simplified installation thanks to the snap-on connection and elimination of aluminum profiles, reducing installation time and cost while increasing the total light coming through the roof.



SABIC has developed a unique concept that adapts to the building design instead of forcing the architect or builder to work around a one-size-fits-all product. With LEXAPANEL™ standing seam system, we can offer our customers the outstanding performance of LEXAN™ multiwall sheet in a new possibility that promises to change the way translucent roofing and walls are designed and installed, thereby making it easier to incorporate natural light into building solutions.

- **High Snow/Wind Pressure Resistant**
Customized width to meet your load requirements
- **Easy Installation**
Saving installation time and cost
- **No Thermal Expansion Problems**
Allowing utilization of very long panels
- **No Intermediate Aluminum Connectors**
Increasing the total light coming through and maximizing uninterrupted openings.
- **Aesthetics**
Allowing a similar look to metal standing-seam roofs, bendable to a minimum radius of 18 ft (5500 mm)
- **Solar Heat Gain Coefficient (SHGC):**
or g-value is the total solar energy that enters the interior of a building, divided by 100.

Property Profile	Value	Test Method
Panel width	12 to 72 ± 0.25 in (305 - 1830 ± 6 mm)	
Length	39 feet (11.9 m) maximum	
Panel thickness	0.788 ± 0.03 in (20 ± 0.8 mm)	
Rate/Extent/Time of burning	Class CC1 (perpendicular and parallel to the ribs)	ASTM D635
Flame spread and smoke developed	Class A	ASTM E84
Hail impact	0.788 in (20 mm) diam ball with v ≥ 47 mi/hr (21 m/sec)	TNO Test
Temperature Resistance	-40 to 212°F (-40 to 100°C)	UL 746 BEN
Air Infiltration at 6.2 psf (300 Pa)	<0.01 cfm/ft² (<0.1 L/s/m²)	ASTM E 283
Water Penetration at 15 psf (718 Pa)	pass (no leakage)	ASTM E 331
U Value	0.34 Btu/hr ft² F (1.93 W/K m²)	ASTM C 1363
SHGC	0.45 (for opal)	NFRC 201
Visible Light Transmittance	41% (for opal)	ASTM E 972 / ASTM E 1084
Coeff. of linear thermal expansion	3.75 x 10 ⁻⁵ in/in per °F (7 x 10 ⁻⁵ mm/mm per °C)	ASTM P696

* All properties are for LEXAPANEL made with 20 mm, 5 wall X structure THERMOCLEAR™ sheet

LEXAPANEL™ SHEET MECHANICAL PROPERTIES

Impact Strength

LEXAPANEL sheet has outstanding impact performance over a wide temperature range of -40°C to +100°C. The product has been shown capable of withstanding many kinds of extreme weather, storms, hailstones, snowfall and ice formation.

Hail simulation

As a glazing material, LEXAPANEL sheet is subject to extremes of weather; storms, hailstones, wind, snowfalls and ice formation. Under these conditions, the product is virtually unbreakable and is able to withstand the subsequent temperature change to sunny conditions without breaking or buckling.

In a test developed by the Dutch Testing Institute TNO, samples of LEXAPANEL sheet have been subjected to simulated hailstones of varying diameters without significant damage. Polyamide balls of varying diameters are shot at the surface of the Thermoclick sample using a pressurized airgun.

In practice, hailstones with a diameter of 0.787 in (20 mm) can reach a terminal velocity of around 69 ft/s (21 m/s). Under these conditions, traditional roof glazing materials such as glass and acrylic fail.

It should be noted that when the glass and the acrylic are tested, their failure characteristics are typically brittle, while the LEXAPANEL sheet shows ductile behavior - upon impact the ball will leave indentations but the sheet will not break.

UV protection

LEXAPANEL sheet has a proprietary UV protected surface on both sides of the sheet to protect the system against the degrading effects of ultra violet radiation of sunlight and promotes long-term optical quality under many kinds of severe weather conditions. Having UV protection on both sides of the sheet allows for greater flexibility when installing the sheet.

Figure: Schematic of Dutch Testing Institute TNO test

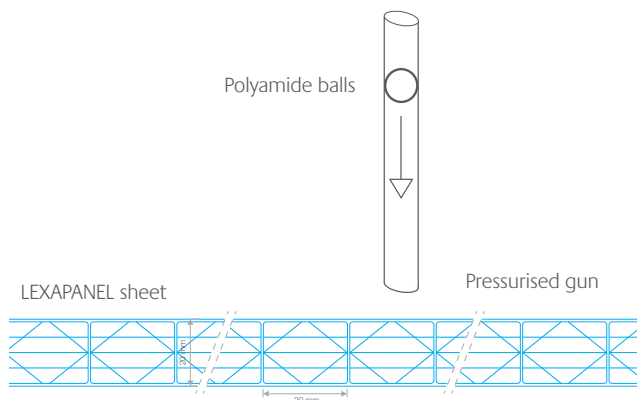


Table: Hail Simulation Test Results

Hail Simulation Test Results	Simulation
Material	Velocity with ball diameter of 0.787 in (20 mm)
Acrylic multiwall sheet t= 0.630 in (16 mm)	23-46 ft/s (7-14 m/s)
Float glass t=0.157 in (4 mm)	33 ft/s (10 m/s)
LEXAPANEL sheet t=0.787 in (20 mm)	> 69 ft/s (21 m/s)
Equilibrium velocity of hail	69 ft/s (21 m/s)

Light / solar transmission properties

Solar heat gain within a building is caused by heat input from radiation emitted from the sun. Sunlight entering the building heats the air both directly and through absorption by the framework, furniture, etc. and is released as infrared energy. In combination with the insulating properties of LEXAPANEL sheet, this prevents heat escaping faster than it is created causing a temperature increase, the so-called 'green-house effect'. The temperature can be controlled by venting, often in combination with specially tinted opal white or LEXAPANEL Solar Control IR* sheet which contains a proprietary additive which selectively absorbs the near infrared region of the light. LEXAPANEL sheet is therefore available in many different colors or with IR additives which both cut down the brightness of sunlight to a pleasing level and reduces heat build up inside the building. Calculations for solar heat input through glazing are normally based on data published in "The Institution of Heating and Ventilating Engineers Guide Book". These calculations are based on clear glass and correction factors or shading coefficients and are then applied when alternative glazing materials are used.

