English

Product portfolio for laminators

Architectural Glazing

Laminated glass interlayers

Photo: © Gasprom

kuraray Trosifol® SentryGlas®

Introduction

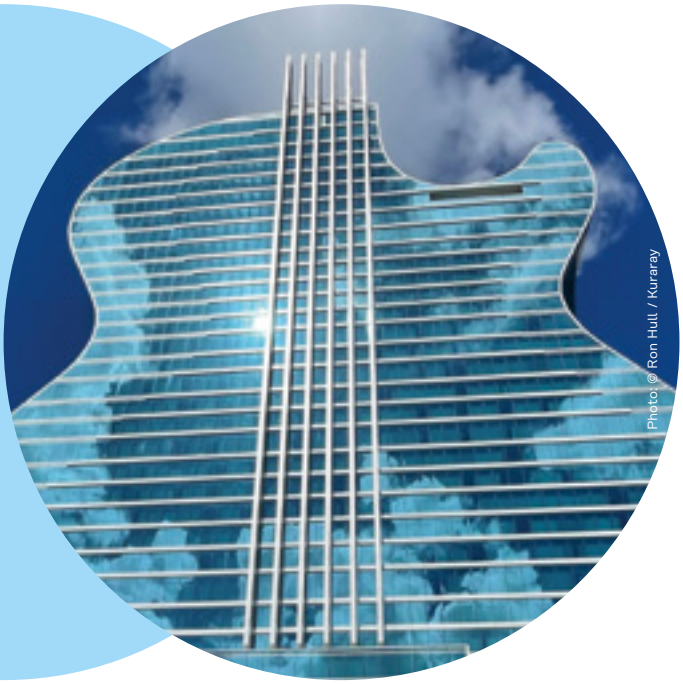
Interlayer strength, depth and capabilities

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.

THE ORIGINAL
SentryGlas®

Lakhta Tower

Product lines

Contents

Photo: © Atlanta Hall Management, Inc.

College Football Hall of Fame, Atlanta, USA

Safety Interlayers

Transparency and safety

SAFETY INTERLAYERS – HIGHLIGHTS

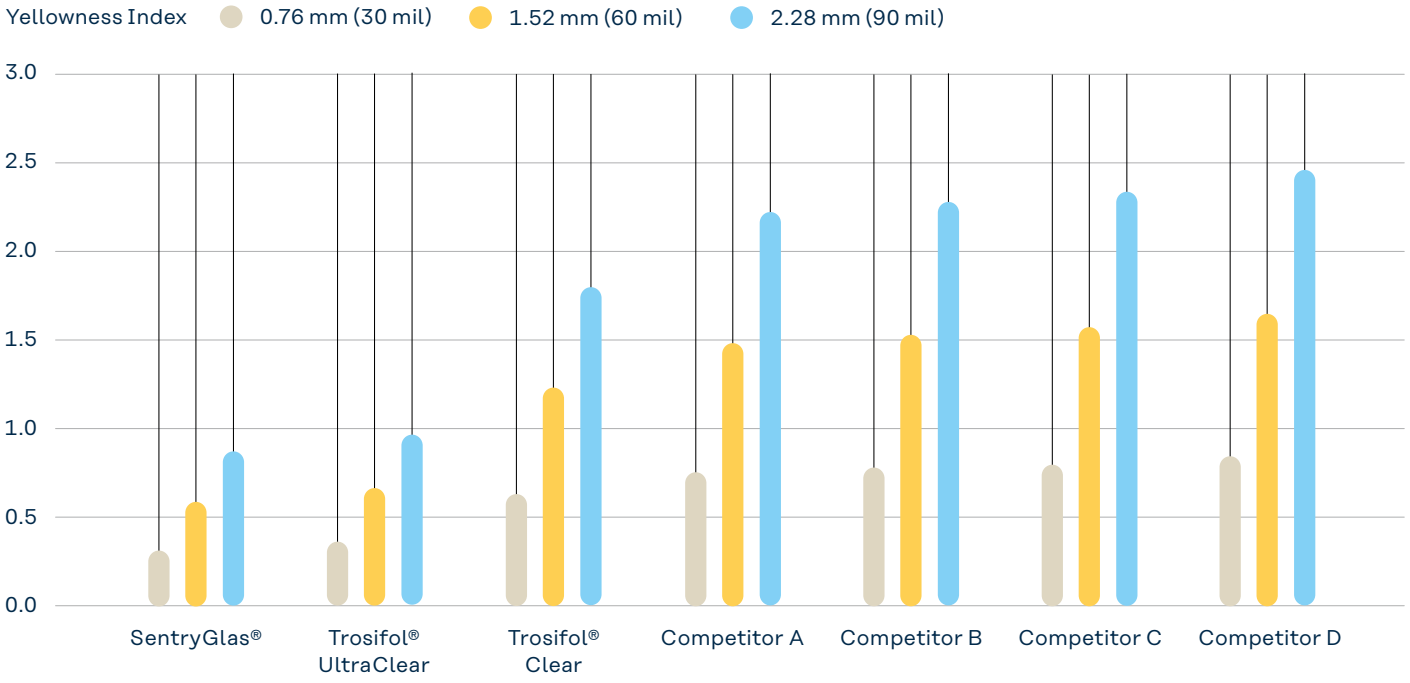
- World market leader in the architectural sector
- Lowest Yellowness Index of all PVB films in the market
- Trosifol® PVB films available with different degrees of adhesion levels
- Exclusive manufacturer of SentryGlas® ionplast interlayers


