English

Product portfolio

Architectural Glazing

kuraray

Trosifol® SentryGlas®

Photo: © www.aeyme

Introduction

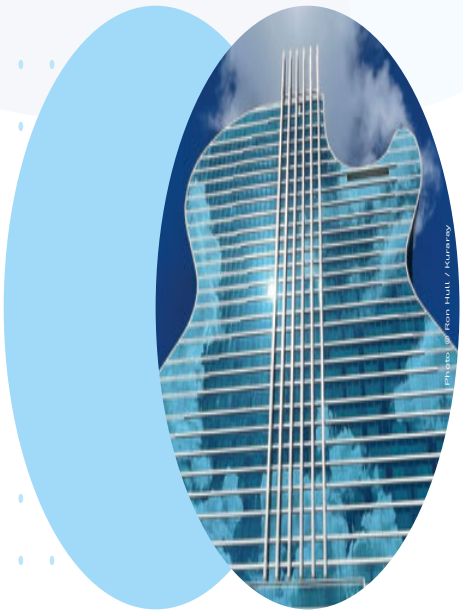
Interlayer strength, depth and capabilities

Delivering your window into the world of advanced interlayers for laminated safety glass, Kuraray's Advanced Interlayer Business is underpinned by decades of innovation, application knowledge, domain experience and market success.

OUR ADVANCED INTERLAYER PORTFOLIO – comprising Trosifol® PVB and SentryGlas® ionoplast interlayers – has continually revolutionized aesthetic, structural and functional design, fabrication and installation in the architectural and automotive/transportation segments.

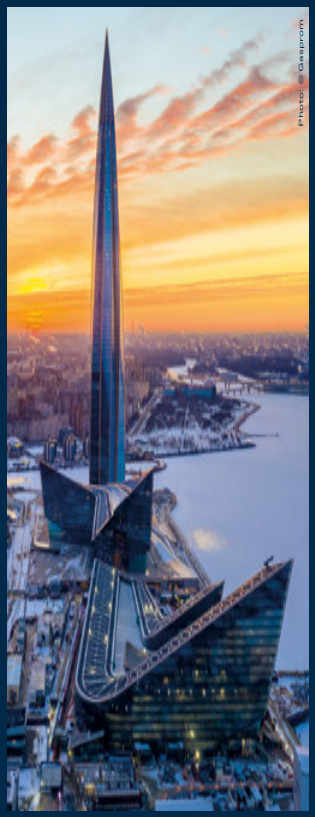
Designed to benefit consumers, society and industry, our products are advancing the functionality of glass, while our engineers and consultants are setting new application benchmarks by collaborating on solutions that both sustain and inspire.

We are committed to helping you transform your mindset and take your applications to the next level – aesthetically, functionally and structurally. Enjoy greater design freedom and give your glazing strength, clarity, character and purpose with solutions that cover safety, security, sound insulation, UV/solar/energy management, color and print.



● Seminole Hard Rock Hotel & Casino, Hollywood, Florida

OUR DIVERSE PRODUCT RANGE, the broadest on the global market and our domain expertise create strength; and we channel this strength into helping you succeed. We strive to be your strongest ally and supporter and will help you navigate and conquer the ever-changing demands of the global glass industry. Worldwide production, R&D and support, means we are always by your side ... no matter where you are.



● Lakhta Tower, Saint Petersburg, Russia

● Guilin Wanda Cultural Tourism Exhibition Center, China

Product lines

Contents

Safety Glazing

Transparency and safety

SAFETY HIGHLIGHTS

- **High adhesion:** Specially designed for laminated safety glass, made with heat strengthened or tempered glass. *It reduces the risk of edge delamination.*
- **Highest light transmittance and lowest Yellowness Index:** the thicker the interlayer and the clearer the glass, the more you benefit from *the UltraClear performance.*
  - **Trosifol® UltraClear interlayer highlights the benefits of low iron glass**
  - **Trosifol® UltraClear ensures best color fastness (e. g. white screen-printing)**
- **Open edge performance:** Salt spray test demonstrates the outstanding open edge performance with Trosifol® UltraClear (in this test as good as SentryGlas®).

Photo: © papmap / shutterstock.com

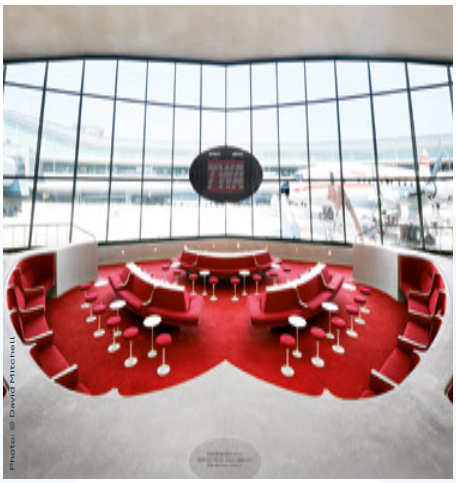


Photo: © David Mitchell

● The Sunken Lounge, TWA Hotel, JFK Airport, New York City, USA

Photo Flower: © Lotus Images/shutterstock.com

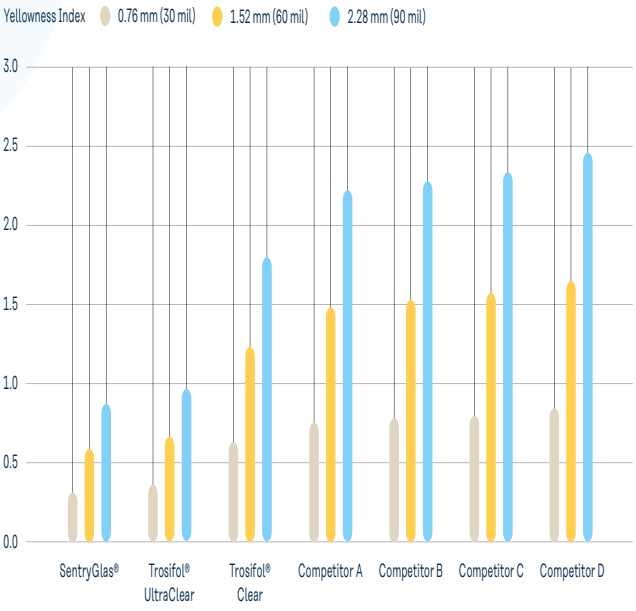
● Trosifol® PVB Trosifol® UltraClear

External yellowness specification for architects and engineers

Film thickness [mm]	[mil]	Trosifol® UltraClear	Trosifol® Clear	SentryGlas®
0.76	30	≤ 0.4	< 1.0	≤ 0.3
1.52	60	≤ 0.8	< 2.0	≤ 0.6
2.28	90	≤ 1.2	< 3.0	≤ 1.0
7.6	300	≤ 4.0	< 10.0	< 3.0

TAB 1 ● Measured between 2 x 2 mm low iron glass

Yellowness Index for Trosifol®, SentryGlas® and competitors



GRAPH 1 ●

● American Dream Mall, East Rutherford, New Jersey

Structural and Security Glazing

Exceptional strength

up to 330 cm (130 in)

STRUCTURAL AND SECURITY HIGHLIGHTS

- Extraordinary post-breakage strength
- High film shear modulus
- Excellent edge stability
- Outstanding clarity
- Open edge design thanks to SentryGlas®

APPLICATIONS & RECOMMENDATIONS

- SentryGlas® is the best choice, with over 20 years of outdoor exposure, for open edge applications that require the very best edge durability and optics.
- SentryGlas® is recommended for applications that require the highest structural performance over a broad range of temperatures and loads.
- SentryGlas® Translucent White provides full structural performance along with a translucent white effect for privacy.
- For moderate design temperature we recommend Trosifol® Extra Stiff.
- For elevated design temperature we recommend SentryGlas®.
- SentryGlas® Xtra™ interlayers have the best optical performance in very thick laminates.
- We recommend SentryGlas® Xtra™ for multi-ply laminate assemblies as an adhesion promoter is no longer required.
- Trosifol® Spallshield® CPET hard-coated PET film helps to stop the showering of small glass particles.
- Trosifol® PET adds strength to the PVB improving both safety and security of the glass laminate.