Typical Properties

	LEXAPANEL Clear	LEXAPANEL Bronze	LEXAPANEL Opal#
Light Transmission (%)	58	30	41
Shading Coefficient	0,76	0,52	0,52
Solar Heat Gain Coefficient	0,66	0,45	0,45

Light Measurements According to ISO 9050 (EN410) Large sphere Spectro on a 24 x 24 in (600 x 600 mm) sample

Shading Coefficient (SC): The ratio of the total solar radiation transmitted by a given material to that transmitted by normal 3 mm glass, whose light transmission is 87%. $SC = \%TST / 87$

Solar heat gain coefficient (SHGC): Total solar transmission divided by 100.

#Properties for Opal are per ASTM E972/ASTM E1084 and NFRC 201-2010

LEXAPANEL™ SHEET MECHANICAL PROPERTIES

Thermal insulation

The multi-wall structure of LEXAPANEL sheet offers potential advantages where thermal insulation is a major consideration.

The amount of energy transmitted through the material per square area and per degree temperature difference, referred to as U-Value is 0.34 Btu/hr ft² F (1.93 W/K m²). This is equivalent to an R value of 3. These measurements are per ASTM C 1363-2011 (NFRC 101).

Temperature resistance

LEXAPANEL sheet is characterized by its excellent retention of impact strength and stiffness at elevated temperatures, even over an extended period. LEXAPANEL sheet has a continuous use temperature rating of -40 to 212°F (-40 to 100°C).

Fire test performance

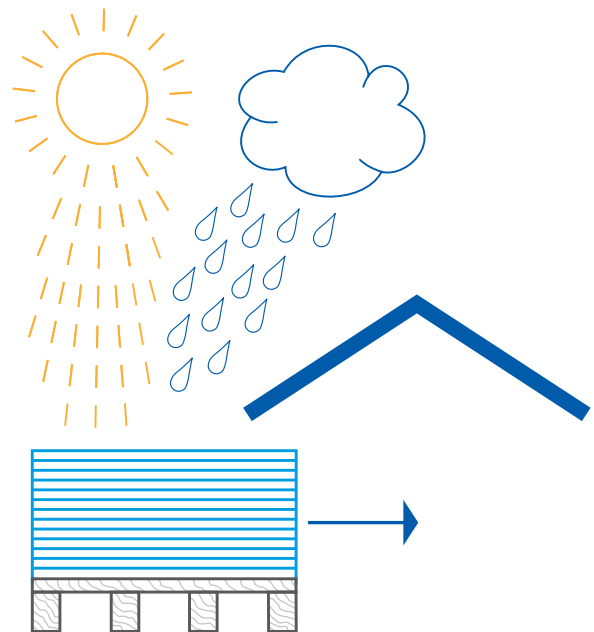
LEXAPANEL sheet has good fire performance in accordance with many national fire standards. It has class A performance per ASTM E84 and CC1 performance per ASTM D 635.

Sawing

LEXAPANEL sheet can be cut easily and accurately with most standard workshop equipment. This includes common circular, hand and hacksaws both with fine-toothed blades. The panel should be clamped to the worktable to avoid undesirable vibration and the sawdust should be blown out of the channels.

Storage

Prior to installation, LEXAPANEL sheet should be stored and protected against atmospheric influences like sun, rain, etc. Failure to properly store the product can result in the masking welding to the sheet surface. Care should be exercised when handling and transporting LEXAPANEL sheet in order to prevent scratches on the panel surface and damage to the panel edges.



Installation guidelines

Sealing recommendations

In order to minimize moisture build-up and dust contamination inside the channels, edge sealing of the open ended channels is very important. An impermeable tape and a perforating venting tape have been developed by the company Multifoil. Both tapes are available via your local authorized dealer.

Standard glazing

For standard glazing applications it is generally recommended to seal the top end channels with an impermeable tape and the bottom end channels with an anti-condensation venting tape. A clearance between the bottom panel end and the sash profile platform helps allow for condensation drainage.

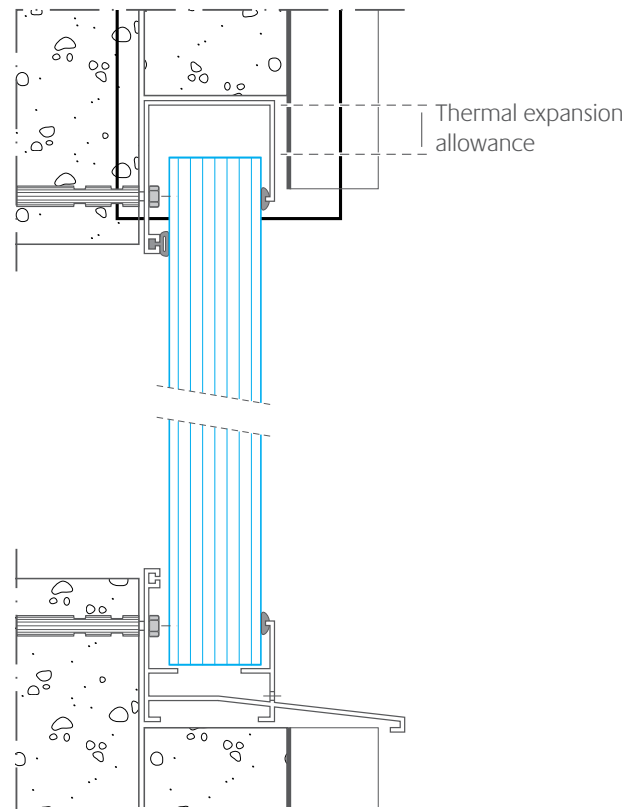
Specific conditions

In extremely dusty environments such as sawmills, welding stations, etc., it is usually advisable to seal both the top and bottom channel ends with an impermeable tape.

