

Product portfolio for laminators

# Architectural Glazing

Laminated glass interlayers

**kuraray**

**Trosifol<sup>®</sup>**

**SentryGlas<sup>®</sup>**

## 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

Product lines

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College Football Hall of Fame, Atlanta, USA

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Safety Interlayers

# Transparency and safety

## SAFETY INTERLAYERS – HIGHLIGHTS

- World market leader in the architectural sector
- Lowest Yellowness Index of all PVB films in the market
- Trosifol® PVB films available with different degrees of adhesion levels
- Exclusive manufacturer of SentryGlas® ionplast interlayers

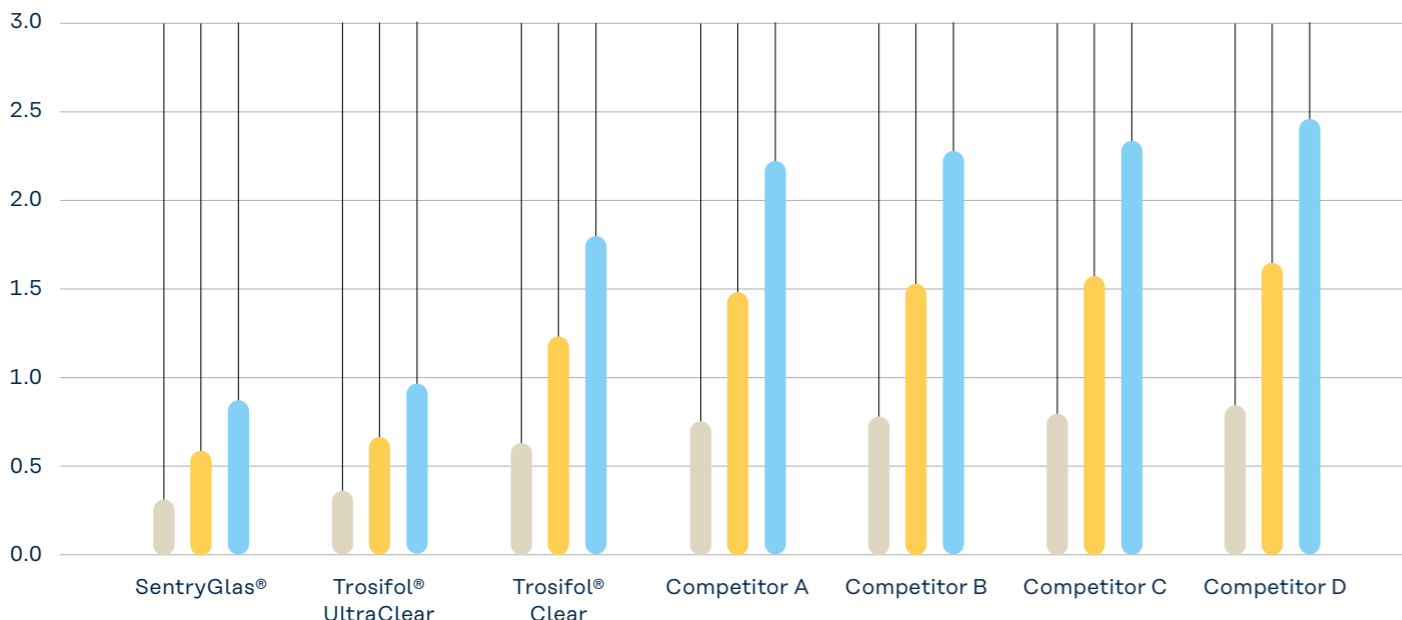
## APPLICATIONS & RECOMMENDATIONS

- For laminated safety glass products made of heat-strengthened or fully tempered glass, we recommend high adhesion, e.g. Trosifol® UltraClear and Trosifol® Clear with J adhesion.
- If there is a need for high adhesion on open edges we recommend Trosifol® UltraClear or SentryGlas®.