● King Power Mahanakhon, Bangkok, Thailand

Interlayer performance comparison

Properties	Trosifol® Clear / UltraClear			Trosifol® Extra Stiff			SentryGlas® ionoplast		
	Good	Advanced	Superior	Good	Advanced	Superior	Good	Advanced	Superior
Post breakage performance at room temperature	✓					✓			✓
Post breakage performance at elevated temperature	✓				✓				✓
Structural properties/ coupling effect at room temperature	✓					✓			✓
Structural properties/ coupling effect at elevated temperature	✓				✓				✓
Clarity		✓*	✓**		✓				✓
Sealant compatibility/ edge stability	✓*	✓**			✓				✓

TAB 2 ● * Valid for Trosifol® Clear ** Valid for Trosifol® UltraClear

● People on Zhangjiajie Glass Bridge, China

Structural and Security Glazing – severe weather

Interlayers for extreme security needs

HURRICANE

- Hurricane impact windows provide protection from wind borne debris
- The use of hurricane impact windows greatly reduces building damage
- First 9 meters (30 feet) of building elevation requires glazing system to pass large missile impact testing
- SentryGlas®, SentryGlas® Xtra™ and Trosifol® PVB pass large missile impact test and have obtained Miami Dade County Product Control Notice of Acceptance (NOA)
- SentryGlas® is best for Level E (essential facility) protection
- SentryGlas® recommended for large glass, high wind loads, or dry glaze systems

TORNADO

- Tornadoes are capable of wind speeds in excess of 250 mph (425 kph)
- Tornadoes strike with little warning
- Window systems using SentryGlas® and Trosifol® Spallshield® CPET are capable of passing FEMA 361 EF5 tornado test

TYPHOON

- Typhoons are synonymous with hurricanes, capable of the same damaging wind borne debris, the only difference is location
- Currently the building codes for window systems in typhoon regions are not very strong or enforced
- Our cooperation with the CTBUH to investigate how to expand hurricane window solutions to this region

https://www.trosifol.com/salessupport/research-testing/

● Miami Courthouse, USA

Structural and Security Glazing – man made

ANTI-INTRUSION GLAZING

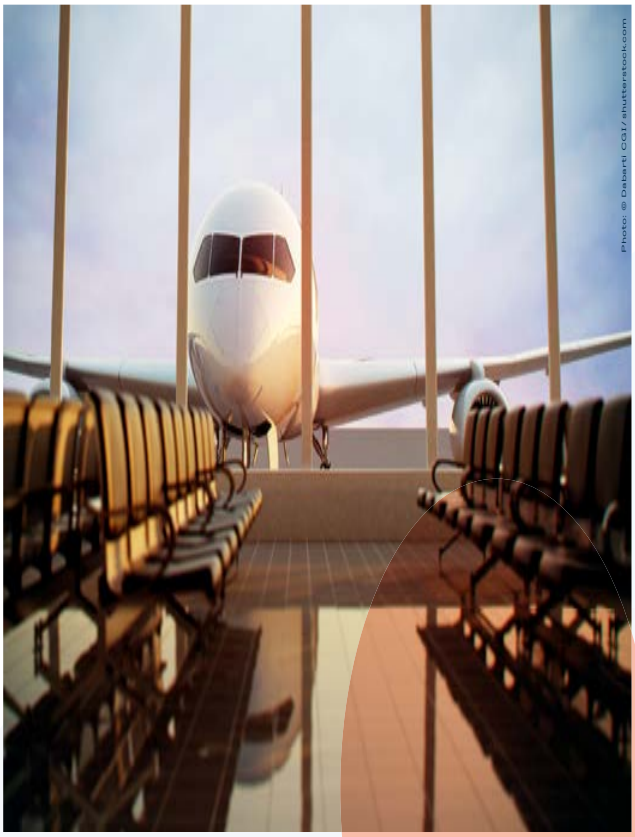
- Security and protection against attacks, vandalism and property theft
- No need to use unsightly bars or roll down gates. Clear transparent protection
- SentryGlas®, Trosifol® PVB and Trosifol® Spallshield® CPET interlayer comply with global security glazing standards

BALLISTIC RESISTANCE

- Protection from a wide range of ballistic threats
- Trosifol® Spallshield® CPET provides a durable spall protection layer
- SentryGlas® certified by the US Department of State for FE (forced entry) BR (bullet resitance)
- Construction using SentryGlas®, Trosifol® PVB, and Trosifol® Spallshield® CPET can meet ballistics-resistance test standards that are thinner, light-weight, and more durable than alternative solutions

BOMB-BLAST GLAZING

- Trosifol® PVB, Trosifol® Spallshield® CPET and SentryGlas® are used in systems for bomb blast protection, both low and high level protection
- SentryGlas® is specified by the US State Department for higher bomb blast requirements of US Embassies
- Embassies, government buildings and high risk buildings



Sound Control Glazing

Customized sound insulation

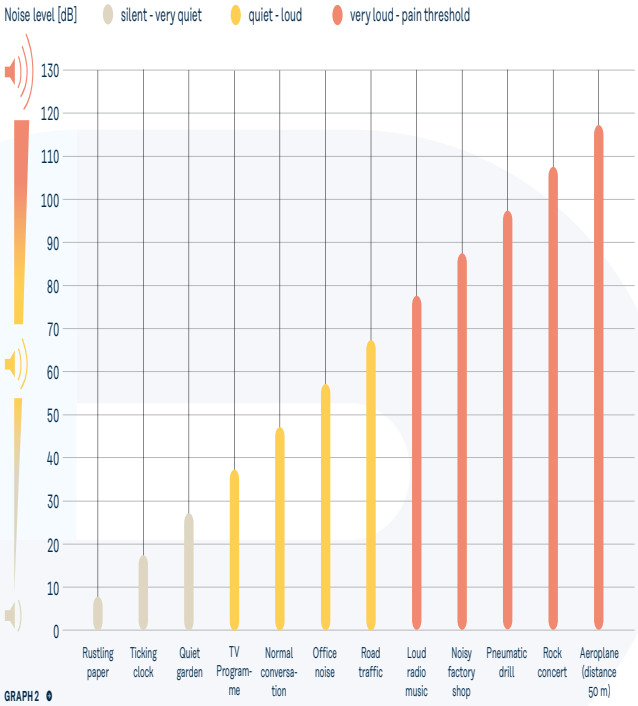
ACOUSTIC HIGHLIGHTS

- Sole supplier of mono- and multilayer PVB for the Acoustic Glazing market.
- R_W or STC/OITC values of 50 dB and better in insulated glass.

APPLICATIONS & RECOMMENDATIONS

- Thanks to its high adhesive strength, Trosifol® SC Monolayer is particularly suitable for laying between plies of heat-strengthened or fully tempered glass.
- Trosifol® SC Multilayer is ideal for achieving impact resistance level P2A conforming to EN 356.
- Trosifol® SC Multilayer can be combined with other Trosifol® products.
- Best optical properties in terms of "orange peel" with Trosifol® SC Monolayer.
- Laminated safety glass containing a Trosifol® SC Monolayer / Trosifol® SC Multilayer has up to 3 dB better sound insulation than the same construction with standard PVB film.

Noise sources and perception

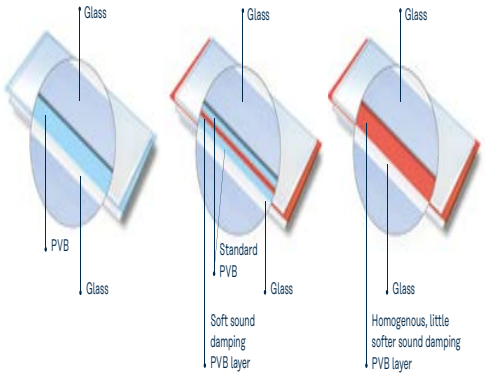


GRAPH 2 ●

Sound Control – select the right interlayers for acoustic and optical performance

Property	Trosifol® Clear / UltraClear	Trosifol® SC Multilayer	Trosifol® SC Monolayer
Acoustic performance	some	excellent	excellent
Optic	great good	risk for orange peel	great good
Films' combination	yes, standard and color	yes, standard and color	no
Ball drop performance*	P2A	P2A	P1A

TAB 3 ● * Between 2 x 4 mm + 0.76 mm (30 mil) interlayer



● Marco Polo Airport, Venice, Italy

● Pinto Martins International Airport, Fortaleza, Brazil

How can I achieve noise insulation, reduce weight of the construction and save costs?

Monolithic glass	Laminated glass	Acoustic laminated glass	
			
10 mm glass	0.76 mm Trosifol® Clear 5 mm glass	0.76 mm Sound Control 3 mm glass	0.76 mm Sound Control 5 mm glass
R_w = 33 dB	R_w = 35 dB	R_w = 36 dB	R_w = 38 dB
STC 30	STC 35	STC 36	STC 38
OITC 33	OITC 33	OITC 30	OITC 34

			
0.76 mm Trosifol® Clear 6 mm glass 4 mm glass	0.76 mm Sound Control 6 mm glass 3 mm glass	0.76 mm Sound Control 6 mm glass 4 mm glass	
R_w = 38 dB	R_w = 40 dB	R_w = 41 dB	
STC 38	STC 40	STC 41	
OITC 31	OITC 31	OITC 33	

TAB 4 ● 0.76 mm = 30 mil

UV Control Glazing

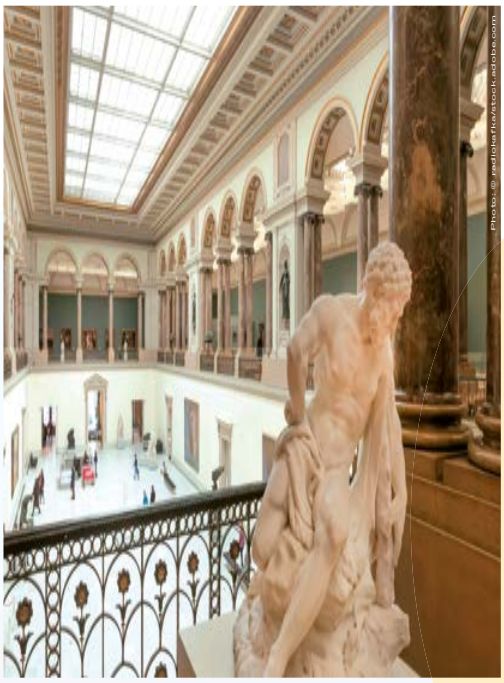
Intentional UV Control

UV CONTROL HIGHLIGHTS

- Trosifol® UV Extra Protect
- Trosifol® Natural UV
- SentryGlas® Natural UV
- Trosifol® UV Extra Protect is crucial in protecting against the sun's harmful UV rays and protects sensitive items against fading due to sun exposure.
- Both Natural UV products allow sunlight to provide essential vitamin D through the glass to promote wellness of animals and marine life.
- Trosifol® Natural UV and SentryGlas® Natural UV for total UV permeability.