Thermal expansion allowance

Take into account a clearance of approximately 0.04 in per linear foot or 3 mm per linear meter between panel top edge and top glazing profile platform. This thermal expansion clearance is typically designed into the glazing profiles used by system integrators. Allowance for thermal expansion between adjacent panels is designed into the standing seam legs.

Fig.: Typical glazing detail Thermoplastic/alu glazing profile



LEXAPANEL™ SHEET CLEANING RECOMMENDATIONS

These cleaning recommendations apply to all LEXAN polycarbonate sheet products, including, but not limited to, LEXAN solid sheet and signs, LEXAPANEL, coated MARGARD™ sheet and LEXAN multiwall sheet. Periodic cleaning using correct procedures can help to prolong service life. For cleaning, it is recommended that the following instructions be adhered to:

Cleaning Procedure for Small Areas – Manual

1. Gently wash sheet with a solution of mild soap and lukewarm water, using a soft, grid-free cloth or sponge to loosen any dirt or grime.
2. Fresh paint splashes, grease and smeared glazing compounds can be removed easily before drying by rubbing lightly with a soft cloth using petroleum ether (BP65), hexane or heptane. Afterwards, wash the sheet using mild soap and lukewarm water.
3. Scratches and minor abrasions can be minimized by using a mild automobile polish. We suggest that a test be made on a small area of LEXAN sheet with the polish selected and that the polish manufacturer's instructions be followed, prior to using the polish on the entire sheet.
4. Finally, thoroughly rinse with clean water to remove any cleaner residue and dry the surface with a soft cloth to prevent water spotting.

Cleaning Procedure for Large Areas - Automated

1. Clean the surface using a high-pressure water cleaner (max. 100bar or 1,450psi) and/or a steam cleaner. We suggest that a test be made on a small area, prior to cleaning the entire sheet.
2. Use of additives to the water and/or steam should be avoided.

Other Important Instructions for All LEXAN sheets:

- Never use abrasive or highly alkaline cleaner on LEXAN polycarbonate materials.
- Never use aromatic or halogenated solvents like toluene, benzene, gasoline, acetone or carbon tetrachloride on LEXAN polycarbonate materials.
- Use of incompatible cleaning materials with LEXAN sheet can cause structural and/or surface damage.
- Contact with harsh solvents such as methyl ethyl ketone (MEK) or hydrochloric acid can result in surface degradation and possible crazing of LEXAN sheet.
- Never scrub with brushes, steel wool or other abrasive materials.
- Never use squeegees, razorblades or other sharp instruments to remove deposits or spots.
- Do not clean LEXAN polycarbonate in direct sunlight or at high temperatures as this can lead to staining.
- For all mentioned chemicals consult the manufacturer's material safety datasheet (MSDS) for proper safety precautions.

Additional Important Considerations for LEXAPANEL, Multiwall, Corrugated and Sign sheet:

- Cleaners and solvents generally recommended for use on polycarbonate are not necessarily compatible with the UV-protected surfaces of LEXAN multiwall, corrugated and sign polycarbonate materials.
- Do not use alcohols on the UV-protected surfaces of LEXAN sheet.

MANY CHOICES, MANY ADVANTAGES

The LEXAPANEL™ system joins LEXAN™ multiwall sheet panels of virtually any length and width with a choice of connectors, including standing seam, tongue and groove and custom configurations. Customers can specify the structure, thickness and color of the LEXAN sheet, as well as the coating they require, including unique enhanced ultraviolet (UV) resistant coating. SABIC supplies the LEXAN multiwall sheet products and profiles while AmeriLux International LLC provides conversion, assembly, and distribution.

Here are the simple steps to help you build your product:

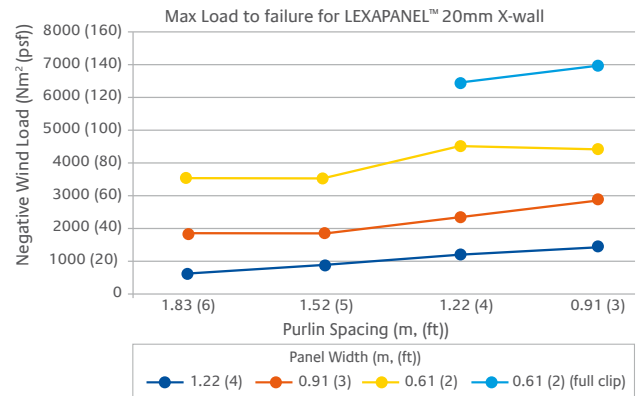
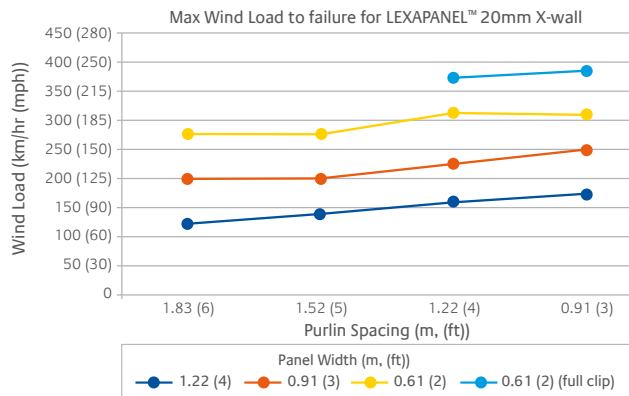
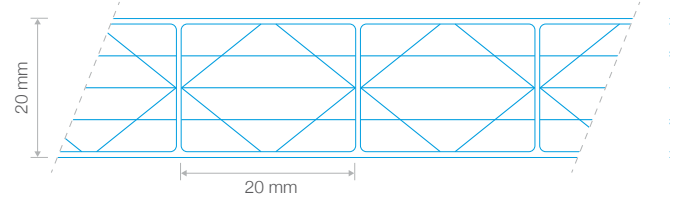
Selection of

- the width
- the thickness
- the structure
- the color
- the connection system

THE WIDTH

LEXAPANEL™ system offers great performance with capability to withstand wind and snow loading pressures. This new sheet product delivers up to 250 times the impact resistance of glass to reduce the risk of breakage from wind, hail, and other extreme weather, as well as vandalism.

