kuraray

trosifol™
world of interlayers

TROSIFOL ARCHITECTURAL GLAZING

English

PRODUCT PORTFOLIO

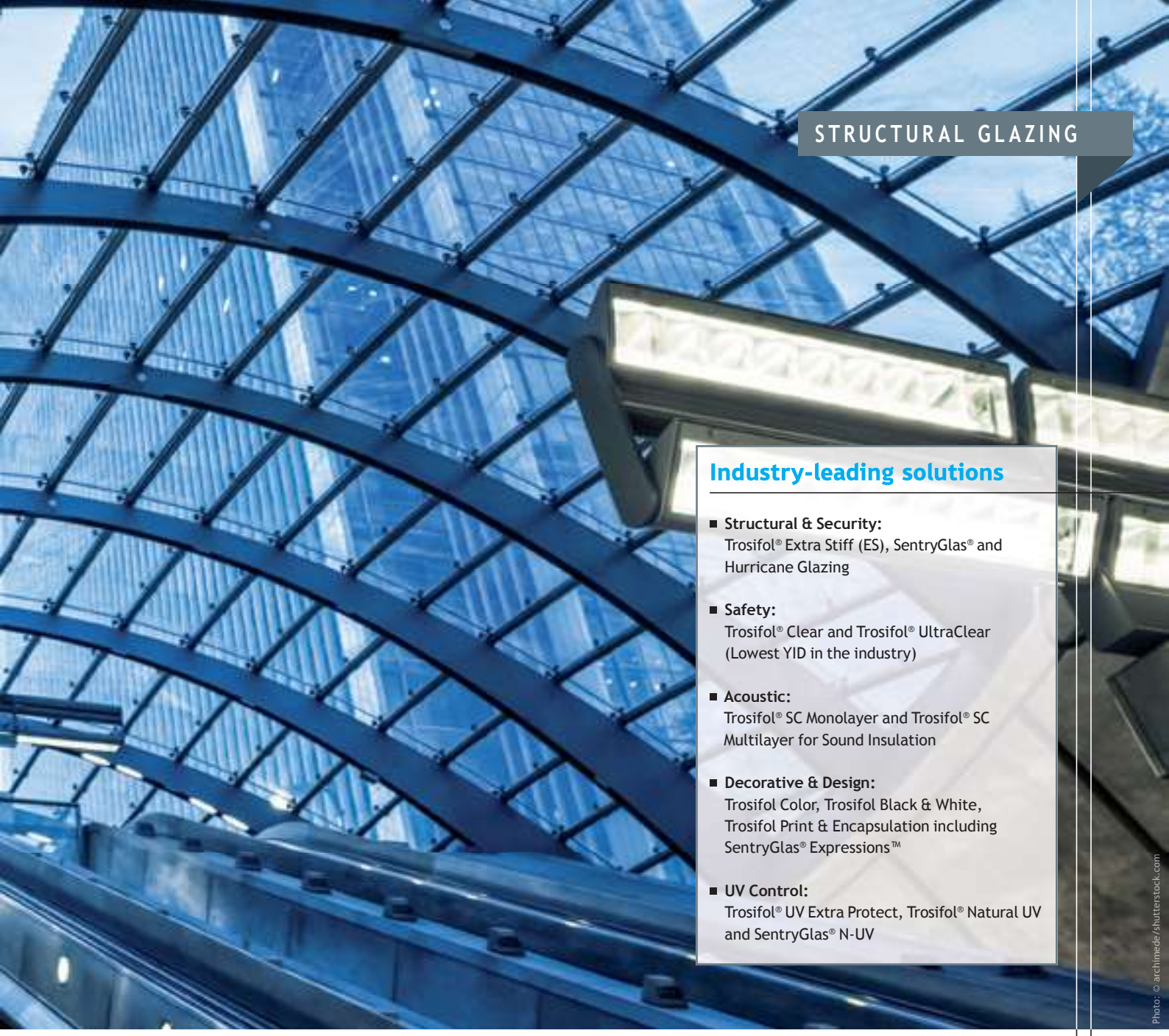
TROSIFOL – YOUR GLOBAL PARTNER FOR LAMINATED SAFETY GLASS

Trosifol – part of the Kuraray Company – is a leading global producer of PVB and ionoplast interlayers for laminated safety glass applications in the architectural, automotive and photovoltaic industries.

The evolution of the Trosifol and Glass Laminating Solutions merger has resulted in consolidation of the Trosifol, SentryGlas and Butacite product brands into a single brand: the new Trosifol.