APPLICATIONS & RECOMMENDATIONS

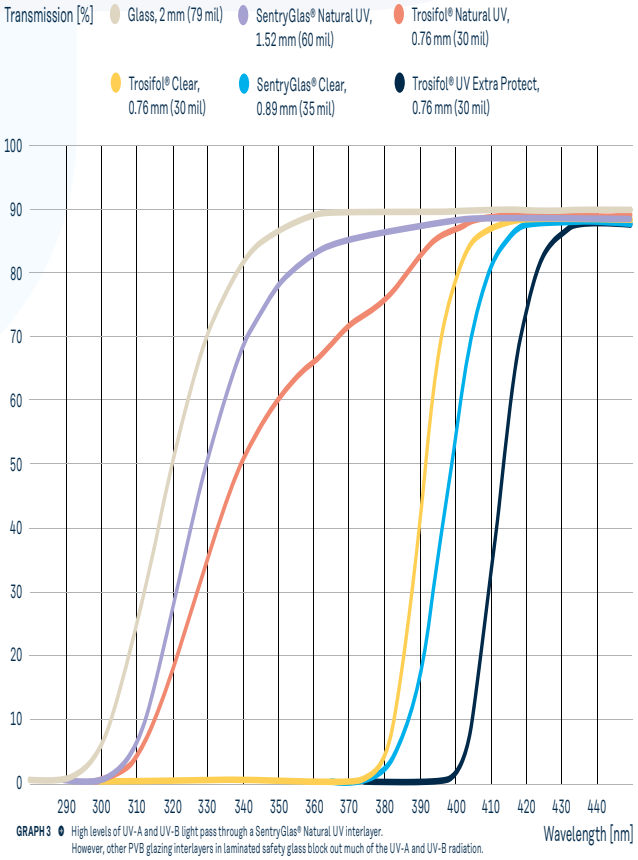
- Museums, archives, galleries
- Greenhouses/botanical gardens
- Restaurants, hotels, holiday resorts
- Hospitals
- Shop windows
- Children's day care centers
- Schools and universities
- Libraries
- Switchable glazing
- Zoo
- Flora
- Fauna
- Smart glazing



● Old sculpture in a museum

● Botanical garden, Berlin, Germany

UV Light transmittance curves



GRAPH 3 ● High levels of UV-A and UV-B light pass through a SentryGlas® Natural UV interlayer. However, other PVB glazing interlayers in laminated safety glass block out much of the UV-A and UV-B radiation.

● LSG with 2 x 2 mm glass

● New Headquarters Building, Seattle, USA

Decorative Glazing

Brilliant colors

DECORATIVE HIGHLIGHTS

- Interior and exterior applications thanks to outstanding color fastness
- Opaque Trosifol® Diamond White
- Totally opaque Trosifol® Brilliant Black
- Different degrees of translucency in the white color range
- Combination of colors possible

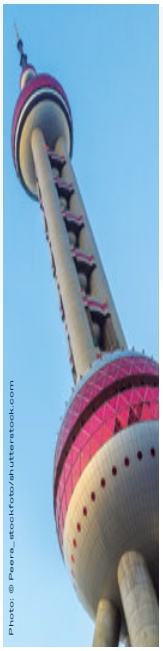
APPLICATIONS & RECOMMENDATIONS

- For total opacity, we recommend Trosifol® Brilliant Black.
- With strong colors, high color intensity is achieved with just a single film in the glass module, making further layers unnecessary.
- To achieve the same effects as body tinted glass, we recommend the tinted colors.

Decorative products

Color	Tints	Black & White
Trosifol® Red	Trosifol® Light Blue-Green	Trosifol® Brilliant Black
Trosifol® Light Green	Trosifol® Ocean Blue	Trosifol® Diamond White
Trosifol® Sky Blue	Trosifol® Bronze	Trosifol® Shining White
Trosifol® Medium Blue	Trosifol® Medium Bronze	Trosifol® Translucent White
Trosifol® Violet	Trosifol® Light Brown	Trosifol® Sand White
	Trosifol® Medium Brown	Trosifol® Coconut White
	Trosifol® Grey	SentryGlas® Translucent White
	Trosifol® Asahi Grey	
	Trosifol® Solar Grey	

TAB 5 ● Not all products are available in all regions.



● Shanghai Pearl Tower, China

● Trosifol® Color samples

● Seattle Space Needle

Technical data

This chapter summarizes the technical data for all of our products, measured as laminated safety glass of 6 or 8 mm thickness. In case technical data for specific designs are needed please use our WinSLT App: https://www.trosifol.com/trosifol-winslt-tool/

Combined interlayers

Product	Trosifol® UltraClear	Color/ Tints	Trosifol® UV Extra Protect	Trosifol® Natural UV	Trosifol® Extra Stiff	Trosifol® SC Mono-layer	Trosifol® SC Multi-layer	Trosifol® HR
Trosifol® Ultra Clear	✓	✓	✓	–	✓	–	✓	✓
Color/Tints	✓	✓	✓	–	✓	–	✓	✓
Trosifol® UV Extra Protect	✓	✓	✓	–	✓	–	✓	✓
Trosifol® Natural UV	–	–	–	✓	–	–	–	–
Trosifol® Extra Stiff	✓	✓	✓	–	✓	–	✓	✓
Trosifol® SC Monolayer	–	–	–	–	–	✓	–	–
Trosifol® SC Multilayer	✓	✓	✓	–	✓	–	✓	✓
Trosifol® HR	✓	✓	✓	–	✓	–	✓	✓

TAB 6 ●

TECHNICAL DATA SAFETY

Safety Interlayers – physical properties

Type	Adhesion	Film thickness [mm]	[mil]	Color	Light transmittance* [%]	UV transmittance* [%]	Solar absorption* [%]
Trosifol® Clear	medium	0.38	15	Clear	88	< 2	18
Trosifol® Clear	low	0.76	30	Clear	88	< 1	19
Trosifol® Clear	medium	1.14	45	Clear	88	< 1	20
Trosifol® Clear	medium	1.52	60	Clear	88	< 0.5	21
Trosifol® Clear	medium	2.28	90	Clear	88	< 0.5	22
Trosifol® UltraClear	high	0.76	30	UltraClear	88	< 1	20
Trosifol® UltraClear	high	1.14	45	UltraClear	88	< 1	20
Trosifol® UltraClear	high	1.52	60	UltraClear	88	< 0.5	21

TAB 7 ●

TECHNICAL DATA STRUCTURAL & SECURITY

Structural & Security Interlayers* – physical properties

Type	Adhesion	Film thickness [mm]	[mil]	Color	Light transmittance*1 [%]	UV transmittance*1 [%]	Solar absorption*1 [%]
Trosifol® Extra Stiff	high	0.76	30	Clear	88	< 1	20
SentryGlas®	high	0.76	30	Clear	88	< 1	19
SentryGlas®	high	0.89	35	Clear	88	< 1	19
SentryGlas®	high	1.52	60	Clear	88	< 1	20
SentryGlas®	high	2.28	90	Clear	88	< 1	21
SentryGlas® Translucent White	high	0.80	31	Translucent White	76	43	26
SentryGlas® Xtra™	high	0.89	35	Clear	88	< 1	20
SentryGlas® Xtra™	high	1.52	60	Clear	88	< 1	21
SentryGlas® Xtra™	high	2.28	90	Clear	88	< 1	22
SentryGlas® Xtra™	high	2.53	100	Clear	88	< 1	22
Trosifol® XT UltraClear	med.-high	2.28	90	UltraClear	88	< 1	22
Trosifol® Spallshield® CPET		0.18	7	Clear	91	0.50	
Trosifol® PET	high	0.18	7	Clear	87	0.0	28

TAB 8 ● * LSG with 2 x 4 mm Floatglass according EN 410/ISO 9050

*1 Values calculated using Lawrence Berkeley National Laboratory Optics5 and Windows5 software.

Not all products are available in all regions.