Using the maximum wind load and maximum load to failure charts below, the designer or architect can determine the best purlin spacing and panel width combination that meets the local building norms while providing the aesthetic look they want. It is necessary to include an appropriate pressure coefficient to allow for local fluctuations in the acceleration/deceleration of the wind by building or glazing geometry. Detailed pressure coefficient values and snow loading factors can be found in the appropriate local or national building norms.



THE COLOR

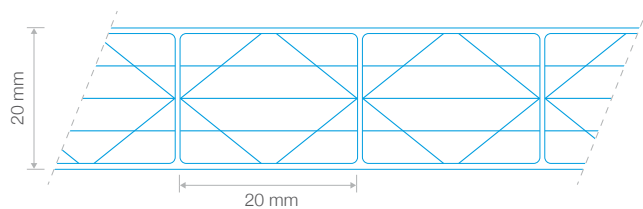
LEXAPANEL™ sheet is available in standard colors of clear, opal, and bronze. Custom colors are also available. Please contact your sales representative for details.

LEXAPANEL sheet has been tested per NFRC standards for U factor and Solar Heat Gain Coefficient. The U factor for clear and all colors was tested to be 0.34 Btu/hr ft² F (1.93 W/K m²). The SHGC for opal was tested to be 0.45. Additional test data may be available. Contact your sales representative for details.



THE STRUCTURE

LEXAPANEL sheet is available with a 20mm 5 wall X structure. Please contact your sales representative for details. Other structures may be available upon request.



THE COATING TECHNOLOGY

LEXAPANEL™ sheet is available with a standard two sided UV coating with a limited 10 year written warranty that covers changes in color, light transmission, and mechanical integrity. Additional coating options may be available such as:

Dripgard™ Coating

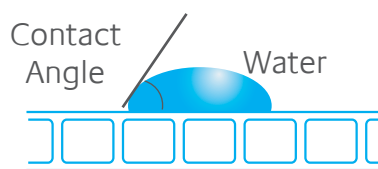
LEXAPANEL™ sheet with Dripgard coating technology is suitable for any roof glazing application in which water droplets are unacceptable, such as commercial greenhouses where they could cause crop spoilage. This innovative product has UV protection on the outer surface and a specially developed hydrophilic coating on the inner surface. This coating reduces the formation of condensation droplets by increasing the surface tension of the sheet and decreasing the contact angle. As a consequence, a thin mist of water will form on the inner surface of the sheet, which will not drip and will not affect the excellent light transmission of the material. Please contact your sales representative for details.

Easy Clean

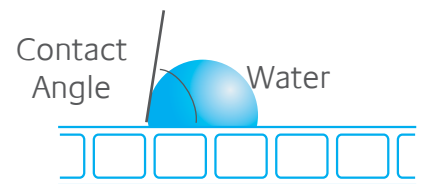
This is the world's first self-cleaning standing seam sheet. UV protected on both sides, LEXAPANEL Easy Clean sheet features a unique hydrophobic coating on the outside surface that reduces the surface tension of polycarbonate and increases the contact angle of water to the sheet. This causes larger droplets to form and wash away dirt, leaving the sheet almost spotless. Furthermore, it stays clean for longer, thereby reducing the frequency and the associated cost of cleaning.

SunXP™ Coating

This coating provides LEXAPANEL sheet with even higher resistance to UV radiation, yellowing and loss of light transmission. This exceptional material is awarded a unique 15 year limited written



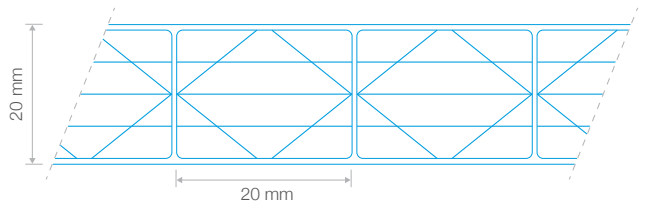
Standard LEXAN
THERMOCLEAR™ Sheet



LEXAN THERMOCLEAR™
Easy Clean Sheet

THE THICKNESS

LEXAPANEL™ sheet is available with a thickness of 20 mm 5 wall X-structure. Other thicknesses are possible through minor design changes to the connector. Contact your sales representative if you would like to discuss other thicknesses for your LEXAPANEL sheet building system design.