Photo: © papmap / shutterstock.com

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



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	600-3300	24-130	500/1000	1640/3281	400	1312
Trosifol® Clear	low	0.76	30	600-3300	24-130	250/500	820/1640	250	820
Trosifol® Clear	medium	1.14	45	600-3300	24-130	150/330	492/1082	150	492
Trosifol® Clear	medium	1.52	60	600-3300	24-130	125/250	410/820	125	410
Trosifol® Clear	medium	2.28	90	600-3300	24-130	95/177	312/580	95	312
Trosifol® UltraClear	high	0.76	30	600-3300	24-130	250/500	820/1640	250	820
Trosifol® UltraClear	high	1.14	45	600-3300	24-130	150/330	492/1082	150	492
Trosifol® UltraClear	high	1.52	60	600-3300	24-130	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

Photo: © Read Jones Christoffersen Ltd

Erin Mills Town Centre, Ontario, Canada

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 Pro.
- 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 Pro			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

Photo: © www.aey.me

➔ Maha Nakhon, Bangkok, Thailand

Photo: © courtesy of W&W Glass, LLC

➔ American Dream Mall, East Rutherford, New Jersey

TECHNICAL DATA STRUCTURAL & SECURITY

Shear Relaxation Modulus G(t) / MPa

Tempera-ture	Product type	Load duration						
		1 sec	3 sec	5 sec	10 sec	30 sec	1 min	5 min
-20°C (-4°F)	Trosifol® Clear/UltraClear	250	230	220	210	180	170	140
	Trosifol® SC Monolayer	210	180	160	150	120	100	71
	Trosifol® SC Multilayer	65	40	31	21	11	7.4	3.4
	Trosifol® Extra Stiff	460	440	420	400	370	350	290
	✶ Trosifol® Extra Stiff Pro							
	SentryGlas®	291	290	290	289	289	288	285
	SentryGlas Xtra®	245	243	243	242	240	238	236
0°C (32°F)	Trosifol® Clear/UltraClear	180	150	140	120	100	94	67
	Trosifol® SC Monolayer	48	32	26	19	12	7.8	3.5
	Trosifol® SC Multilayer	2.6	2.0	1.9	1.7	1.5	1.4	1.2
	Trosifol® Extra Stiff	420	390	370	350	310	290	230
	✶ Trosifol® Extra Stiff Pro							
	SentryGlas®	260	258	257	256	254	252	249
	SentryGlas Xtra®	203	199	196	193	186	182	172
10°C (50°F)	Trosifol® Clear/UltraClear	86	66	57	46	31	23	10
	Trosifol® SC Monolayer	5.1	3.1	2.5	1.9	1.1	0.90	0.61
	Trosifol® SC Multilayer	1.5	1.3	1.3	1.2	1.1	0.94	0.65
	Trosifol® Extra Stiff	380	350	330	310	270	240	170
	Trosifol® Extra Stiff Pro	420	390	370	350	320	300	250
	SentryGlas®	240	236	235	230	228	225	220
	SentryGlas Xtra®	181	179	178	176	172	170	161
20°C (68°F)	Trosifol® Clear/UltraClear	12	6.6	4.8	3.2	1.7	1.2	0.74
	Trosifol® SC Monolayer	0.86	0.66	0.60	0.54	0.47	0.45	0.39
	Trosifol® SC Multilayer	1.2	1.0	0.91	0.78	0.58	0.50	0.40
	Trosifol® Extra Stiff	280	240	210	190	140	120	67
	Trosifol® Extra Stiff Pro	340	310	290	270	230	205	150
	SentryGlas®	217	211	209	205	206	192	188
	SentryGlas Xtra®	162	155	144	135	131	125	120
25°C (77°F)	Trosifol® Clear/UltraClear	2.7	1.5	1.2	0.92	0.69	0.61	0.50
	Trosifol® SC Monolayer	0.58	0.50	0.47	0.44	0.41	0.38	0.33
	Trosifol® SC Multilayer	1.0	0.75	0.66	0.55	0.45	0.42	0.36
	Trosifol® Extra Stiff	190	150	130	100	70	51	20