TECHNICAL DATA STRUCTURAL & SECURITY

Shear Relaxation Modulus G(t) / MPa

Temperature	Product type	Load duration 3 sec	30 sec	1 min	5 min	30 min	1 hour	1 day	5 days	3 weeks	1 month	1 year	10 years
10°C (50°F)	Trosifol® Clear/UltraClear	66	31	23	10	3.5	2.4	0.69	0.53	0.46	0.47	0.37	0.28
	Trosifol® SC Monolayer	3.1	1.1	0.90	0.61	0.48	0.45	0.34	0.28	0.21	0.22	0.11	0.042
	Trosifol® SC Multilayer	1.3	1.1	0.94	0.65	0.45	0.41	0.30	0.23	0.16	0.17	0.060	
	Trosifol® Extra Stiff	350	270	240	170	110	85	16	4.7	1.6	1.9	0.86	0.70
	SentryGlas®	236	228	225	220	217	206	190	178	171	172	161	153
	SentryGlas® Xtra™	179	172	170	161	126	120	67.2	46.6	34.1	36.8	22.6	16.5
20°C (68°F)	Trosifol® Clear/UltraClear	6.6	1.7	1.2	0.74	0.54	0.50	0.39	0.33	0.26	0.27	0.14	0.063
	Trosifol® SC Monolayer	0.66	0.47	0.45	0.39	0.33	0.30	0.17	0.11	0.056	0.063		
	Trosifol® SC Multilayer	1.0	0.58	0.50	0.40	0.34	0.32	0.18	0.11	0.057	0.065		
	Trosifol® Extra Stiff	240	140	120	67	26	17	1.8	1.0	0.81	0.84	0.66	0.56
	SentryGlas®	211	206	192	188	175	169	146	130	112	115	96.5	86.6
	SentryGlas® Xtra™	155	131	125	120	100	80.1	39.9	29.5	18.4	21.2	11.1	6.69
25°C (77°F)	Trosifol® Clear/UltraClear	1.5	0.69	0.61	0.50	0.43	0.41	0.29	0.22	0.14	0.15	0.056	
	Trosifol® SC Monolayer	0.50	0.41	0.38	0.33	0.26	0.23	0.10	0.054	0.024	0.027		
	Trosifol® SC Multilayer	0.75	0.45	0.42	0.36	0.29	0.27	0.13	0.068	0.029	0.034		
	Trosifol® Extra Stiff	150	70	51	20	5.4	3.3	0.94	0.78	0.68	0.69	0.56	0.43
	SentryGlas®	167	149	142	117	106	101	80.5	60.8	42.4	45.1	32.1	24.3
	SentryGlas® Xtra™	136	115	97.9	80.4	45.8	37.2	18.6	15.4	10.5	11.1	5.61	3.31
30°C (86°F)	Trosifol® Clear/UltraClear	0.69	0.50	0.47	0.41	0.35	0.33	0.19	0.12	0.062	0.070		
	Trosifol® SC Monolayer	0.43	0.35	0.33	0.26	0.19	0.16	0.054	0.025				
	Trosifol® SC Multilayer	0.54	0.39	0.37	0.31	0.24	0.21	0.078	0.036				
	Trosifol® Extra Stiff	44	10	5.8	2.0	1.0	0.92	0.68	0.61	0.53	0.54	0.37	0.21
	SentryGlas®	141	119	110	83	66	60	50	24.7	11.6	12.9	6.8	5.31
	SentryGlas® Xtra™	101	84.8	80.1	55.1	38.2	26.0	8.97	7.13	5.17	5.54	3.07	1.98
35°C (95°F)	Trosifol® Clear/UltraClear	0.51	0.42	0.40	0.35	0.27	0.24	0.10	0.057				
	Trosifol® SC Monolayer	0.38	0.30	0.27	0.20	0.13	0.11	0.027					
	Trosifol® SC Multilayer	0.43	0.34	0.32	0.26	0.18	0.15	0.041					
	Trosifol® Extra Stiff	5.7	1.4	1.1	0.85	0.72	0.69	0.54	0.45	0.34	0.36	0.17	
	SentryGlas®	102	77.7	70.5	53.4	37.9	34.7	20.3	12.4	7.45	8.31	4.95	4.11
	SentryGlas® Xtra™	70.3	55.1	44.9	29.0	13.5	10.0	3.31	2.76	2.15	2.32	1.51	1.05
40°C (104°F)	Trosifol® Clear/UltraClear	0.44	0.37	0.34	0.28	0.20	0.16	0.54					
	Trosifol® SC Monolayer	0.34	0.25	0.22	0.15	0.089	0.068						
	Trosifol® SC Multilayer	0.36	0.28	0.25	0.18	0.10	0.079						
	Trosifol® Extra Stiff	1.3	0.83	0.77	0.68	0.60	0.57	0.39	0.28	0.17	0.18		
	SentryGlas®	63	37	31	19	11.4	9.3	4.5	3.6	3.3	3.4	3.1	2.9
	SentryGlas® Xtra™	46.3	33.1	27.0	15.0	6.99	5.20	1.86	1.57	1.11	1.19	0.70	0.47
50°C (122°F)	Trosifol® Clear/UltraClear	0.36	0.26	0.23	0.16	0.089	0.068						
	Trosifol® SC Monolayer	0.27	0.17	0.14	0.087	0.041	0.029						
	Trosifol® SC Multilayer	0.28	0.18	0.15	0.084	0.036	0.025						
	Trosifol® Extra Stiff	0.72	0.61	0.58	0.50	0.38	0.34	0.13					
	SentryGlas®	26.4	13.5	11.3	7.31	4.9	4.2	2.8	2.4	2.2	2.2	2	2
	SentryGlas® Xtra™	12.7	4.90	3.89	2.71	2.00	1.70	1.05	0.92	0.54	0.61	0.43	0.23
60°C (140°F)	Trosifol® Clear/UltraClear	0.27	0.17	0.14	0.081								
	Trosifol® SC Monolayer	0.22	0.12	0.10	0.052								
	Trosifol® SC Multilayer	0.20	0.10	0.07	0.036								
	Trosifol® Extra Stiff	0.60	0.47	0.43	0.33	0.21	0.16						
	SentryGlas®	8.2	4.3	3.6	2.6	1.9	1.7	1.3	1.2	1.1	1.1	1.0	0.97
	SentryGlas® Xtra™	3.78	2.15	1.88	1.40	1.00	0.90	0.58		0.28	0.31	0.18	0.12
70°C (158°F)	Trosifol® Clear/UltraClear	0.21	0.11	0.088	0.047								
	Trosifol® SC Monolayer	0.16	0.076	0.058	0.027								
	Trosifol® SC Multilayer	0.13	0.054	0.039									
	Trosifol® Extra Stiff	0.48	0.33	0.28	0.18								
	SentryGlas®	2.9	2	1.9	1.4	1.0	0.8	0.6	0.5	0.5	0.5	0.5	0.45
	SentryGlas® Xtra™	1.73	1.05	0.90	0.68	0.45	0.40	0.24	0.17	0.11	0.12	0.07	0.05
80°C (176°F)	Trosifol® Clear/UltraClear	0.16	0.074	0.056									
	Trosifol® SC Monolayer	0.11	0.047	0.033									
	Trosifol® SC Multilayer	0.10	0.34	0.023									
	Trosifol® Extra Stiff	0.36	0.20	0.16									
	SentryGlas®	1.3	1.0	0.8	0.6	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2
	SentryGlas® Xtra™	0.27	0.10	0.09	0.06	0.04	0.04	0.02	0.01				

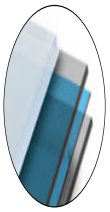
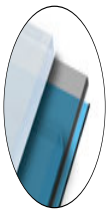
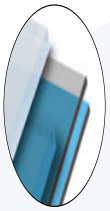
TAB 9 ● G(t) data were determined by Dynamic Mechanical-Analysis in accordance to EN ISO 6721 within the linear range of deformation. All samples were stored at 23°C for 4 weeks before measurement. G(t) data were experimentally verified by 4-Point-Bend-Tests on laminated glass following prEN 16613 at third party labs for selected time-load combinations.