## Yellowness Index for Trosifol®, SentryGlas® and competitors

Yellowness Index ● 0.76 mm (30 mil) ● 1.52 mm (60 mil) ● 2.28 mm (90 mil)



GRAPH 1 ●

## 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 1 ● \* LSG with 2 x 4 mm Floatglass according EN 410/ISO 9050 · Further light, solar and heat parameters can be calculated with WinSLT App. Trosifol® Clear = L Adhesion/M Adhesion · Trosifol® UltraClear = N Adhesion

### Safety Interlayers – dimensions

Type	Adhesion	Film thickness [mm] [mil]	Roll widths** [mm] [in]	Roll length refrigerated [m] [ft]	Roll length PE interleaved [m] [ft]
Trosifol® Clear	medium	0.38 15	600-3210 24-126	500/1000 1640/3281	400 1312
Trosifol® Clear	low	0.76 30	600-3210 24-126	250/500 820/1640	250 820
Trosifol® Clear	medium	1.14 45	600-3210 24-126	150/330 492/1082	150 492
Trosifol® Clear	medium	1.52 60	600-3210 24-126	125/250 410/820	125 410
Trosifol® Clear	medium	2.28 90	600-3210 24-126	95/177 312/580	95 312
Trosifol® UltraClear	high	0.76 30	600-3210 24-126	250/500 820/1640	250 820
Trosifol® UltraClear	high	1.14 45	600-3210 24-126	150/330 492/1082	150 492
Trosifol® UltraClear	high	1.52 60	600-3210 24-126	125/250 410/820	125 410

TAB 2 ● \*\* Only available in standard width. Other sizes available on request with minimum order quantities and binding purchase commitment.

Not all products are available in all regions.

### 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 3 ● Measured between 2 x 2 mm low iron glass



Erin Mills Town Centre, Ontario, Canada

Photo: © Read Jones Christoffersen Ltd

Structural and Security Interlayers

# Exceptional strength up to 330 cm (130 in)

## STRUCTURAL AND SECURITY INTERLAYERS – 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™ has 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.

## 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 4 • \* Valid for Trosifol® Clear \*\* Valid for Trosifol® UltraClear



Maha Nakhon, Bangkok, Thailand

Photo: © www.aey.me



American Dream Mall, East Rutherford, New Jersey

Photo: © courtesy of W&W Glass, LLC

## 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	172	171	161	153
	SentryGlas® Xtra™	179	172	170	161	126	120	67.2	46.6	36.8	34.1	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	115	112	96.5	86.6
	SentryGlas® Xtra™	155	131	125	120	100	80.1	39.9	29.5	21.2	18.4	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	0.054					
	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 5** • 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	0.90	0.50	0.98	0.80
	Trosifol® SC Monolayer	2.0	1.4	1.3	1.2	0.98	0.90	0.50	0.32	0.19	0.17	0.42	0.19
	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

### Conversion table MPa to kpsi

MPa	kpsi	MPa	kpsi
10	1.450	90	13.053
15	2.175	100	14.503
20	2.900	200	29.007
25	3.625	300	43.511
30	4.351	400	58.015
35	5.076	500	72.519
40	5.801	600	87.023
45	6.526	700	101.526
50	7.251	800	116.030
60	8.702	900	130.534
70	10.513	1000	145.037
80	11.603	1100	159.542

TAB 7 •



• Steve Jobs Theater Pavilion, Cupertino, USA

### 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

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.

#### GLASGLOBAL

For performing structural analysis for glass:

#### WINSLT

For calculating the light, solar and heat parameters of glazing specifically containing films from the Trosifol® & SentryGlas® product range:

### Structural & Security Interlayers\*1 – dimensions for products on rolls

Type	Thickness [mm] [mil]	Color	Roll widths [mm]	Roll widths [in]	Roll lengths [m] [ft]
Trosifol® Extra Stiff	0.76 30	Clear	1000/1300/1600/2000/2250/2600/3210	39/51/63/78/88/102/126	250 820
SentryGlas®/SGX™ <sup>1</sup>	0.76 30	Clear	1050/1150/1220/1300/1530/1600/1830/2250/2400/2500/2600/2700/3300	41/45/48/51/60/63/72/88/94/98/102/106/130	250 820
SentryGlas®	0.76 30	Clear	1220/1530/1830	48/60/72	200 656
SentryGlas®	0.76 30	Clear	1530	60	50 164
SentryGlas®/SGX™	0.76 30	Clear	1050/1530/1600/2250/2400/2500/2700/3300	41/60/63/88/94/98/106/130	60 197
SentryGlas®/SGX™	0.89 35	Clear	1220/1530/1830/2250/2400/2500/2700/3300	48/60/72/88/94/98/106/130	200 656
SentryGlas®/SGX™	0.89 35	Clear	1530/2250/2400/2500/2700/3300	60/88/94/98/106/130	50 164
SentryGlas® Translucent White	0.80 31	Transl. White	1220/1830/1530/3300* <sup>2</sup>	48/72/60/130* <sup>2</sup>	200 656 200/50 656/164