	Trosifol® Extra Stiff Pro	250	210	190	160	120	95	49
	SentryGlas®	176	167	163	157	149	142	117
	SentryGlas Xtra®	141	136	126	117	115	97.9	80.4
30°C (86°F)	Trosifol® Clear/UltraClear	0.93	0.69	0.63	0.56	0.50	0.47	0.41
	Trosifol® SC Monolayer	0.47	0.43	0.41	0.39	0.35	0.33	0.26
	Trosifol® SC Multilayer	0.71	0.54	0.49	0.44	0.39	0.37	0.31
	Trosifol® Extra Stiff	73	44	33	21	10	5.8	2.0
	Trosifol® Extra Stiff Pro	120	82	67	49	25	16	4.1
	SentryGlas®	151	141	138	130	119	110	83
	SentryGlas Xtra®	106	101	95.6	91.2	84.8	80.1	55.1
35°C (95°F)	Trosifol® Clear/UltraClear	0.59	0.51	0.49	0.46	0.42	0.40	0.35
	Trosifol® SC Monolayer	0.42	0.38	0.36	0.34	0.30	0.27	0.20
	Trosifol® SC Multilayer	0.51	0.43	0.41	0.38	0.34	0.32	0.26
	Trosifol® Extra Stiff	13	5.7	3.9	2.4	1.4	1.1	0.85
	Trosifol® Extra Stiff Pro	39	19	13	7.1	3.0	1.9	1.0
	SentryGlas®	114	102	96.9	89.9	77.7	70.5	53.4
	SentryGlas Xtra®	78.7	70.3	65.5	61.5	55.1	44.9	29.0
40°C (104°F)	Trosifol® Clear/UltraClear	0.48	0.44	0.43	0.40	0.37	0.34	0.28
	Trosifol® SC Monolayer	0.38	0.34	0.32	0.30	0.25	0.22	0.15
	Trosifol® SC Multilayer	0.40	0.36	0.35	0.32	0.28	0.25	0.18
	Trosifol® Extra Stiff	2.1	1.3	1.1	1.0	0.83	0.77	0.68
	Trosifol® Extra Stiff Pro	10	4.1	2.7	1.6	1.1	0.85	0.69
	SentryGlas®	77	63	56.4	48.1	37	31	19
	SentryGlas Xtra®	50.3	46.3	40.5	35.5	33.1	27.0	15.0
50°C (122°F)	Trosifol® Clear/UltraClear	0.39	0.36	0.34	0.31	0.26	0.23	0.16
	Trosifol® SC Monolayer	0.31	0.27	0.25	0.22	0.17	0.14	0.087
	Trosifol® SC Multilayer	0.32	0.28	0.26	0.23	0.18	0.15	0.084
	Trosifol® Extra Stiff	0.79	0.72	0.69	0.66	0.61	0.58	0.50
	Trosifol® Extra Stiff Pro	0.93	0.78	0.74	0.70	0.64	0.61	0.54
	SentryGlas®	36.2	26.4	22.1	18.5	13.5	11.3	7.31
	SentryGlas Xtra®	22.1	12.7	8.45	5.98	4.90	3.89	2.71
60°C (140°F)	Trosifol® Clear/UltraClear	0.32	0.27	0.25	0.22	0.17	0.14	0.081
	Trosifol® SC Monolayer	0.26	0.22	0.19	0.16	0.12	0.10	0.052
	Trosifol® SC Multilayer	0.25	0.20	0.18	0.15	0.10	0.07	0.036
	Trosifol® Extra Stiff	0.64	0.60	0.57	0.54	0.47	0.43	0.33
	Trosifol® Extra Stiff Pro	0.66	0.60	0.58	0.55	0.49	0.45	0.35
	SentryGlas®	11.8	8.2	6.89	5.76	4.3	3.6	2.6
	SentryGlas Xtra®	4.90	3.78	3.33	2.54	2.15	1.88	1.40
70°C (158°F)	Trosifol® Clear/UltraClear	0.26	0.21	0.19	0.16	0.11	0.088	0.047
	Trosifol® SC Monolayer	0.20	0.16	0.14	0.11	0.076	0.058	0.027
	Trosifol® SC Multilayer	0.18	0.13	0.11	0.088	0.054	0.039	
	Trosifol® Extra Stiff	0.54	0.48	0.45	0.40	0.33	0.28	0.18
	Trosifol® Extra Stiff Pro	0.55	0.49	0.46	0.42	0.35	0.30	0.18
	SentryGlas®	3.77	2.9	2.71	2.45	2	1.9	1.4
	SentryGlas Xtra®	2.20	1.73	1.43	1.30	1.05	0.90	0.68
80°C (176°F)	Trosifol® Clear/UltraClear	0.21	0.16	0.14	0.11	0.074	0.056	
	Trosifol® SC Monolayer	0.16	0.11	0.10	0.075	0.047	0.033	
	Trosifol® SC Multilayer	0.14	0.10	0.079	0.058	0.34	0.023	
	Trosifol® Extra Stiff	0.43	0.36	0.32	0.28	0.20	0.16	
	✶ Trosifol® Extra Stiff Pro							
	SentryGlas®	1.55	1.3	1.22	1.11	1.0	0.8	0.6
	SentryGlas Xtra®	0.31	0.27	0.23	0.18	0.10	0.09	0.06