Young Relaxation Modulus E(t) / MPa

Temperature	Product type	Load duration 3 sec	30 sec	1 min	5 min	30 min	1 hour	1 day	5 days	3 weeks	1 month	1 year	10 years
10°C (50°F)	Trosifol® Clear/UltraClear	200	92	69	31	11	7.0	2.1	1.6	1.4	1.4	1.1	0.83
	Trosifol® SC Monolayer	9.1	3.4	2.7	1.8	1.4	1.3	1.0	0.83	0.66	0.62	0.32	0.13
	Trosifol® SC Multilayer												
	Trosifol® Extra Stiff	1000	780	700	510	310	250	46	14	5.5	4.7	2.5	2.1
	SentryGlas®	681	661	651	638	629	597	553	516	498	499	467	448
	SentryGlas® Xtra™	530	509	503	477	373	355	199	138	109	101	66.9	48.8
20°C (68°F)	Trosifol® Clear/UltraClear	20	5.1	3.7	2.2	1.6	1.5	1.2	0.98	0.80	0.77	0.42	0.19
	Trosifol® SC Monolayer	2.0	1.4	1.3	1.2	0.98	0.90	0.50	0.32	0.19	0.17		
	Trosifol® SC Multilayer												
	Trosifol® Extra Stiff	690	420	350	200	77	50	5.4	3.1	2.5	2.4	1.9	1.6
	SentryGlas®	612	602	567	549	511	493	428	380	336	330	282	256
	SentryGlas® Xtra™	459	389	370	355	296	237	118	87.3	62.8	54.4	32.9	19.8
25°C (77°F)	Trosifol® Clear/UltraClear	4.4	2.1	1.8	1.5	1.3	1.2	0.86	0.65	0.46	0.42	0.17	
	Trosifol® SC Monolayer	1.5	1.2	1.1	0.97	0.76	0.68	0.30	0.16	0.080	0.072		
	Trosifol® SC Multilayer												
	Trosifol® Extra Stiff	430	210	150	59	16	9.6	2.8	2.3	2.0	2.0	1.7	1.3
	SentryGlas®	485	433	413	340	308	294	234	177	131	123	93.3	70.6
	SentryGlas® Xtra™	403	340	289	238	136	110	55.1	45.6	32.9	31.4	16.6	9.80
30°C (86°F)	Trosifol® Clear/UltraClear	2.1	1.5	1.4	1.2	1.0	0.97	0.56	0.35	0.21	0.19		
	Trosifol® SC Monolayer	1.3	1.0	0.97	0.78	0.56	0.47	0.16	0.075				
	Trosifol® SC Multilayer												
	Trosifol® Extra Stiff	130	29	17	5.8	3.0	2.7	2.0	1.8	1.6	1.5	1.1	0.62
	SentryGlas®	413	349	324	243	194	178	146	72	38	35	20.3	15
	SentryGlas® Xtra™	299	250	237	163	113	77.0	26.6	21.1	16.4	15.3	9.09	5.86
35°C (95°F)	Trosifol® Clear/UltraClear	1.5	1.3	1.2	1.0	0.81	0.72	0.31	0.17				
	Trosifol® SC Monolayer	1.1	0.89	0.81	0.61	0.39	0.31	0.081					
	Trosifol® SC Multilayer												
	Trosifol® Extra Stiff	17	4.1	3.3	2.5	2.1	2.0	1.6	1.3	1.0	1.0	0.49	
	SentryGlas®	302	230	209	158	122	103	60.1	36.7	24.6	22.1	14.7	12.2
	SentryGlas® Xtra™	208	163	133	85.8	40.0	29.6	9.80	8.17	6.87	6.35	4.47	3.11
40°C (104°F)	Trosifol® Clear/UltraClear	1.3	1.1	1.0	0.82	0.58	0.49	0.16					
	Trosifol® SC Monolayer	1.0	0.75	0.66	0.46	0.26	0.20						
	Trosifol® SC Multilayer												
	Trosifol® Extra Stiff	3.7	2.4	2.3	2.0	1.8	1.7	1.1	0.81	0.54	0.49		
	SentryGlas®	187	109	91.6	57	34	27.8	13.5	11	10	9.9	9.3	8.84
	SentryGlas® Xtra™	137	98.0	79.9	44.4	20.7	15.4	5.51	4.65	3.52	3.28	2.07	1.39
50°C (122°F)	Trosifol® Clear/UltraClear	1.1	0.78	0.69	0.48	0.27	0.20						
	Trosifol® SC Monolayer	0.80	0.52	0.43	0.26	0.12	0.086						
	Trosifol® SC Multilayer												
	Trosifol® Extra Stiff	2.1	1.8	1.7	1.5	1.1	1.0	0.4					
	SentryGlas®	78	40	33.8	21.7	14.6	12.6	8.4	7.2	6.5	6.5	6.3	6
	SentryGlas® Xtra™	37.6	14.5	11.5	8.02	5.92	5.03	3.11	2.72	1.81	1.59	1.27	0.68
60°C (140°F)	Trosifol® Clear/UltraClear	0.82	0.51	0.42	0.24								
	Trosifol® SC Monolayer	0.64	0.36	0.29	0.15								
	Trosifol® SC Multilayer												
	Trosifol® Extra Stiff	1.8	1.4	1.3	0.96	0.60	0.48						
	SentryGlas®	24.5	12.8	10.9	7.6	5.5	5.1	3.8	3.6	3.3	3.3	3	2.9
	SentryGlas® Xtra™	11.2	6.36	5.57	4.14	2.96	2.66	1.72	1.18	0.92	0.84	0.53	0.36
70°C (158°F)	Trosifol® Clear/UltraClear	0.63	0.34	0.26	0.14								
	Trosifol® SC Monolayer	0.47	0.23	0.17	0.080								
	Trosifol® SC Multilayer												
	Trosifol® Extra Stiff	1.4	0.97	0.83	0.52								
	SentryGlas®	8.8	6.3	5.64	4.2	2.9	2.5	1.8	1.6	1.5	1.5	1.4	1.3
	SentryGlas® Xtra™	5.12	3.11	2.66	2.01	1.33	1.18	0.71	0.49	0.36	0.32	0.21	0.15
80°C (176°F)	Trosifol® Clear/UltraClear	0.48	0.22	0.17									
	Trosifol® SC Monolayer	0.34	0.14	0.099									
	Trosifol® SC Multilayer												
	Trosifol® Extra Stiff	1.1	0.6	0.48									
	SentryGlas®	4.0	2.9	2.5	1.7	1.1	1.0	0.8	0.7	0.6	0.8	0.6	0.5
	SentryGlas® Xtra™	0.80	0.30	0.27	0.18	0.12	0.12	0.06	0.03				

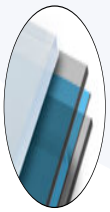
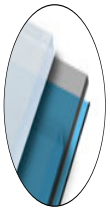
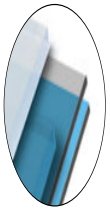
TAB 10 ● E(t) was calculated according E(t) = 2 x G(t) x (1+v) for isotropic materials with: v = 0.47 (Trosifol® Extra Stiff), v = 0.49 (Trosifol® Clear, Trosifol® SC Monolayer); v = 0.48 (SentryGlas®, SentryGlas® Xtra™). The Poisson ratio v was measured in accordance to EN ISO 527 (23°C, 30% r. H.). If numerical simulation tools (FEA) require E(t) data for Trosifol® SC Multilayer, these data can be calculated using E(t) = 2 x G(t) x (1+v) with: v = 0.49. This is the closest approximation available and validation tests did show that it gives conservative E modulus values.

Trosifol® Extra Stiff 0.76 (30 mil) and Trosifol® PVB combinations – Shear Relaxation Modulus G(t)/MPa

Combination	Temperature	Load duration																				
		1 sec	3 sec	5 sec	10 sec	30 sec	1 min	5 min	10 min	30 min	1 hour	6 hours	12 hours	1 day	2 days	5 days	1 week	3 weeks	1 month	1 year	10 years	50 years
 Trosifol® Extra Stiff 0.76 mm (30 mil) Trosifol® PVB 0.38 mm (15 mil) Trosifol® Extra Stiff 0.76 mm (30 mil)	10°C (50°F)	370	330	310	280	240	210	140	120	81	61	23	15	10	6.4	3.7	3.1	1.7	1.5	0.82	0.66	0.58
	20°C (68°F)	220	180	160	130	92	71	33	22	11	7.0	2.5	1.8	1.4	1.2	0.97	0.92	0.80	0.77	0.63	0.52	0.42
	25°C (77°F)	98	65	51	36	19	12	4.5	3.0	1.8	1.4	0.93	0.84	0.78	0.73	0.68	0.67	0.62	0.60	0.46	0.31	0.19
	30°C (86°F)	23	12	8.4	5.5	2.9	2.1	1.2	1.0	0.86	0.79	0.68	0.64	0.61	0.58	0.53	0.51	0.45	0.43	0.25	0.11	
	35°C (95°F)	4.3	2.4	1.9	1.5	1.1	0.95	0.77	0.73	0.67	0.64	0.55	0.51	0.47	0.43	0.36	0.34	0.26	0.24	0.09		
	40°C (104°F)	1.5	1.1	0.99	0.88	0.77	0.73	0.65	0.61	0.56	0.52	0.41	0.36	0.32	0.27	0.20	0.18	0.12	0.11			
	50°C (122°F)	0.76	0.69	0.67	0.63	0.58	0.55	0.45	0.41	0.33	0.28	0.16	0.12	0.093								
	60°C (140°F)	0.62	0.57	0.54	0.50	0.44	0.39	0.28	0.23	0.16	0.12											
	70°C (158°F)	0.51	0.44	0.41	0.36	0.29	0.24	0.14	0.10													
	80°C (176°F)	0.41	0.33	0.29	0.24	0.17	0.13															
 Trosifol® Extra Stiff 0.76 mm (30 mil) Trosifol® PVB 0.38 mm (15 mil)	10°C (50°F)	330	290	280	250	210	190	130	100	68	50	17	11	7.0	4.5	2.7	2.3	1.5	1.3	0.78	0.64	0.56
	20°C (68°F)	200	160	140	120	82	62	27	18	8.3	5.2	2.0	1.5	1.2	1.0	0.86	0.82	0.72	0.70	0.58	0.46	0.37
	25°C (77°F)	89	57	45	31	16	10	3.5	2.4	1.5	1.2	0.83	0.76	0.71	0.67	0.63	0.61	0.56	0.55	0.41	0.27	0.17
	30°C (86°F)	21	10	6.9	4.4	2.4	1.8	1.1	0.93	0.78	0.73	0.62	0.59	0.57	0.53	0.49	0.47	0.41	0.39	0.22	0.094	
	35°C (95°F)	3.7	2.1	1.7	1.3	1.0	0.88	0.72	0.68	0.62	0.59	0.50	0.47	0.43	0.39	0.33	0.31	0.24	0.22	0.081		
	40°C (104°F)	1.4	1.0	0.92	0.82	0.72	0.68	0.60	0.57	0.52	0.49	0.38	0.33	0.29	0.25	0.19	0.17	0.11	0.096			
	50°C (122°F)	0.71	0.65	0.62	0.59	0.54	0.51	0.42	0.38	0.31	0.26	0.15	0.11	0.083								
	60°C (140°F)	0.58	0.53	0.51	0.47	0.41	0.36	0.26	0.21	0.15	0.11											
	70°C (158°F)	0.48	0.41	0.38	0.34	0.27	0.22	0.13	0.093													
	80°C (176°F)	0.37	0.30	0.27	0.22	0.16	0.12															
 Trosifol® Extra Stiff 0.76 mm (30 mil) Trosifol® PVB 0.76 mm (30 mil)	10°C (50°F)	290	260	240	210	170	150	93	73	45	32	11	6.8	4.6	3.1	2.0	1.8	1.3	1.2	0.74	0.61	0.53
	20°C (68°F)	110	77	63	47	27	17	6.3	4.2	2.3	1.8	1.0	0.91	0.82	0.75	0.68	0.66	0.61	0.60	0.47	0.33	0.22
	25°C (77°F)	35	18	13	8.6	4.4	3.0	1.5	1.2	1.0	0.86	0.68	0.65	0.61	0.58	0.54	0.52	0.47	0.45	0.29	0.14	0.068
	30°C (86°F)	6.7	3.5	2.7	2.0	1.4	1.1	0.83	0.75	0.67	0.64	0.55	0.52	0.49	0.45	0.39	0.37	0.30	0.28	0.12		
	35°C (95°F)	1.9	1.3	1.2	1.0	0.83	0.75	0.64	0.61	0.56	0.53	0.43	0.39	0.35	0.30	0.24	0.22	0.15	0.13			
	40°C (104°F)	1.1	0.86	0.80	0.73	0.66	0.63	0.55	0.52	0.46	0.42	0.30	0.26	0.21	0.17	0.12	0.10					
	50°C (122°F)	0.66	0.61	0.59	0.55	0.50	0.46	0.37	0.32	0.25	0.20	0.098	0.070									
	60°C (140°F)	0.55	0.50	0.47	0.43	0.36	0.32	0.21	0.16	0.10	0.075											
	70°C (158°F)	0.43	0.37	0.33	0.29	0.21	0.17	0.085														
	80°C (176°F)	0.32	0.25	0.22	0.17	0.11	0.079															