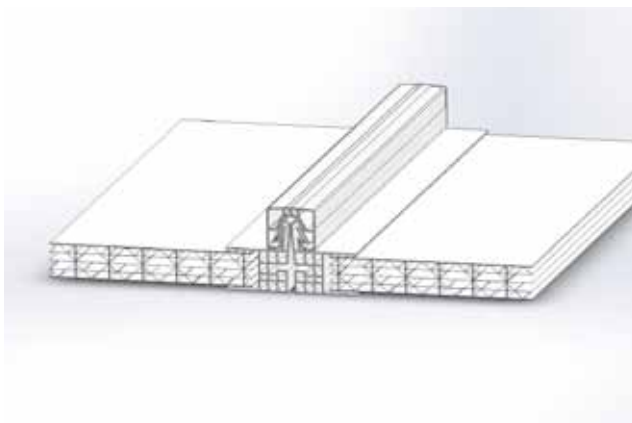


THE CONNECTION SYSTEM

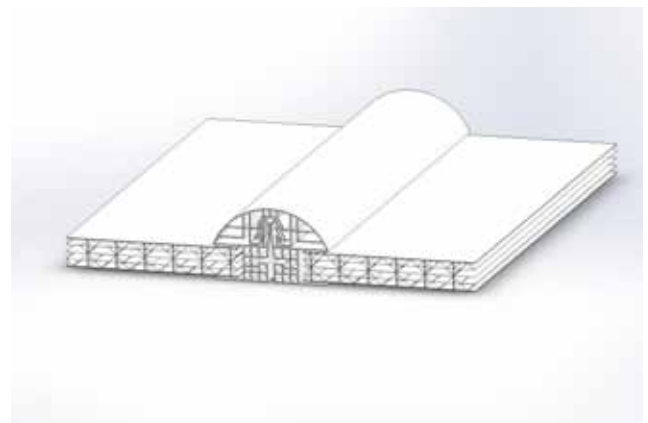
LEXAPANEL™ sheet is available with a standing seam connection system that incorporates a high strength aircraft grade aluminum clip and a batten connector with either a square shape or round shape. Both batten connectors are designed with one way snap features and capillary breaks to ensure a secure fit and high resistance to air and water infiltration. Testing of this system at Architectural Testing Inc. for air and water infiltration resulted in a pass for both tests with a reading of $<0.01 \text{ cfm/ft}^2$ ($<0.1 \text{ L/s/m}^2$) for the air penetration test and a pass at 15 psf (718 Pa) for the water penetration resistance test.

Custom connection systems for tongue and groove or snap connections may be possible along with custom batten or clip designs. Please contact your sales representative for details.

Available Connection Systems



LPS20C2 - square batten



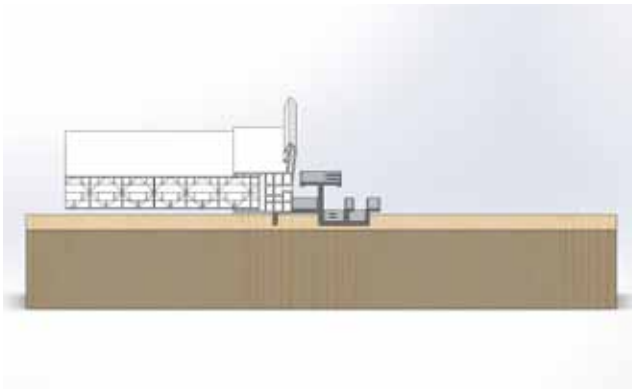
LPR20C2 - round batten

INSTALLATION GUIDELINES

Vertical wall or Sloped roof glazing

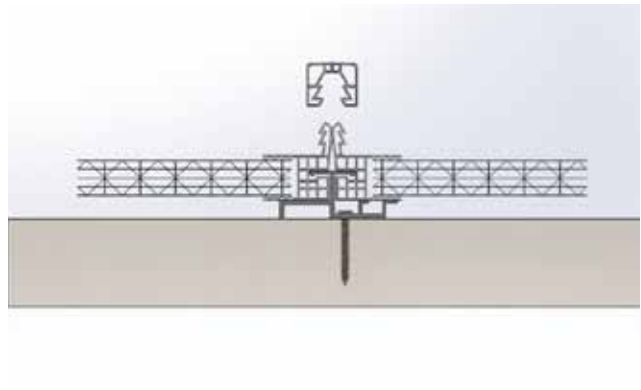
A wide range of easy to use aluminum glazing profiles are available at the vast majority of authorized LEXA-PANEL sheet distributors and specialized installers. It is critical to use SABIC designed or approved fastener clips to ensure maximum load characteristics.