We at Trosifol now offer the world's broadest portfolio of innovative glass-laminating solutions, including structural and functional interlayers for safety and security applications, sound insulation and UV protection. For decorative applications, we supply colored interlayers, digitally printable films and other innovative products for interior design projects. Our UltraClear films exhibit the lowest Yellowness Index (YID) in the industry.

Trosifol is in the perfect position to be your preferred partner for laminated safety glass applications – serving the ever-changing demands of the global glass industry with seven worldwide production sites and five R&D centers.



Industry-leading solutions

- **Structural & Security:**
  Trosifol® Extra Stiff (ES), SentryGlas® and Hurricane Glazing
- **Safety:**
  Trosifol® Clear and Trosifol® UltraClear (Lowest YID in the industry)
- **Acoustic:**
  Trosifol® SC Monolayer and Trosifol® SC Multilayer for Sound Insulation
- **Decorative & Design:**
  Trosifol Color, Trosifol Black & White, Trosifol Print & Encapsulation including SentryGlas® Expressions™
- **UV Control:**
  Trosifol® UV Extra Protect, Trosifol® Natural UV and SentryGlas® N-UV

How we can support you

Consultancy services

- Finite element analysis
- Window glass/panel design
- Bomb blast performance
- Thermal and energy performance
- Test design support
  - *Miami Dade County*

Laminated glass expertise

- Interlayer advice and selection
- Extensive network of laminators worldwide
- Glass and lamination training
- Building codes monitoring
- Technical support on building codes and standards
- New-applications development and testing
- Global technical support team with 3 technical labs in Korea, Germany and USA

Laminated glass support

- Online strength calculator
- Technical support and educational seminars for designers and engineers
- Sealant compatibility information
- Extensive library of technical papers and test reports
- List of glazing systems tested for hurricane glazing
- Regular "Laminated Glass News" newsletter

STRUCTURAL INTERLAYERS FOR DEMANDING APPLICATIONS

Fondation Louis Vuitton, Paris, France

Structural Glazing applications

- Overhead glazing (skylights and canopies)
- Minimally supported structures
- Façades
- Screens and louvers
- Floors and stairs
- Balustrades
- Fins

Structural interlayers make glass panels stronger, expanding the possibilities of architectural glazing designs. Trosifol offers the world's broadest portfolio of structural interlayers. That gives architects and structural engineers a choice of solutions to address the precise needs of their specific applications. Trosifol® Extra Stiff is a stiff PVB interlayer and SentryGlas® is based on a unique ionoplast technology. Both interlayers excel over standard PVB and are UltraClear – offering the lowest YID on the market – making them ideal, e.g. for use with low-iron glass, where long-term optical clarity needs to be assured.

Both products have the general approval of the building authorities issued by the German Institute for Construction Engineering (DIBt), Berlin. SentryGlas® meets the strict performance requirements of Miami Dade County, Florida.

Edificio Oceanía, Santa Marta, Colombia

Interlayer performance comparison

Properties	Standard PVB	Other Stiff PVB	Trosifol® Extra Stiff	SentryGlas® Ionoplast
Post Breakage Performance at room temperature (21°C/70°F)	🔴	🟢	🟢	🟢
Post Breakage Performance at elevated temperature (50°C/122°F)	🔴	🔴	🔴	🟢
Structural Properties/ Coupling effect at room temperature (21°C/70°F)	🔴	🟢	🟢	🟢
Structural Properties/ Coupling effect at elevated temperature (50°C/122°F)	🔴	🔴	🔴	🟢
Clarity	🔴*	🔴	🟢	🟢
Sealant compatability/ Edge stability	🔴	🟠	🟠	🟢

* Not valid for Trosifol® UltraClear film

Photo: © hxdbzxy/shutterstock.com

Riverside Plaza, Chicago, USA

Photo: © Goettsch Partners

STRUCTURAL GLAZING

Photo: © Paul Czitrom

Parque Toreo Mall, Mexico City, Mexico

High performance structural interlayers from Trosifol give designers much more freedom to exploit the aesthetics of glazed features. The use of laminated glass is now preferred by leading designers as a safer choice – compared to monolithic tempered or heat-strengthened glass – due to enhanced glass-retention characteristics. This is demonstrated by greatly improved post glass-breakage properties, providing enhanced safety.