TAB 9 • <sup>1</sup> SGX™ = SentryGlas® Xtra™

\*<sup>2</sup> Translucent White expected Q4/2021

### Structural & Security Interlayers\* – dimensions for sheet products

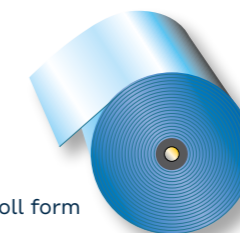
Type	Thickness [mm] [mil]	Sheet widths [mm]	Sheet widths [in]	Sheet lengths [m] [ft]
SentryGlas®	0.89 35	610-2160* <sup>3</sup>	24-85* <sup>3</sup>	6 19
SentryGlas®	1.52 60	610-2160* <sup>3</sup>	24-85* <sup>3</sup>	6 19
SentryGlas®	2.28 90	610-2160* <sup>3</sup>	24-85* <sup>3</sup>	6 19
SentryGlas®	2.53 100	610-1830	24-72	6 19
SentryGlas®	3.04 120	610-1830	24-73	6 19
SentryGlas® Xtra™	0.89 35	610-2160* <sup>3</sup>	24-85* <sup>3</sup>	6 19
SentryGlas® Xtra™	1.52 60	610-2160* <sup>3</sup>	24-85* <sup>3</sup>	6 19
SentryGlas® Xtra™	2.28 90	610-2160* <sup>3</sup>	24-85* <sup>3</sup>	6 19
SentryGlas® Xtra™	2.53 100	610-2160* <sup>3</sup>	24-85* <sup>3</sup>	6 19

TAB 10 • \*<sup>3</sup> Oversize shipment possible up to 2500 mm/99 inches

\*<sup>1</sup> The table shows the global product program. Not all products are available in all regions.



• King Power Mahanakhon, Bangkok, Thailand



Roll form



Sheet form

Sound Control Interlayers

# Customized sound insulation

## ACOUSTIC INTERLAYERS – 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.



Photo: © Vladimir Borovic / shutterstock.com

## TECHNICAL DATA – SOUND CONTROL

### Acoustic Interlayers – physical properties

Type	Adhesion	Film thickness		Color	Light transmittance* [%]	UV transmittance* [%]	Solar absorption* [%]
		[mm]	[mil]				
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 11 • \* LSG with 2 x 4 mm Floatglass according EN 410/ISO 9050



Photo: © Dubovec/shutterstock.com



Photo: © One Works

• Marco Polo Airport, Venice, Italy

### Acoustic Interlayers – dimensions

Type	Film thickness		Roll widths		Roll length refrigerated		Roll length PE interleaved	
	[mm]	[mil]	[mm]	[in]	[m]	[ft]	[m]	[ft]
Trosifol® SC Monolayer	0.76	30	600-3210*2	23-126*2	–	–	200/450	656/1476
Trosifol® SC Monolayer	1.52	60	600-3210*2	23-126*2	–	–	100	328
Trosifol® SC Multilayer	0.50	20	3210	126	350/700	1148/2296	370/700	1214/2296
Trosifol® SC Multilayer	0.76	30	600-3210*2	23-126*2	470	1542	230	754

TAB 12 • \*\* Not all products are available in all stocks. Standard stock sizes mm (in): 1000/1300/1600/2000/2250/2600/3210 (39/51/63/78/88/102/126)

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.

**0.76 mm (30 mil) Monolayer products – test results**

Glass [mm]	Cavity air or argon [mm]	Glass [mm]	Cavity [mm]	Glass [mm]	R <sub>w</sub> [dB]	C, C <sub>tr</sub> [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	(-1/-5)	39	31		
4	SC Mono	0.76	4	16	6	(-2/-6)	41	33		
4	SC Mono	0.76	4	16	8	(-3/-8)	42	31		
6	SC Mono	0.76	6	16	8	(-2/-6)	43	34		
4	SC Mono	0.76	4	16	10	(-2/-6)	44	35		
4	SC Mono	0.76	4	16	6 SC Mono 0.76 6	(-2/-6)	47	37		
4	SC Mono	0.76	4	20	6 SC Mono 0.76 6	(-2/-7)	49	38		
4	SC Mono	0.76	4	12	4	12	6	(-2/-6)	41	32
4	SC Mono	0.76	4	12	4	12	8	(-2/-6)	42	33
4	SC Mono	0.76	4	12	6	12	4 SC Mono 0.76 6	(-2/-7)	47	38