✶ Still being tested

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.

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
120	99	85	53	42	33	25	16	14	7	6	1.5	0.7	0.5
58	41	31	14	9.9	6.8	4.9	3.2	2.7	1.7	1.5	0.66	0.47	0.41
2.7	2.1	1.8	1.5	1.4	1.3	1.2	1.1	1.0	0.84	0.79	0.45	0.35	0.30
270	220	200	120	100	81	61	38	32	16	13	2.1	1.0	0.78
284	283	281	280	279	278	277	276	276	275	273	268	260	250
233	227	226	221	213	209	192	187	186	184	176	159	139	131
55	40	32	14	10	7.0	4.7	2.7	2.3	1.3	1.2	0.62	0.48	0.42
2.6	1.7	1.2	0.7	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.30	0.21	0.14
1.1	0.92	0.79	0.50	0.45	0.42	0.39	0.36	0.35	0.31	0.30	0.19	0.090	0.044
200	150	130	70	51	36	24	13	10	4.4	3.5	1.1	0.78	0.69
248	246	244	236	232	231	227	225	224	222	221	210	201	194
169	160	144	124	107	101	95.3	85.1	83.8	75.0	70.6	54.7	42.9	38.9
6.9	3.5	2.4	1.0	0.81	0.69	0.61	0.53	0.52	0.47	0.46	0.37	0.28	0.21
0.55	0.48	0.45	0.39	0.36	0.34	0.32	0.28	0.27	0.22	0.21	0.11	0.042	
0.54	0.45	0.41	0.35	0.32	0.30	0.27	0.23	0.22	0.17	0.16	0.060		
150	110	85	36	24	16	9.5	4.7	3.6	1.9	1.6	0.86	0.70	0.62
220	180	160	92	70	52	35	20	15	5.9	4.7	1.1	0.74	0.65
214	217	206	199	194	190	188	178	180	172	171	161	153	146
143	126	120	91.6	85.1	67.2	57.4	46.6	42.6	36.8	34.1	22.6	16.5	13.2
0.64	0.54	0.50	0.43	0.41	0.39	0.36	0.33	0.32	0.27	0.26	0.14	0.063	
0.37	0.33	0.30	0.23	0.20	0.17	0.14	0.11	0.10	0.063	0.056			
0.38	0.34	0.32	0.24	0.21	0.18	0.15	0.11	0.10	0.065	0.057			
49	26	17	4.2	2.6	1.8	1.3	1.0	1.0	0.84	0.81	0.66	0.56	0.47
120	83	63	23	14	7.5	4.3	2.2	1.8	1.1	1.0	0.71	0.60	0.52
181	175	169	158	151	146	140	130	127	115	112	96.5	86.6	77.1
115	100	80.1	55.1	50.0	39.9	36.8	29.5	26.9	21.2	18.4	11.1	6.69	5.03
0.47	0.43	0.41	0.34	0.31	0.29	0.26	0.22	0.20	0.15	0.14	0.056		
0.30	0.26	0.23	0.15	0.12	0.10	0.078	0.054	0.046	0.027	0.024			
0.33	0.29	0.27	0.18	0.15	0.13	0.10	0.068	0.058	0.034	0.029			
13	5.4	3.3	1.3	1.1	0.94	0.85	0.78	0.75	0.69	0.68	0.56	0.43	0.33
32	16	8.7	2.1	1.5	1.1	0.95	0.82	0.79	0.70	0.69	0.56	0.45	0.34
115	106	101	90.6	86.2	80.5	70.8	60.8	55.1	45.1	42.4	32.1	24.3	18.1