Step 1



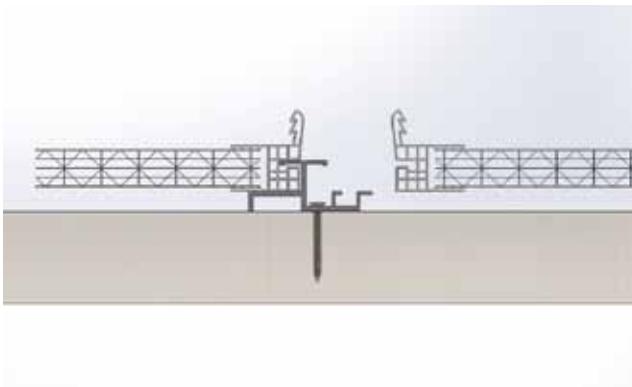
Slide metal fastener clip in place

Step 3



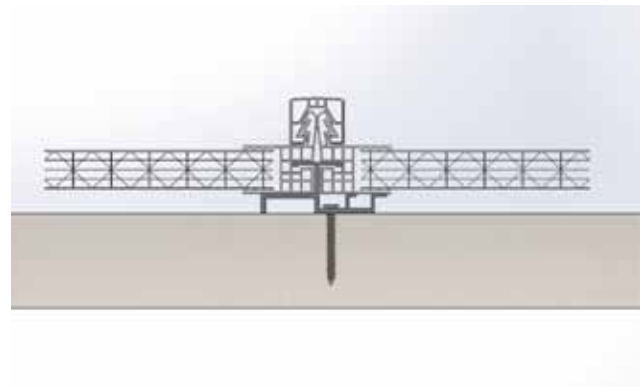
Slide next pannel into place

Step 2



Bolt/screw clip to purlin

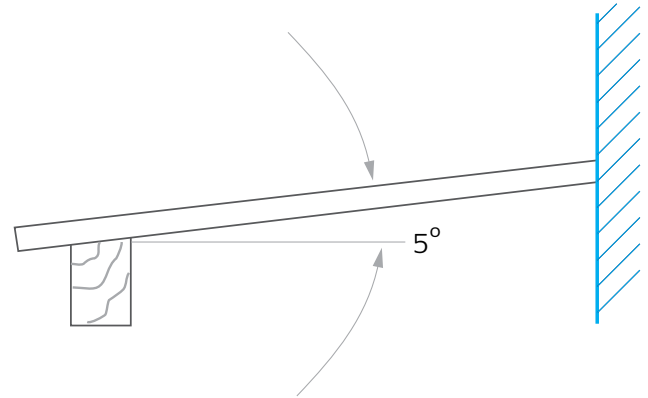
Step 4



Snap batten onto standing seam

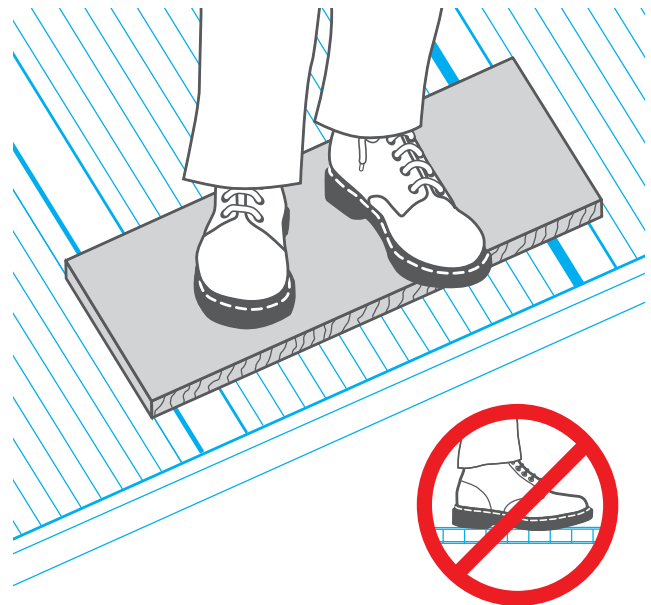
Sloped roofing

For sloped glazing applications a minimum slope of 5° (9 cm/m sheet length) is advised to allow for rainwater drainage.



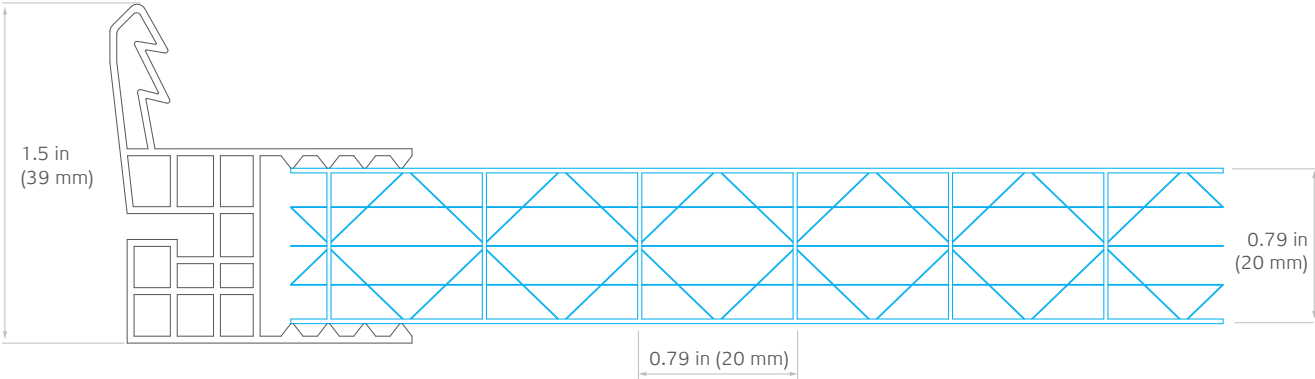
Site Safety

On roof constructions LEXAN THERMOCLEAR sheet should not be used to support a person's weight during installation or cleaning. A temporary wooden beam or other device, supported by the roof members, should always be used.

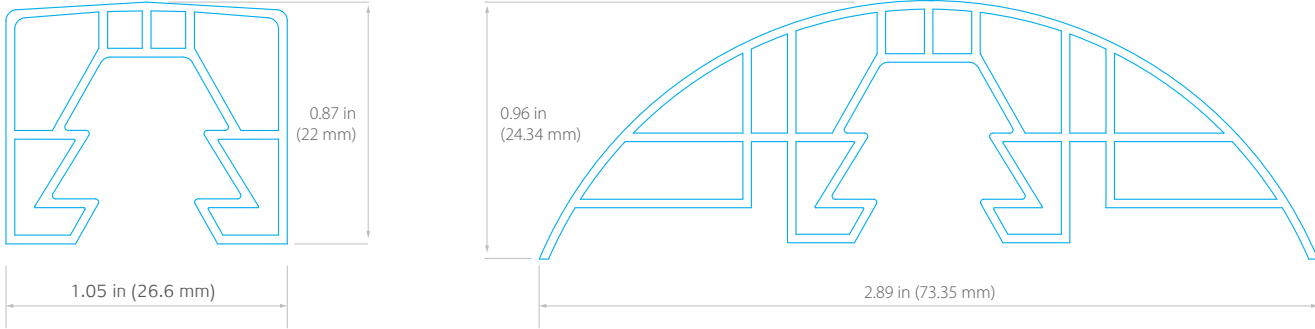


TECHNICAL DRAWINGS

Panel and L Collector (PART # SS205XP)