TAB 11 ●

Trosifol® Extra Stiff 0.76 (30 mil) and Trosifol® PVB combinations – Young Relaxation Modulus E(t)/MPa

Combination	Temperature	Load duration																				
		1 sec	3 sec	5 sec	10 sec	30 sec	1 min	5 min	10 min	30 min	1 hour	6 hours	12 hours	1 day	2 days	5 days	1 week	3 weeks	1 month	1 year	10 years	50 years
 Trosifol® Extra Stiff 0.76 mm (30 mil) Trosifol® PVB 0.38 mm (15 mil) Trosifol® Extra Stiff 0.76 mm (30 mil)	10°C (50°F)	1100	970	910	830	700	610	420	350	240	180	68	44	29	19	11	9.1	4.9	4.3	2.4	1.9	1.7
	20°C (68°F)	660	520	460	390	270	210	96	64	32	21	7.3	5.4	4.2	3.5	2.9	2.7	2.3	2.3	1.9	1.5	1.2
	25°C (77°F)	290	190	150	110	56	36	13	9.0	5.4	4.2	2.7	2.5	2.3	2.2	2.0	2.0	1.8	1.8	1.4	0.90	0.57
	30°C (86°F)	69	34	25	16	8.6	6.2	3.5	3.0	2.5	2.3	2.0	1.9	1.8	1.7	1.6	1.5	1.3	1.3	0.74	0.33	
	35°C (95°F)	13	7.1	5.6	4.3	3.2	2.8	2.3	2.1	2.0	1.9	1.6	1.5	1.4	1.2	1.1	1.00	0.77	0.71	0.28		
	40°C (104°F)	4.4	3.2	2.9	2.6	2.3	2.1	1.9	1.8	1.6	1.5	1.2	1.1	0.93	0.78	0.60	0.54	0.36	0.31			
	50°C (122°F)	2.2	2.0	2.0	1.9	1.7	1.6	1.3	1.2	0.98	0.83	0.47	0.36	0.27								
	60°C (140°F)	1.8	1.7	1.6	1.5	1.3	1.2	0.82	0.68	0.47	0.36											
	70°C (158°F)	1.5	1.3	1.2	1.1	0.84	0.70	0.40	0.30													
	80°C (176°F)	1.2	0.97	0.86	0.72	0.51	0.39															
 Trosifol® Extra Stiff 0.76 mm (30 mil) Trosifol® PVB 0.38 mm (15 mil)	10°C (50°F)	970	860	810	740	620	540	370	300	200	150	51	32	21	13	7.8	6.7	4.3	3.9	2.3	1.9	1.7
	20°C (68°F)	590	480	420	350	240	180	79	52	25	15	5.7	4.4	3.6	3.0	2.5	2.4	2.1	2.1	1.7	1.4	1.1
	25°C (77°F)	260	170	130	91	46	29	10	7.1	4.5	3.6	2.4	2.2	2.1	2.0	1.8	1.8	1.7	1.6	1.2	0.78	0.49
	30°C (86°F)	60	29	20	13	7.1	5.3	3.2	2.7	2.3	2.1	1.8	1.7	1.7	1.6	1.4	1.4	1.2	1.1	0.65	0.28	
	35°C (95°F)	11	6.2	5.0	3.9	3.0	2.6	2.1	2.0	1.8	1.7	1.5	1.4	1.3	1.1	0.98	0.91	0.70	0.65	0.24		
	40°C (104°F)	4.0	3.0	2.7	2.4	2.1	2.0	1.8	1.7	1.5	1.4	1.1	0.98	0.86	0.72	0.55	0.49	0.32	0.28			
	50°C (122°F)	2.1	1.9	1.8	1.7	1.6	1.5	1.2	1.1	0.90	0.77	0.43	0.33	0.24								
	60°C (140°F)	1.7	1.6	1.5	1.4	1.2	1.1	0.76	0.63	0.44	0.33											
	70°C (158°F)	1.4	1.2	1.1	0.99	0.78	0.65	0.37	0.27													
	80°C (176°F)	1.1	0.89	0.79	0.66	0.46	0.35															
 Trosifol® Extra Stiff 0.76 mm (30 mil) Trosifol® PVB 0.76 mm (30 mil)	10°C (50°F)	860	750	700	620	500	430	270	210	130	95	31	20	14	9.2	5.9	5.2	3.7	3.4	2.2	1.8	1.6
	20°C (68°F)	320	230	190	140	78	51	19	12	6.9	5.2	3.0	2.7	2.4	2.2	2.0	1.9	1.8	1.7	1.4	0.97	0.65
	25°C (77°F)	100	54	39	25	13	8.8	4.5	3.7	2.8	2.5	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	0.85	0.41	0.20
	30°C (86°F)	20	10	7.9	5.8	4.0	3.3	2.4	2.2	2.0	1.9	1.6	1.5	1.4	1.3	1.2	1.1	0.88	0.82	0.35		
	35°C (95°F)	5.7	4.0	3.4	2.9	2.4	2.2	1.9	1.8	1.7	1.6	1.3	1.1	1.0	0.89	0.70	0.64	0.43	0.39			
	40°C (104°F)	3.1	2.5	2.4	2.2	1.9	1.8	1.6	1.5	1.4	1.2	0.89	0.75	0.63	0.49	0.34	0.30					
	50°C (122°F)	1.9	1.8	1.7	1.6	1.5	1.4	1.1	0.95	0.73	0.59	0.29	0.21									
	60°C (140°F)	1.6	1.5	1.4	1.3	1.1	0.93	0.61	0.48	0.31	0.22											
	70°C (158°F)	1.3	1.1	0.98	0.84	0.62	0.49	0.25														
	80°C (176°F)	0.95	0.73	0.63	0.50	0.32	0.23															

TAB 12 ●

TECHNICAL DATA – SOUND CONTROL

Acoustic Interlayers – physical properties

Type	Adhesion	Film thickness [mm]	[mil]	Color	Light transmittance* [%]	UV transmittance* [%]	Solar absorption* [%]
Trosifol® SC Monolayer	high	0.76	30	Clear	88	< 1	19
Trosifol® SC Monolayer	high	1.52	60	Clear	88	< 0.5	21
Trosifol® SC Multilayer	low	0.50	20	Clear	88	< 1	20
Trosifol® SC Multilayer	low	0.76	30	Clear	88	< 1	20

TAB 13 ● * LSG with 2 x 4 mm Floatglass according EN 410/ISO 9050

Not all products are available in all regions.

SOUNDLAB
For calculating acoustic performance of monolithic, double and triple glazed units.