Photo: © Atlanta Hall Management

College Football Hall of Fame, Atlanta, USA

Trosifol® Extra Stiff

- Effective at temperatures of 30 °C and below, ideal for interior structural applications, such as stairs, floors and railings; and open-edge interior applications, such as balustrades and railings
- Very good edge stability
- High stiffness and strength allows for thinner glass, reduced cost, and large glass designs
- Can be combined with other colored PVB interlayers
- UltraClear
- Excellent post breakage strength

SentryGlas®

- Offers the highest level of structural properties and edge stability over a broad range of temperatures and loads
- Available in UltraClear and Translucent White
- Up to 100 times stiffer and five times tougher than conventional laminated safety glass interlayers
- Excellent sealant compatibility
- Excellent edge stability
- Ideal choice for exterior open-edge (high edge stability) applications, even in warm humid conditions
- High stiffness and strength allow for thinner glass, reduced cost and large glass designs
- Highest level of structural performance over wide range of temperatures and load durations of any interlayer

SentryGlas®

- 100 times stiffer and five times stronger than standard PVB
- Ideal for large-missile impact and high design pressures
- Can be used in dry-glazed systems, which lowers installation costs
- High clarity

Trosifol® UltraClear

- Ideal for smaller-missile impact and/or lower design pressures
- High clarity
- Lowest YID of any PVB interlayer

Trosifol® Clear

- Ideal for smaller-missile impact and/or lower design pressures

South Miami Dade Cultural Arts Center, Miami, Florida, USA

WEATHERING THE STORM – HURRICANE-PROOF GLAZING

Wilkie D. Ferguson Jr. Federal Courthouse, Miami, Florida, USA

Hurricane-impact-resistant glazing is capable of resisting violent storms and can help protect against the impact forces created by large and small flying debris. This type of glazing is often mandated in hurricane-prone regions to protect the integrity of buildings and their occupants.

The choice of interlayer depends on the specific design requirements and local building codes. All Trosifol Hurricane Glazing products have Miami Dade County NOA (Notice of Acceptance) certificates.

Source: Jeff Schmaltz, MODIS Rapid Response Team, NASA/GSFC. Courtesy of NASA Visible Earth, http://visibleearth.nasa.gov

Hurricane Rita between Cuba and Florida

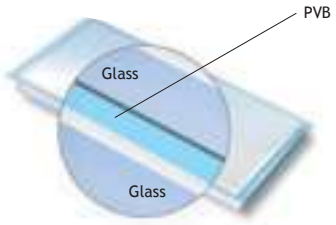
SOUND CONTROL AND FUNCTIONAL PERFORMANCE

Sky Tower, Wrocław, Poland

Trosifol is the only PVB manufacturer that offers both mono- and multilayer acoustic film and, as a result, can offer the perfect solution for any glazing application.

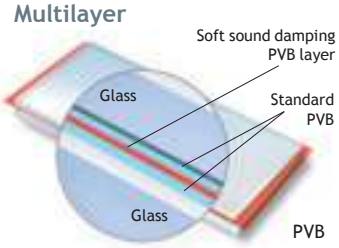
Both films offer outstanding sound insulation with the advantages of conventional PVB film. Compared to laminated glass with standard PVB film, sound attenuation can be 5 dB greater. R_w values over 50 dB can be achieved with both products.

Trosifol PVB



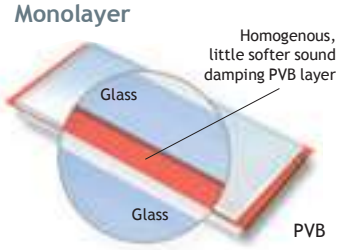
- Some acoustic performance
- Excellent optics
- Impact resistance
- Low yellowness index for UltraClear

Multilayer



- Excellent acoustic performance
- Impact resistance
- Film can be combined with standard and color
- Low yellowness index

Monolayer



- Excellent acoustic performance
- Excellent optics
- Ideal to be used in combination with toughened glass
- Low yellowness index

Trosifol PVB

- Some acoustic performance
- Impact resistance
- Low YID (UltraClear variant)

Trosifol® SC Multilayer

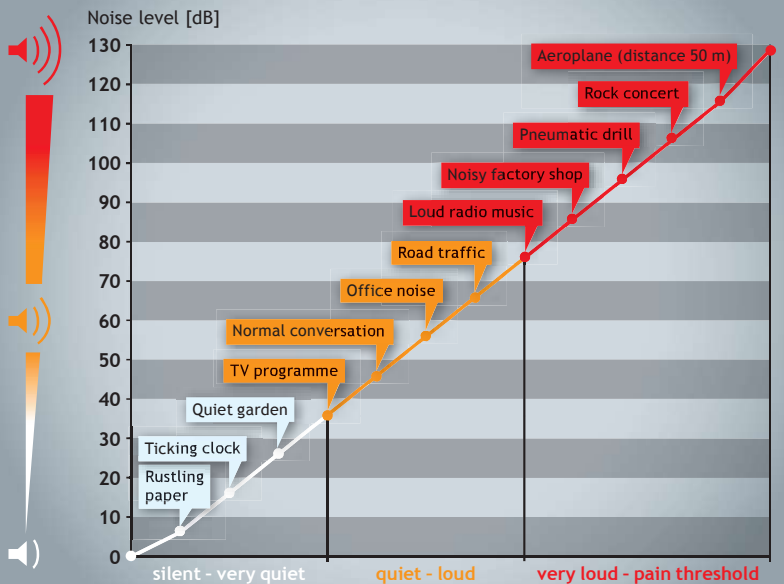
- Excellent acoustic performance
- Film can be combined with standard PVB and colored films
- Low YID
- Impact resistance