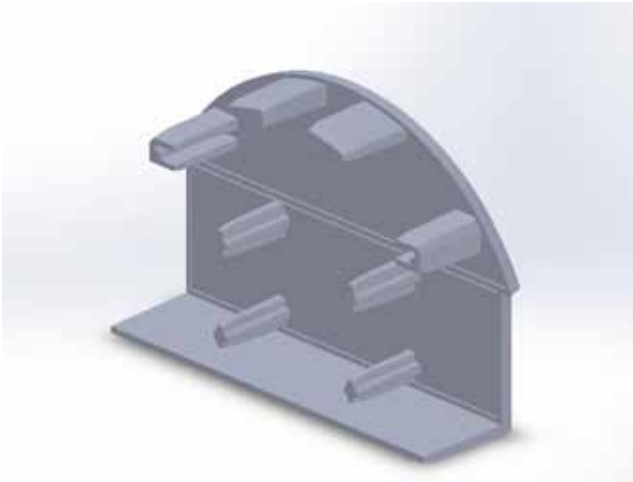
SQUARE and ROUND BATTENS (PART #s LPS20C2 and LPR20C2)



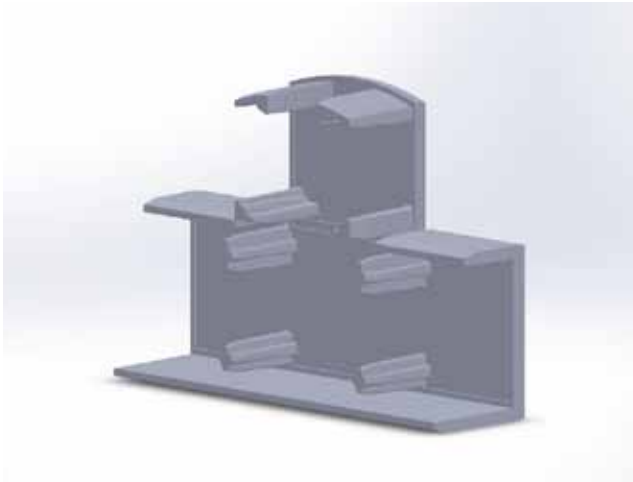
Optional End Caps:

Optional U profile end cap part # LPUVU20 (not shown)

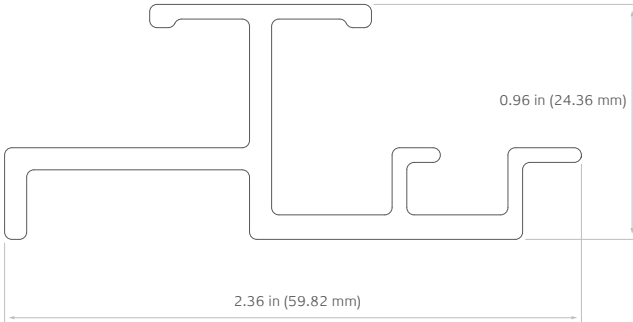
Curved End CAP (part # LPREC20),
use with batten LPR20C2



Square End Cap (part # LPSEC20),
use with batten LPS20C2



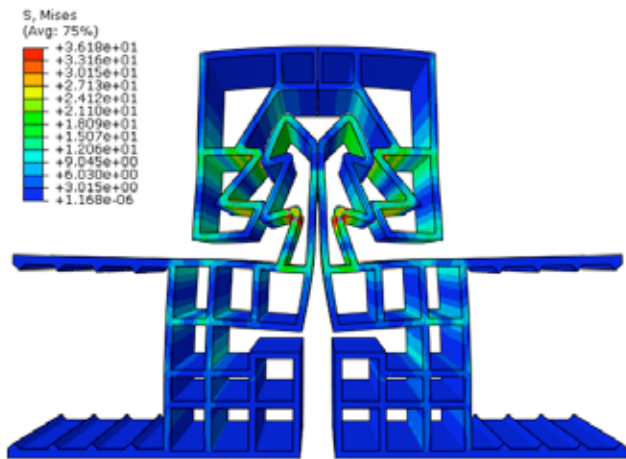
CLIP (part # SSCL003) Standard Length 3 inches.
Custom lengths available.



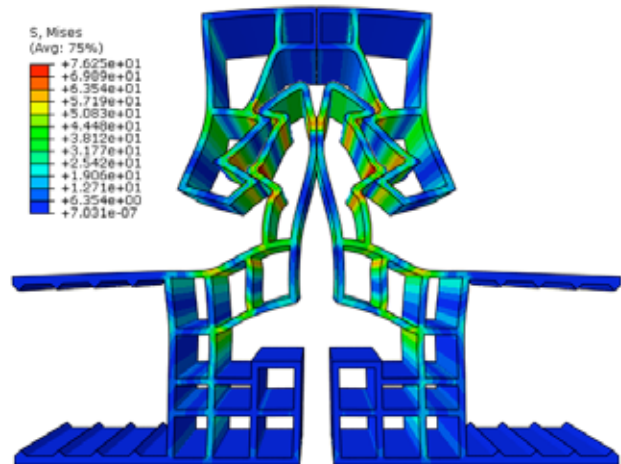
HELPING WITH SPECIAL REQUIREMENTS

The vast technical resources of SABIC Specialty Film and Sheet make it easy for architects and builders to obtain the support, customized products, and design assistance needed to help complete projects on time and meet stringent specifications. Computer aided engineering, prototyping, and full scale testing are all just a phone call away. Contact your sales representative to learn more about the extensive resources SABIC can bring to the table on your next glazing application.