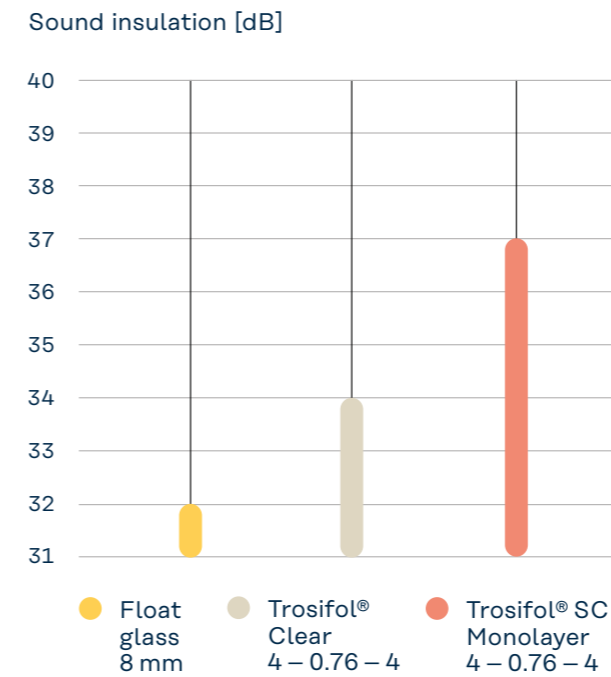
TAB 13 • \*SC Mono = Trosifol® SC Monolayer

**0.50 mm (20 mil) Multilayer products – test results**

Glass [mm]	Cavity air or argon [mm]	Glass [mm]	Cavity [mm]	Glass [mm]	R <sub>w</sub> [dB]	C, C <sub>tr</sub> [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

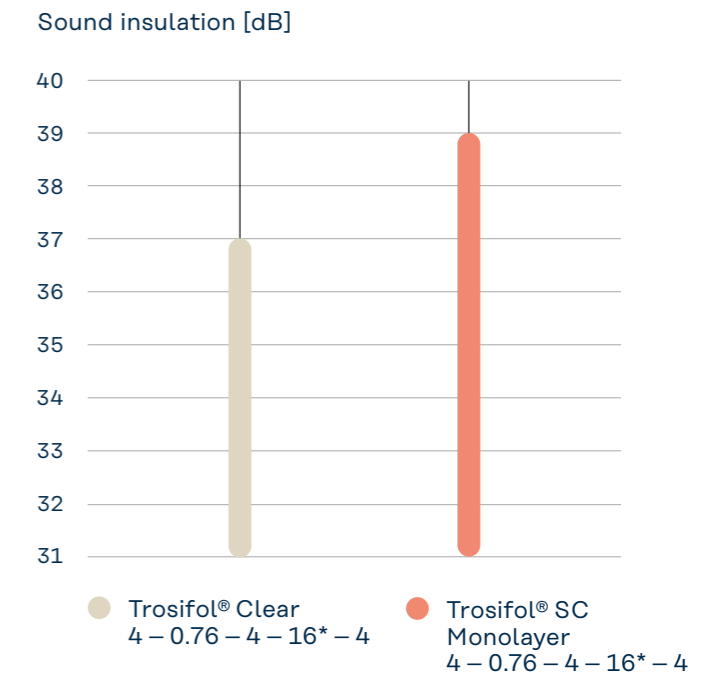
TAB 14 • \*\*SC Multi = Trosifol® SC Multilayer

**Sound insulation with monolithic glass**



GRAPH 2 • 0.76 mm = 30 mil

**Sound insulation with multiple insulating glass**



GRAPH 3 • \* Argon filling

0.76 mm (30 mil) Multilayer products – test results

Glass [mm]	Cavity air or argon [mm]	Glass [mm]	Cavity [mm]	Glass [mm]	R <sub>w</sub> [dB]	C, C <sub>tr</sub> [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 15 • Internally calculated according ASTM 1332-10a based on the originally measurement results \*\*SC Multi = Trosifol® SC Multilayer