Trosifol® SC Monolayer

- Excellent acoustic performance
- Superior optical performance
- Low YID

Photo: © NicoElNino/shutterstock.com

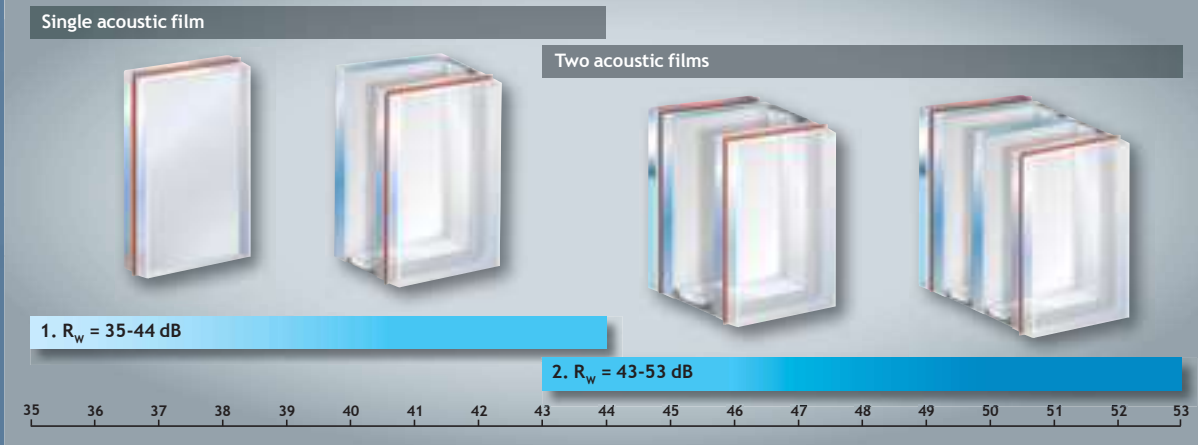
Noise sources and perception



Highlights

- High adhesion makes Trosifol® SC Monolayer ideal for laminated safety glass incorporating heat-strengthened or fully tempered glass
- Up to 5 dB sound attenuation compared to standard PVB film
- Trosifol® SC Monolayer has best optics in the industry
- 88 % light transmittance and low YID value

Sound reduction overview

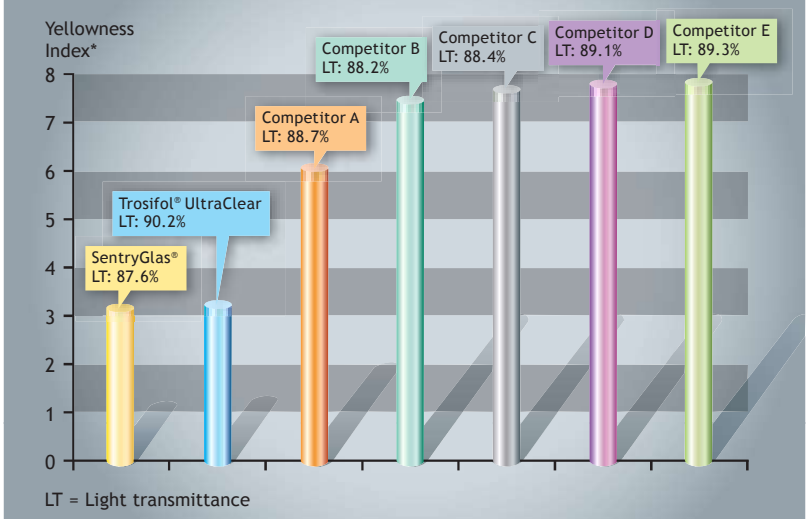


CLARITY COMES AS STANDARD

Aesthetics are not short-term phenomena. Architects, designers, engineers and consultants expect their structures to remain visually appealing and in terms of glazing, retaining their clarity for many years. They must also balance structural requirements with aesthetic appeal; as a result, YID is an incredibly important factor when specifying interlayers.