Max Push Stress: 36 Mpa



Max Pull Stress: Exceeds Yield Stress



EXAMPLES OF DESIGN CONCEPTS WITH LEXAPANEL™ STANDING SEAM SHEET

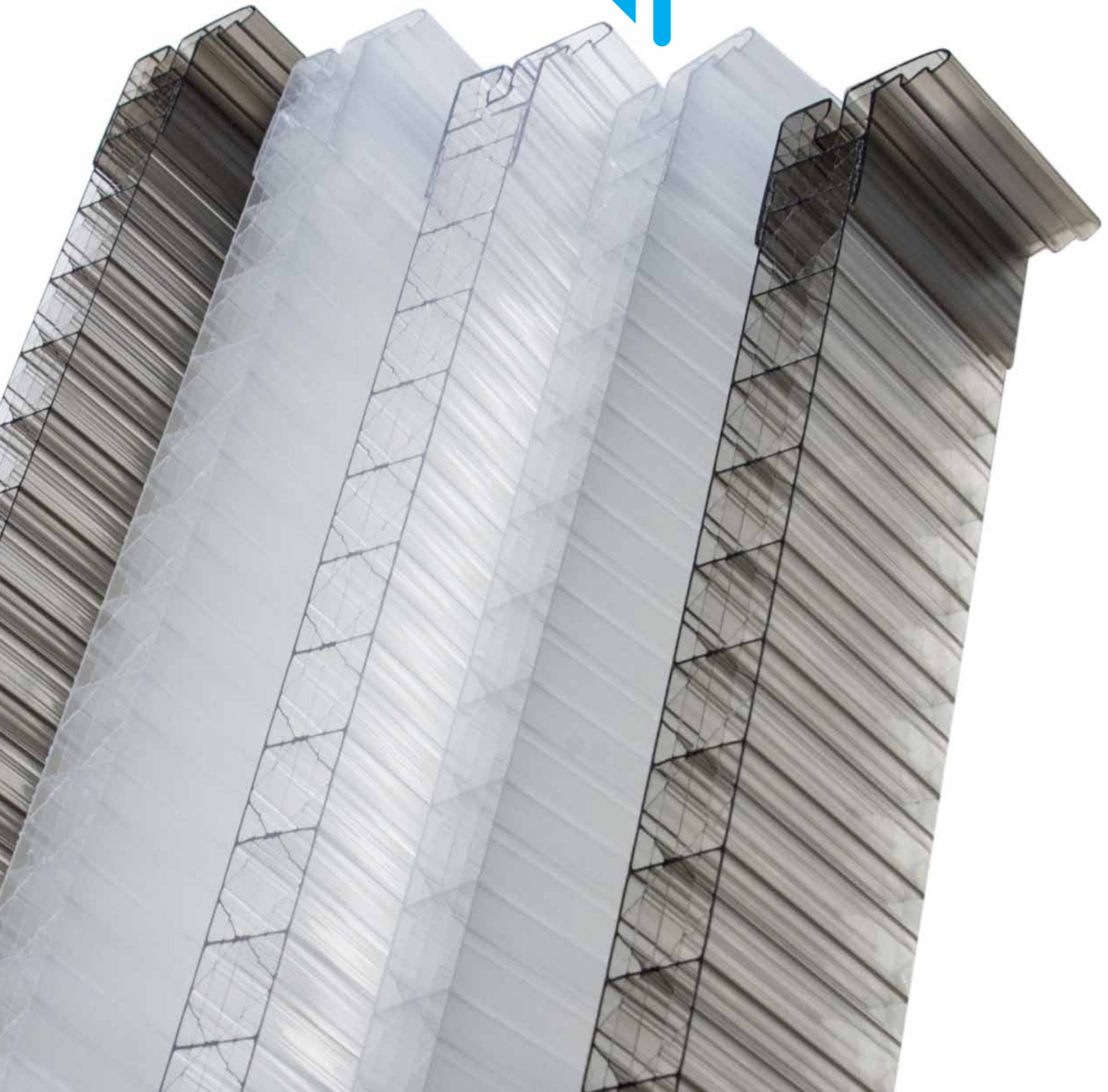
LEXAPANEL™ standing seam panels are integrated here to enhance the roof system by providing lighting in areas where it would be too complex... more lighting can be brought into the home without added complexity or loss in insulation.

For Commercial buildings such as barns and warehouses, LEXAPANEL standing seam panels can enhance work areas while improving interior lighting and maximizing insulation for the building. Construction techniques remain the same, though the underlay of the plywood sub-roof is eliminated.

For Public buildings such as rest stops, LEXAPANEL standing seam panels enhance public spaces while increasing interior lighting, reducing electric lighting needs, and maximizing the insulation value. Daylighting costs are greatly reduced which improves public energy bills.



LEXAPANEL STANDING SEAM
PANELS FROM SABIC
AVAILABLE IN VARIOUS
STRUCTURES, COLORS
AND WIDTHS; EXCELLENT
CHOICE FOR YOUR
DAYLIGHTING NEEDS.



CONTACT US

SABIC HEADQUARTERS

PO Box 5101
Riyadh 11422
Saudi Arabia
T +966 (0) 1 225 8000
F +966 (0) 1 225 9000
E info@sabic.com

AMERICAS

SABIC
One Plastics Avenue
Pittsfield, MA 01201
USA
Toll-free
1 800 323 3783 ext.3
T 1 413 448 7125
F (888) 443 2033
E sfscustomerservice@sabic-ip.com

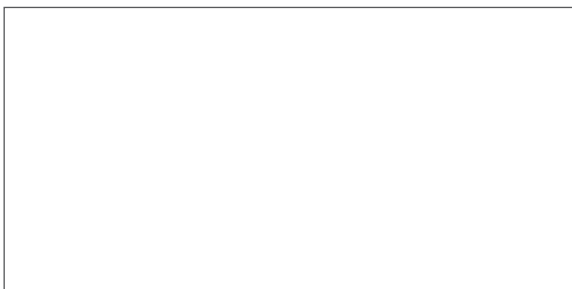
EUROPE

SABIC
Plasticslaan 1
4612 PX
Bergen op Zoom
The Netherlands
T +31 (0)164 293684
F +31 (0)164 293272
E sfs.info@sabic-ip.com

PACIFIC

SABIC
1266 Nanjing Road (W)
16th Floor, Plaza 66
200040 Shanghai
China
T +86 21 62881088 ext. 6733
F +86 21 6288 0818
E sfs.info@sabic-ip.com

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