63.3	45.8	37.2	27.0	21.0	18.6	17.9	15.4	14.2	11.1	10.5	5.61	3.31	2.44
0.39	0.35	0.33	0.25	0.22	0.19	0.16	0.12	0.11	0.070	0.062			
0.23	0.19	0.16	0.091	0.070	0.054	0.038	0.025						
0.29	0.24	0.21	0.13	0.10	0.078	0.057	0.036	0.031					
1.4	1.0	0.92	0.75	0.71	0.68	0.65	0.61	0.59	0.54	0.53	0.37	0.21	0.12
2.4	1.3	1.0	0.78	0.73	0.69	0.65	0.61	0.60	0.54	0.53	0.38	0.22	0.12
75.2	66	60	55.3	52.3	50	35.9	24.7	22.5	12.9	11.6	6.8	5.31	4.05
50.0	38.2	26.0	16.2	10.6	8.97	8.35	7.13	6.18	5.54	5.17	3.07	1.98	1.51
0.32	0.27	0.24	0.16	0.13	0.10	0.081	0.057	0.049					
0.17	0.13	0.11	0.052	0.037	0.027								
0.23	0.18	0.15	0.076	0.056	0.041	0.029							
0.79	0.72	0.69	0.60	0.57	0.54	0.50	0.45	0.43	0.36	0.34	0.17		
0.88	0.75	0.70	0.61	0.59	0.55	0.52	0.47	0.46	0.39	0.37	0.19		
47.7	37.9	34.7	26.4	23.1	20.3	16.5	12.4	11.4	8.31	7.45	4.95	4.11	3.05
22.0	13.5	10.0	4.60	3.99	3.31	3.23	2.76	2.63	2.32	2.15	1.51	1.05	0.87
0.25	0.20	0.16	0.091	0.070	0.054								
0.13	0.089	0.068	0.029										
0.15	0.10	0.079	0.033	0.023									
0.65	0.60	0.57	0.47	0.43	0.39	0.34	0.28	0.25	0.18	0.17			
0.66	0.60	0.57	0.47	0.44	0.41	0.37	0.32	0.30	0.23	0.21			
15.8	11.4	9.3	5.76	5.06	4.5	4.16	3.6	3.66	3.4	3.3	3.1	2.9	2.31
12.0	6.99	5.20	2.64	1.99	1.86	1.84	1.57	1.39	1.19	1.11	0.70	0.47	0.37
0.13	0.089	0.068											
0.067	0.041	0.029											
0.062	0.036	0.025											
0.45	0.38	0.34	0.21	0.17	0.13	0.10							
0.50	0.44	0.40	0.27	0.22	0.18	0.13							
6.19	4.9	4.2	3.24	2.98	2.8	2.67	2.4	2.42	2.2	2.2	2	2	1.82
2.45	2.00	1.70	1.20	1.10	1.05	1.00	0.92	0.74	0.61	0.54	0.43	0.23	0.17
0.062													
0.037													
0.025													
0.28	0.21	0.16											
0.30	0.22	0.18											
2.25	1.9	1.7	1.42	1.35	1.3	1.26	1.2	1.18	1.1	1.1	1.0	0.97	0.74
1.25	1.00	0.90	0.68	0.61	0.58	0.43	0.40	0.38	0.31	0.28	0.18	0.12	0.09
0.14													
0.14													
1.15	1.0	0.8	0.65	0.63	0.6	0.58	0.5	0.54	0.5	0.5	0.5	0.45	0.35
0.65	0.45	0.40	0.28	0.26	0.24	0.20	0.17	0.14	0.12	0.11	0.07	0.05	0.04
0.45	0.4	0.3	0.3	0.3	0.3	0.29	0.2	0.25	0.2	0.2	0.2	0.2	0.16
0.05	0.04	0.04	0.03	0.03	0.02	0.01	0.01	0.01					