Photo: © Rainer Hardtke

Yellowness index of Trosifol and competitors



LT = Light transmittance

*All data measured in accordance with ASTM D 1003 and ASTM E 313 on 3 mm low iron glass / total interlayer thickness approx. 7.6 mm / 3 mm low iron glass.

Highlights

We at Trosifol offer the world's broadest portfolio of innovative glass-laminating solutions **with the lowest Yellowness Index in the industry** for structural and functional interlayers for safety and security applications, sound insulation and UV protection.

SentryGlas® and Trosifol® UltraClear films exhibit negligible inherent color and excellent long-term environmental stability. As a result, they provide the lowest YID on the market.

This visual neutrality results in a measurable improvement, especially in laminated glass that deploy low-iron glass. The result is brilliant uniformity across a wide range of applications.

The Vaeven Building, Umeå, Sweden

Trosifol Color

- PVB design film for colored laminated safety glass
- Broad range of colors, with varying light transmittance values
- Unparalleled in the brilliance of their hues
- Outstanding colorfastness for use indoors and outdoors
- Huge diversity of possible uses

Trosifol Black & White

- **Trosifol® Brilliant Black** offers unsurpassed color depth, high color brilliance and total opacity. Suitable for laminated safety glass applications bonded on the reverse
- **Trosifol® Diamond White** offers an opaque, rich, strong shade of white with high reflectivity. Suitable for laminated safety glass applications bonded on the reverse
- **Trosifol® Shining White** is a radiant, aesthetic white offering 10 per cent transmittance. Particularly suitable for backlighting
- **Trosifol® Translucent White** offers delivers a screening effect combined with 55% light transmittance
- **Trosifol® Sand White** is an elegant semi-transparent shade of white offering 70% light transmittance and outstanding light scattering

COLOR AND CLARITY COMPLEMENT CAPABILITY

Photo: © Lindman Photography

Color plays such an important role in an architect's vision and through the use of opaque, semi-transparent and printable PVB interlayers some truly staggering effects can be achieved in both internal and external applications.

Highlights

- Brings aesthetics, vividness and identity to functional interior or exterior structures
- Completely changes the aspect of entire buildings and interior spaces
- Completements local scenery, history, environment and fauna
- Unique offering of 100% opaque Black and White films in industry

CREATE YOUR OWN DESIGNS ... WITH LIMITLESS POSSIBILITIES

Define, reinforce and advertise your organization's brand and colors. Or simply create innovative graphical effects and tones to differentiate spaces, functions and building designs. Your imagination is the only limit to what can be achieved.

SentryGlas® Expressions™ - digitally printable PVB

- PVB interlayers can be printed directly using ink-jet technology
- High-grade color prints with specially formulated proprietary inks - even fine textures are visible
- Digital technology permits high design freedom, customization and accurate color rendition
- Faithful reproduction of logos, text and graphics
- Virtually any image can be rendered - a design, photograph, solid color or continuous tone

Trosifol® HR – encapsulating PVB

- Additional inserts can be incorporated, while still delivering laminated safety glass
- Wide variety of encapsulated materials can be used (metal, organic materials, etc.)
- Increases the creativity of laminated glass
- 3D glass forms and designs can be exploited

Trosifol® UV Extra Protect

for full protection against UV transmission

- Blocks out incidental UV light in its entirety
- Protects the human skin
- Protects art and artifacts from ageing
- Applications include office spaces, shopping centers, museums, galleries, hospitals, shop fronts and libraries
- No UV transmission at 400 nm

Trosifol® Natural UV

total UV-permeability for solar radiation with enhanced permeability for short-wave UV-A and UV-B radiation

- Remarkable resistance to environmental factors
- Long service life on exposure to heat and moisture in laminated safety glass
- Applications include zoos, quarantine areas, greenhouses and other areas where full-spectrum light is beneficial libraries

SentryGlas® N-UV

total UV-permeability for solar radiation with enhanced permeability for short-wave UV-A and UV-B radiation

- Combines the increased transmittance of natural ultraviolet radiation (see properties of Trosifol Natural UV) with the unique structural performance of SentryGlas® ionoplast interlayers

UV CONTROL: PROTECT OR TRANSMIT

Ultraviolet (UV) light is vital to life, but too much UV in the 315 to 400 nm range can be particularly damaging, not only to human skin, but also to plastics, pigments and paints.

To cater for varying needs of different applications, Trosifol offers solutions that either totally block UV wavelengths or, unlike standard PVB, offer complete spectrum transmission.

Photo: © A.Anisko/shutterstock.com