Photo: © Denis Belitsky/shutterstock.com



Photo: © Bettina Koch / Kuraray

• Trosifol® Color samples

Decorative Interlayers

# Brilliant colors

## DECORATIVE INTERLAYERS – 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

## 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.

## TECHNICAL DATA – DECORATIVE

### Decorative Interlayers – physical properties

Product	Adhesion	Film thickness		Color code	RAL code	Light transmittance* [%]	UV transmittance* [%]	Solar absorption* [%]
		[mm]	[mil]					
<b>Color</b>								
● Trosifol® Red	medium	0.38	15	R30	3018	23	< 1	44
● Trosifol® Light Green	medium	0.38	15	G80	6027	81	< 1	25
● Trosifol® Sky Blue	medium	0.38	15	B54	5012	60	< 1	32
● Trosifol® Medium Blue	medium	0.38	15	B37	5015	36	< 1	45
● Trosifol® Violet	medium	0.38	15	V30	4008	31	< 1	39
<b>Tints</b>								
● Trosifol® Light Blue-Green	medium	0.38 <sup>1</sup>	15 <sup>1</sup>	84073	6034	71	< 1	29
● Trosifol® Ocean Blue	medium	0.38	15	74071	5024	73	< 1	26
● Trosifol® Bronze	medium	0.76	30	36038	8002	36	< 1	55
● Trosifol® Medium Bronze	medium	0.38 <sup>1</sup>	15 <sup>1</sup>	31052	8025	55	< 1	42
● Trosifol® Light Brown	medium	0.38	15	S4055	7002	54	< 1	44
● Trosifol® Medium Brown	medium	0.38	15	S6028	8014	22	< 1	69
● Trosifol® Grey	medium	0.38 <sup>1</sup>	15 <sup>1</sup>	66044	7015	42	< 1	47
● Trosifol® Asahi Grey	medium	0.38	15	65042	7031	38	< 1	51
● Trosifol® Solar Grey	medium	0.76	30	1654400	7024	42	< 1	-
<b>Black &amp; White</b>								
● Trosifol® Brilliant Black	high	0.76	30	S00	9005	0	< 1	96
● Trosifol® Diamond White	high	0.76	30	W00	9003	0	< 1	95
● Trosifol® Shining White	high	0.38	15	W17	9002	21	< 1	73
● Trosifol® Translucent White	medium/low	0.76 <sup>2</sup>	30 <sup>2</sup>	W3065	9002	70	< 1	36
● Trosifol® Translucent White	high	0.76	30	W3065	9002	70	< 1	36
● Trosifol® Sand White	medium	0.38	15	W4071	9002	78	< 1	27
● Trosifol® Coconut White	medium	0.38	15	5131500	9002	16	< 1	77
● SentryGlas® Translucent White	high	0.80	31	-	9002	76	43	26

TAB 16 • <sup>1</sup> Product also available as 0.76 mm (30 mil) version with comparable optics and enhanced safety features. <sup>2</sup> 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.



● Frankfurt Airport Terminal 1, Germany



● New Headquarters Building, Seattle, USA

## Decorative Interlayers – dimensions

Product	Film thickness [mm]	Film thickness [mil]	Roll widths [mm]	Roll widths [in]	Roll lengths refrigerated [m]	Roll lengths refrigerated [ft]	Roll lengths PE interleaf [m]	Roll lengths PE interleaf [ft]
<b>Color</b>								
● Trosifol® Red	0.38	15	1000/1600/2250	39/63/88	–	–	30/210	98/688
● Trosifol® Light Green	0.38	15	1000/1600/2250	39/63/88	–	–	30/210	98/688
● Trosifol® Sky Blue	0.38	15	1000/1600/2250	39/63/88	–	–	30/210	98/688
● Trosifol® Medium Blue	0.38	15	1000/1600/2250	39/63/88	–	–	30/210	98/688
● Trosifol® Violet	0.38	15	1000/1600/2250	39/63/88	–	–	30/210	98/688
<b>Tints</b>								
● Trosifol® Light Blue-Green	0.38 0.76*1	15 30*1	600-3210**	23-126**	400/500 200/250	1312/1640 656/250	400 200	1312 656
● Trosifol® Ocean Blue	0.38	15	600-3210**	23-126**	400	1312	400	1312
● Trosifol® Bronze	0.76	30	600-3210**	23-126**	200	656	200	656
● Trosifol® Medium Bronze	0.38 <sup>1</sup>	15 <sup>1</sup>	600-3210**	23-126**	400	1312	400	1312
● Trosifol® Light Brown	0.38	15	600-3210**	23-126**	400	1312	400	1312
● Trosifol® Medium Brown	0.38	15	600-3210**	23-126**	400	1312	400	1312
● Trosifol® Grey	0.38 0.76	15 30	600-3210**	23-126**	400/500 200/250	1312/1640 656/820	400 200	1312 656
● Trosifol® Asahi Grey	0.38	15	600-3210**	23-126**	400	1312	400	1312
● Trosifol® Solar Grey	0.76	30						
<b>Black &amp; White</b>								
● Trosifol® Brilliant Black	0.76	30	1000/1600/2250	39/63/88	–	–	30/210	98/688
● Trosifol® Diamond White	0.76	30	1000/1600/2250	39/63/88	–	–	30/210	98/688
● Trosifol® Shining White	0.38	15	1000/1600/2250	39/63/88	–	–	30/210	98/688
● Trosifol® Translucent White	0.38 0.76	15 30	600-3210*2 1530/2440	23-126*2 60/96	400/1000 250/500	1312/3280 820/1640	400 200	1312 656
● Trosifol® Translucent White	0.76 high adhesion	30	1000/1100/1200/1300/1600/1830/2250/2400	39/43/47/51/63/72/88/94	–	–	250	820
● Trosifol® Sand White	0.38	15	600-3210*2 1530/2440	23-126*2 60/96	400	1312	400	1312
● Trosifol® Coconut White	0.38	15	600-2350*2	23-92*2	50/250	164/820	50/250	164/820
● SentryGlas® Translucent White	0.80	31	1220/1830 1530	48/72 60	–	–	200 200/50	656 656/164