SOUNDLAB AI
First global acoustic calculator based on artificial intelligence for calculating/estimating acoustic performance of monolithic, double and triple glazed units.

0.50 mm (20 mil) Multilayer products – test results

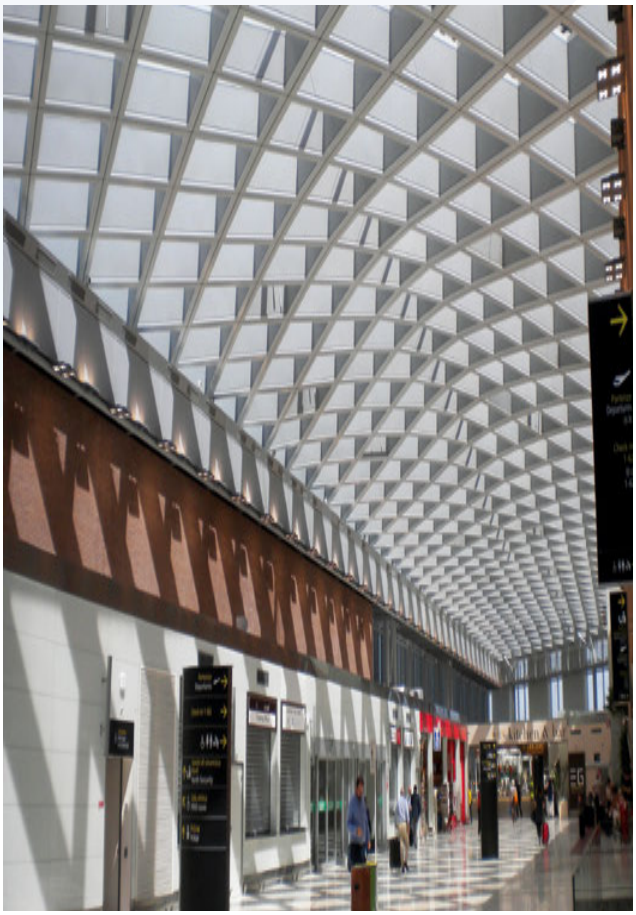
Glass [mm]	Cavity air or argon [mm]	Glass [mm]	Cavity [mm]	Glass [mm]	R_W [dB]	C, C_{tr} [dB]	STC	OITC
3 SC Multi** 0.50 3					36	(-1/-4)	35	30
4 SC Multi 0.50 4					37	(0/-2)	37	33
5 SC Multi 0.50 5					39	(-1/-3)	38	35
6 SC Multi 0.50 6					40	(-1/-3)	40	36
8 SC Multi 0.50 8					41	(0/-2)	41	38

TAB 15 ● ** SC Multi = Trosifol® SC Multilayer

0.76 mm (30 mil) Monolayer products – test results

Glass [mm]	Cavity air or argon [mm]	Glass [mm]	Cavity [mm]	Glass [mm]	R_W [dB]	C, C_{tr} [dB]	STC	OITC
3 SC Mono* 0.76 3					35	(-1/-4)	35	30
4 SC Mono 0.76 4					37	(-1/-3)	37	32
5 SC Mono 0.76 5					38	(0/-2)	38	34
6 SC Mono 0.76 6					39	(0/-2)	39	35
8 SC Mono 0.76 8					41	(-1/-3)	41	37
10 SC Mono 0.76 10					42	(0/-3)	42	38
12 SC Mono 0.76 12					43	(0/-3)	43	39
4 SC Mono 0.76 4	16	4			39	(-1/-5)	39	31
4 SC Mono 0.76 4	16	6			41	(-2/-6)	41	33
4 SC Mono 0.76 4	16	8			42	(-3/-8)	42	31
6 SC Mono 0.76 6	16	8			43	(-2/-6)	43	34
4 SC Mono 0.76 4	16	10			44	(-2/-6)	44	35
4 SC Mono 0.76 4	16	6 SC Mono 0.76 6			47	(-2/-6)	48	37
4 SC Mono 0.76 4	20	6 SC Mono 0.76 6			49	(-2/-7)	49	38
4 SC Mono 0.76 4	12	4	12	6	41	(-2/-6)	41	32
4 SC Mono 0.76 4	12	4	12	8	42	(-2/-6)	42	33
4 SC Mono 0.76 4	12	6	12	4 SC Mono 0.76 6	47	(-2/-7)	47	38

TAB 14 ● * SC Mono = Trosifol® SC Monolayer



● Marco Polo Airport, Venice, Italy

0.76 mm (30 mil) Multilayer products – test results

Glass [mm]	Cavity air or argon [mm]	Glass [mm]	Cavity [mm]	Glass [mm]	R_w [dB]	C, C_{tr} [dB]	STC	OITC
3 SC Multi** 0.76 3					36	(-1/-4)	36	30*
4 SC Multi 0.76 4					37	(0/-2)	37	33
5 SC Multi 0.76 5					38	(-1/-3)	38	33*
6 SC Multi 0.76 6					40	(-1/ 3)	39	36*
8 SC Multi 0.76 8					41	(-1/-3)	41	37*
10 SC Multi 0.76 10					42	(-1/-3)	42	38
12 SC Multi 0.76 12					43	(-1/-3)	43	39
3 SC Multi 0.76 3	16	4			36	(-2/-6)	36	28
3 SC Multi 0.76 3	16	6			40	(-2/-6)	40	31
3 SC Multi 0.76 3	16	8			42	(-3/-7)	42	32
4 SC Multi 0.76 4	16	4			39	(-3/-7)	37	30*
4 SC Multi 0.76 4	16	6			41	(-2/-6)	41	33*
4 SC Multi 0.76 4	16	8			42	(-3/-8)	42	31*
6 SC Multi 0.76 6	16	8			43	(-2/-6)	43	34
4 SC Multi 0.76 4	16	10			44	(-2/-6)	44	36
4 SC Multi 0.76 4	20	10			46	(-2/-6)	46	37
6 SC Multi 0.76 6	16	10			44	(-1/-5)	44	36
4 SC Multi 0.76 4	16	6 SC Multi 0.76 6			48	(-2/-7)	48	38*
4 SC Multi 0.76 4	20	6 SC Multi 0.76 6			49	(-2/-7)	49	38*
8 SC Multi 0.76 6	16	6 SC Multi 0.76 6			51	(-2/-6)	51	42
8 SC Multi 0.76 8	16	6 SC Multi 0.76 6			51	(-1/-6)	51	42
8 SC Multi 0.76 8	24	4 SC Multi 0.76 6			52	(-2/-6)	51	44*
4 SC Multi 0.76 4	12	4	12	6	42	(-3/-8)	41	30
4 SC Multi 0.76 4	14	4	14	6	43	(-2/-7)	44	33
4 SC Multi 0.76 4	12	4	12	8	43	(-2/-7)	43	33
4 SC Multi 0.76 4	16	4	16	8	45	(-3/-7)	45	34
5 SC Multi 0.76 5	12	6	12	8	44	(-2/-7)	44	35
6 SC Multi 0.76 6	12	6	12	8	45	(-1/-5)	46	37
6 SC Multi 0.76 6	14	6	14	8	46	(-2/-6)	46	38
4 SC Multi 0.76 4	12	4	12	4 SC Multi 0.76 4	46	(-2/-7)	47	35
4 SC Multi 0.76 4	12	6	12	4 SC Multi 0.76 6	47	(-2/-7)	47	37
6 SC Multi 0.76 6	12	6	12	4 SC Multi 0.76 4	49	(-1/-7)	50	39
6 SC Multi 0.76 6	14	6	14	4 SC Multi 0.76 4	50	(-2/-7)	51	40

TAB 16 ● *Internally calculated according ASTM 1332-10a based on the originally measurement results **SC Multi = Trosifol® SC Multilayer

TECHNICAL DATA – UV CONTROL

UV Control Interlayers – physical properties

Type	Adhesion	Film thickness [mm]	[mil]	Color	Light transmittance* [%]	UV transmittance* [%]
Trosifol® UV Extra Protect	high	0.76	30	Clear	90	0.0
Trosifol® Natural UV*[1]	high	0.76	30	UltraClear	89	48
SentryGlas® Natural UV*[1]	high	0.89	35	UltraClear	89	46
SentryGlas® Natural UV*[1]	high	1.52	60	UltraClear	88	40

TAB 17 ● * LSG with 2 x 4 mm Floatglass according EN 410/ISO 9050

[1] * Values calculated using Lawrence Berkeley National Laboratory Optics5 and Windows5 software

Not all products are available in all regions.