**TAB 17** ● \*1 Product also available as 0.76 mm (30 mil) version with comparable optics and enhanced safety features \*2 Maximum roll width refrigerated 2300 mm (90 in)  
 \*\* Only available in standard width. Other sizes available on request with minimum order quantities and binding purchase commitment.

Not all products are available in all regions.



● Shanghai Pearl Tower, China

Specialized Interlayers

# Specialities

## SPECIALIZED INTERLAYERS – HIGHLIGHTS

- Autoclave-free processing with Trosifol® HR
- High surface roughness for better deairing with Trosifol® HR
- 0% UV transmittance up to 400 nm with UV Extra Protect
- Trosifol® XT UltraClear: Special PVB hurricane grade with UltraClear appearance
- Maximum UV transmittance for SentryGlas® Natural UV and Trosifol® Natural UV
- Trosifol® Spallshield® CPET is a hard coated PET film
- Trosifol® PET is a super clear film with pre-treatment on both sides designed for adhering to PVB.

## APPLICATIONS & RECOMMENDATIONS

- Trosifol® Natural UV and SentryGlas® Natural UV feature high UV transmittance with applications in greenhouses, zoos and the health sector.
- Complete UV protection Trosifol® UV Extra Protect for museums, shop windows and libraries, for example.
- High surface roughness of Trosifol® HR for better deairing.
- 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.
- All hurricane products require system testing and approval.



• Botanical garden, Berlin, Germany

## Specialized Interlayers – physical properties

Type	Adhesion	Film thickness [mm] [mil]		Color	Light transmittance* [%]	UV transmittance* [%]
Trosifol® HR	high	0.76	30	UltraClear	88	< 1
Trosifol® UV Extra Protect	high	0.76	30	Clear	90	0.0
Trosifol® Natural UV*1	high	0.76	30	UltraClear	89	48
Trosifol® XT UltraClear	medium-high	2.28	90	UltraClear	88	< 1
SentryGlas® Natural UV*1	high	0.89	35	UltraClear	89	46
SentryGlas® Natural UV*1	high	1.52	60	UltraClear	88	40
Trosifol® Spallshield® CPET		0.18	7	Clear	91	0.50
Trosifol® PET	high	0.18	7	Clear	87	0.0

TAB 18 • \* LSG with 2 x 4 mm Floatglass according EN 410/ISO 9050

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

## Specialized Interlayers – dimensions for products on rolls

Type	Thickness [mm] [mil]	Roll widths [mm]	Roll widths [in]	Roll lengths [m] [ft]
Trosifol® HR	0.76 30	600-3210*3	24-126*3	200 656
Trosifol® UV Extra Protect	0.76 30	1000/1600/2250/2600/3210	39/63/88/102/126	50 164
Trosifol® Natural UV	0.76 30	1000/1600/2250/2600/3210	39/63/88/102/126	200 656
Trosifol® XT UltraClear	2.28 90	1530/1830/2440	60/72/96	95 312
SentryGlas® Natural UV	0.89 35	1220/1530/1830/3300*4	48/60/72/130*4	50/200 164/656
SentryGlas® Natural UV	1.52*2 60	–	–	– –
Trosifol® Spallshield® CPET	0.18 7	1520	60	50/250* 164/820*
Trosifol® PET	0.18 7	1530	60	1325 4347

TAB 19 • \*2 SentryGlas® Natural UV 1.52 mm (60 mil) is only available in sheets. Same sizes as standard SG sheets.

\*3 Standard stock sizes:  
[mm] = 1000/1300/1600/2000/2250/2600/3210  
[in] = 39/51/63/78/88/102/126

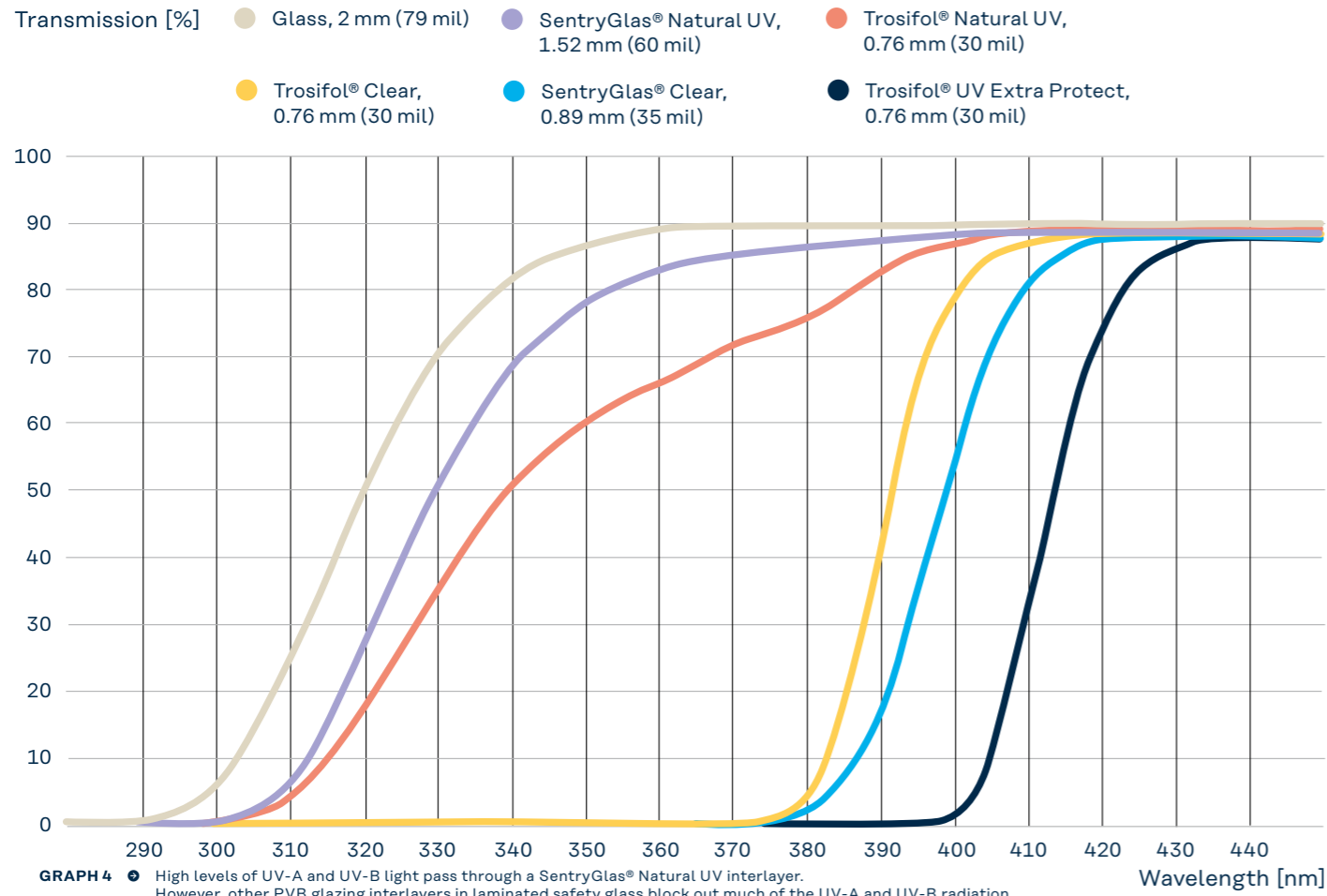
\*4 Roll width 3300 mm (130 in) expected Q4/2021

Not all products are available in all regions.