● Botanical garden

TECHNICAL DATA – DECORATIVE

Decorative Interlayers – physical properties

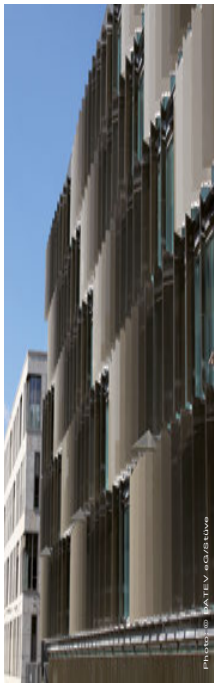
Product	Adhesion	Film thickness [mm]	[mil]	Pantone code	RAL code	Light transmittance* [%]	UV transmittance* [%]	Solar absorption* [%]	g-value EN 410 [%]	g-value ISO [%]
Color										
Trosifol® Red	medium	0.38	15	710	3018	23	< 1	44	60	62
Trosifol® Light Green	medium	0.38	15	631	6027	81	< 1	25	75	75
Trosifol® Sky Blue	medium	0.38	15	307	5012	60	< 1	32	69	70
Trosifol® Medium Blue	medium	0.38	15	3015	5015	36	< 1	45	60	61
Trosifol® Violet	medium	0.38	15	689	4008	31	< 1	39	64	65
Tints										
Trosifol® Light Blue-Green	medium	0.38 [1]	15 [1]	624	6034	71	< 1	29	72	72
Trosifol® Ocean Blue	medium	0.38	15	628	5024	73	< 1	26	73	74
Trosifol® Bronze	medium	0.76	30	478	8002	36	< 1	55	53	54
Trosifol® Medium Bronze	medium	0.38 [1]	15 [1]	4705	8025	55	< 1	42	63	64
Trosifol® Light Brown	medium	0.38	15	Warm Gray 10	7002	54	< 1	44	61	62
Trosifol® Medium Brown	medium	0.38	15	4695	8014	22	< 1	69	43	45
Trosifol® Grey	medium	0.38 [1]	15 [1]	446	7015	42	< 1	47	59	60
Trosifol® Asahi Grey	medium	0.38	15	445	7031	38	< 1	51	55	57
Trosifol® Solar Grey	medium	0.76	30	432	7024	42	< 1	-	60	61
Black & White										
Trosifol® Brilliant Black	high	0.76	30	Black 4	9005	0	< 1	96	23	26
Trosifol® Diamond White	high	0.76	30	705	9003	0	< 1	95	23	27
Trosifol® Shining White	high	0.38	15	420	9002	21	< 1	73	40	42
Trosifol® Translucent White	medium/low	0.76 [2]	30 [2]	420	9002	70	< 1	36	67	68
Trosifol® Translucent White	high	0.76	30	420	9002	70	< 1	36	67	68
Trosifol® Sand White	medium	0.38	15	420	9002	78	< 1	27	73	73
Trosifol® Coconut White	medium	0.38	15	420	9002	16	< 1	77	36	39
SentryGlas® Translucent White	high	0.80	31	420	9002	76	43	26	74	77

TAB 18 ● [1] Product also available as 0.76 mm (30 mil) version with comparable optics and enhanced safety features.
[2] Product also available as 0.38 mm (15 mil) version with comparable optics.

The Color samples are merely intended as illustration and inadequately represent the real colors. Custom colors are available on request.

* All data measured in accordance with EN 410 (2011)/ISO 9050 on laminated safety glass with 4 mm – 0.38 mm PVB – 4 mm float glass. All Color types meet the requirements of EN ISO 12543. If used in exterior applications or combined with radiation sources, the energy absorption of the glass combination must be borne in mind.

Not all products are available in all regions.



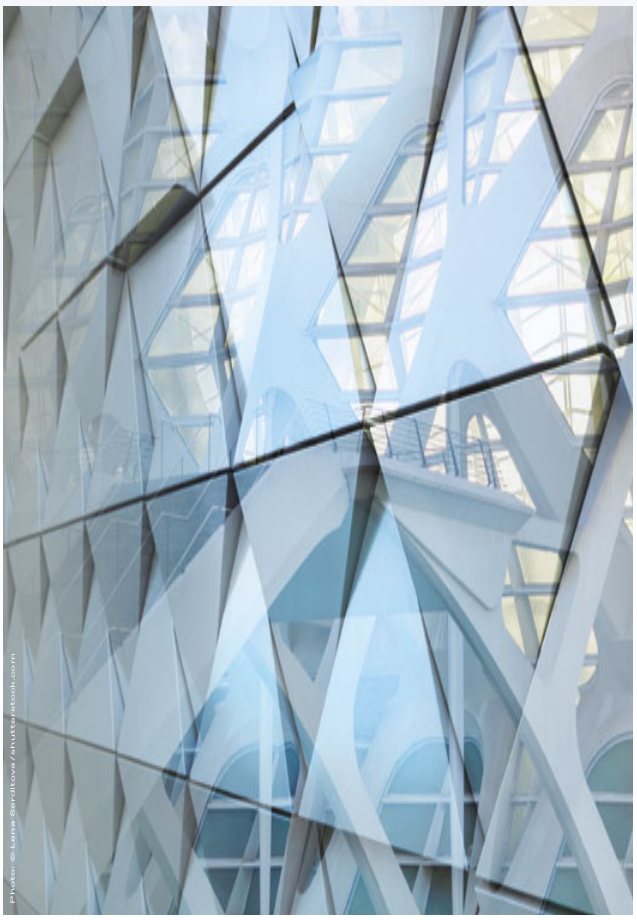
● DATEV IT Campus, Nürnberg, Germany

TECHNICAL DATA – PRODUCTS

Technical data

Property	Test method	Unit	Trosifol® Clear	Trosifol® UltraClear	Trosifol® SC Monolayer	Trosifol® SC Multilayer	Trosifol® Extra Stiff	Trosifol® XT UltraClear	Trosifol® Natural UV	Trosifol® UV Extra Protect	SentryGlas®	SentryGlas® Xtra™
Density	DIN EN ISO 1183-1	g/cm³	1.07	1.07	1.06	1.06	1.08	1.07	1.07	1.07	0.97	0.97
Refractive index	DIN EN ISO 489	-	1.480	1.480	1.477	1.480	1.486	1.480	1.480	1.482	1.499	1.497
Thermal conductivity	DIN EN 993-15	W/mK	0.21	0.21	0.20	0.20	0.22	0.21	0.21	0.21	0.26	0.25
Thermal expansion coefficient	ISO 11359-2	1/K	$1.7E^{-4}$	$1.7E^{-4}$	$2.0E^{-4}$	$2.0E^{-4}$	$1.2E^{-4}$	$1.7E^{-4}$	$1.7E^{-4}$	$1.7E^{-4}$	$1.30E^{-4}$	$1.30E^{-4}$
Specific heat capacity		J/g K	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.5	1.5
Surface resistivity	DIN 53482	Ω	$> 10^{12}$	$> 10^{12}$	1×10^{11}	$> 10^{12}$	$> 10^{12}$	$> 10^{12}$	$> 10^{12}$	$> 10^{12}$	$> 10^{12}$	$> 10^{12}$
Tensile strength	ISO 527-3	N/mm²	> 20	> 20	> 13	> 20	> 30	> 20	> 20	> 20	36	29
Elongation at break	ISO 527-3	%	> 250	> 250	> 300	> 250	> 180	> 250	> 250	> 250	340	270
Tg	DMA, 3K/min, 1 Hz	°C	32	32	21	-	47	32	32	32	-	-

TAB 19 ●



Trosifol® Spallshield® CPET and Trosifol® PET

Product	Property	Unit	Value	Minimum	Maximum	Test
Trosifol® Spallshield® CPET	Calculated mean thickness	mil	7.0	6.80	7.20	
	Haze	%	0.8	None	1.0	ASTM D1003
	MD shrinkage at 190°C for 5 minutes	%	2.5	1.0	4.0	Unrestrained
	TD shrinkage at 190°C for 5 minutes	%	2.0	1.0	3.0	Unrestrained
	MD tensile strength	Kpsi (MPa)	25 (172)	20 (138)	None	ASTM D882A
	TD tensile strength	Kpsi (MPa)	29 (200)	22 (152)	None	ASTM D882A
Trosifol® PET	Calculated mean thickness	mil	7.0			
	Haze	%			1.0	ASTM D1003
	MD shrinkage at 190°C for 5 minutes	%	2.5			Unrestrained
	TD shrinkage at 190°C for 5 minutes	%	2.0			Unrestrained
	MD tensile strength	Kpsi (MPa)	25 (172)	20 (138)		ASTM D882A
	TD tensile strength	Kpsi (MPa)	29 (200)	22 (152)		ASTM D882A

TAB 20 ●

Tools & Apps

WINSLT
For calculating the light, solar and heat parameters of glazing specifically containing films from the Trosifol® & SentryGlas® product range:
https://www.trosifol.com/trosifol-winslt-tool/

SOUNDLAB
For calculating acoustic performance of monolithic, double and triple glazed units.
https://www.trosifol.com/trosifol-soundlab/

SOLUTION FINDER
For finding the right product of your project
https://www.trosifol.com/solution-finder

GLASGLOBAL
For performing structural analysis for glass:
https://www.trosifol.com/trosifol-glasglobal/

SOUNDLAB AI
First global acoustic calculator based on artificial intelligence for calculating/estimating acoustic performance of monolithic, double and triple glazed units.
https://www.trosifol.com/soundlab-ai

STRENGTH OF GLASS CALCULATOR
The easy-to-use Calculator is designed to help designers and architects accurately model a variety of glass-mounting solutions in combination with glass types, interlayer materials and external factors such as loads, load duration and temperatures.
https://www.trosifol.com/strength-of-glass-calculator/

* Only available as web app

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