• Trosifol® Spallshield® CPET impact test

### UV Light transmittance curves



● Old sculpture in a museum



● Parque Tereo, Mexico

## 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/cm <sup>3</sup>	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 <sup>-4</sup>	1.7E <sup>-4</sup>	2.0E <sup>-4</sup>	2.0E <sup>-4</sup>	1.2E <sup>-4</sup>	1.7E <sup>-4</sup>	1.7E <sup>-4</sup>	1.7E <sup>-4</sup>	1.30E <sup>-4</sup>	1.30E <sup>-4</sup>
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 <sup>12</sup>	> 10 <sup>12</sup>	1 x 10 <sup>11</sup>	> 10 <sup>12</sup>	> 10 <sup>12</sup>	> 10 <sup>12</sup>	> 10 <sup>12</sup>	> 10 <sup>12</sup>	> 10 <sup>12</sup>	> 10 <sup>12</sup>
Tensile strength	ISO 527-3	N/mm <sup>2</sup>	> 20	> 20	> 13	> 20	> 30	> 20	> 20	> 20	-	-
Elongation at break	ISO 527-3	%	> 250	> 250	> 300	> 250	> 180	> 250	> 250	> 250	-	-
Tg	DMA, 3K/min, 1 Hz	°C	32	32	21	-	47	32	32	32	-	-

TAB 20 •



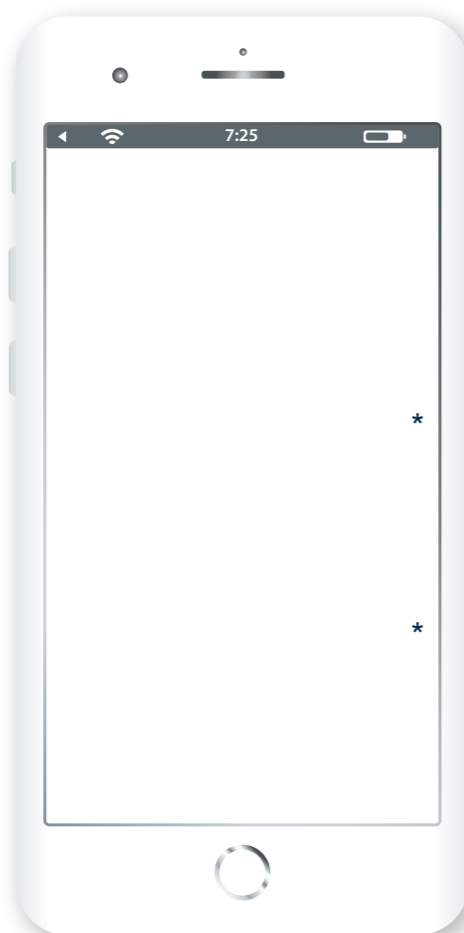
Photo: © Lena Serditova / shutterstock.com

### 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 21 •

# Tools & Apps



**WINSLT**

For calculating the light, solar and heat parameters of glazing specifically containing films from the Trosifol® & SentryGlas® product range:

**SOUNDLAB**

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

**SOLUTION FINDER**

For finding the right product of your project

\*

\*

\* Only available as web app

**GLASGLOBAL**

For performing structural analysis for glass:

**SOUNDLAB AI**

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

**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.

# Contact



**FOR FURTHER INFORMATION**

on products from Kuraray, please visit [www.kuraray.com](http://www.kuraray.com). You can find further information on our Trosifol® and SentryGlas® products at [www.trosifol.com](http://www.trosifol.com).

**Kuraray America, Inc.**  
Advanced Interlayer Solutions Division  
Wells Fargo Tower  
2200 Concord Pike, Ste. 1101  
Wilmington, DE 19803, USA  
P +1 800 635 3182

**Kuraray Europe GmbH**  
Advanced Interlayer Solutions Division  
Muelheimer Str. 26  
53840 Troisdorf  
Germany  
P +49 2241 2555 226

**Kuraray Co., Ltd**  
Advanced Interlayer Solutions Division  
Tokiwabashi Tower  
2-6-4 Otemachi, Chiyoda-ku  
Tokyo 100-0004, Japan  
P +813 6701 1508

[trosifol@kuraray.com](mailto:trosifol@kuraray.com)

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