TECHNICAL DATA STRUCTURAL & SECURITY

Young Relaxation Modulus E(t) / MPa

Tempera-ture	Product type	Load duration						
		1 sec	3 sec	5 sec	10 sec	30 sec	1 min	5 min
-20°C (-4°F)	Trosifol® Clear/UltraClear	750	680	650	610	550	500	400
	Trosifol® SC Monolayer	610	520	490	430	350	310	210
	Trosifol® SC Multilayer							
	Trosifol® Extra Stiff	1400	1300	1200	1200	1100	1000	860
	✶ Trosifol® Extra Stiff Pro							
	SentryGlas®	838	835	835	832	832	829	821
	SentryGlas Xtra®	725	719	719	716	710	705	699
0°C (32°F)	Trosifol® Clear/UltraClear	530	450	410	370	310	280	200
	Trosifol® SC Monolayer	140	95	77	58	35	23	11
	Trosifol® SC Multilayer							
	Trosifol® Extra Stiff	1200	1100	1100	1000	930	850	670
	✶ Trosifol® Extra Stiff Pro							
	SentryGlas®	749	743	740	737	732	726	717
	SentryGlas Xtra®	601	589	580	571	551	539	512
10°C (50°F)	Trosifol® Clear/UltraClear	260	200	170	140	92	69	31
	Trosifol® SC Monolayer	15	9.1	7.4	5.6	3.4	2.7	1.8
	Trosifol® SC Multilayer							
	Trosifol® Extra Stiff	1100	1000	970	900	780	700	510
	Trosifol® Extra Stiff Pro	1240	1150	1090	1030	940	880	740
	SentryGlas®	693	681	678	664	661	651	638
	SentryGlas Xtra®	536	530	527	521	509	503	477
20°C (68°F)	Trosifol® Clear/UltraClear	37	20	14	9.4	5.1	3.7	2.2
	Trosifol® SC Monolayer	2.6	2.0	1.8	1.6	1.4	1.3	1.2
	Trosifol® SC Multilayer							
	Trosifol® Extra Stiff	820	690	630	540	420	350	200
	Trosifol® Extra Stiff Pro	1000	910	850	800	680	600	440
	SentryGlas®	629	612	606	594	602	567	549
	SentryGlas Xtra®	480	459	426	400	389	370	355
25°C (77°F)	Trosifol® Clear/UltraClear	7.9	4.4	3.5	2.7	2.1	1.8	1.5
	Trosifol® SC Monolayer	1.7	1.5	1.4	1.3	1.2	1.1	0.97
	Trosifol® SC Multilayer							
	Trosifol® Extra Stiff	560	430	370	310	210	150	59
	Trosifol® Extra Stiff Pro	740	620	560	470	350	280	140
	SentryGlas®	511	485	474	456	433	413	340
	SentryGlas Xtra®	417	403	373	346	340	289	238
30°C (86°F)	Trosifol® Clear/UltraClear	2.8	2.1	1.9	1.7	1.5	1.4	1.2
	Trosifol® SC Monolayer	1.4	1.3	1.2	1.2	1.0	0.97	0.78
	Trosifol® SC Multilayer							
	Trosifol® Extra Stiff	210	130	96	63	29	17	5.8
	Trosifol® Extra Stiff Pro	350	240	200	140	74	47	12
	SentryGlas®	443	413	405	381	349	324	243
	SentryGlas Xtra®	314	299	283	270	250	237	163
35°C (95°F)	Trosifol® Clear/UltraClear	1.8	1.5	1.5	1.4	1.3	1.2	1.0
	Trosifol® SC Monolayer	1.2	1.1	1.1	1.0	0.89	0.81	0.61
	Trosifol® SC Multilayer							
	Trosifol® Extra Stiff	39	17	11	7.2	4.1	3.3	2.5
	Trosifol® Extra Stiff Pro	120	56	38	21	8.8	5.6	2.9
	SentryGlas®	338	302	287	266	230	209	158
	SentryGlas Xtra®	233	208	194	182	163	133	85.8
40°C (104°F)	Trosifol® Clear/UltraClear	1.4	1.3	1.3	1.2	1.1	1.0	0.82
	Trosifol® SC Monolayer	1.1	1.0	0.96	0.88	0.75	0.66	0.46
	Trosifol® SC Multilayer							
	Trosifol® Extra Stiff	6.1	3.7	3.2	2.8	2.4	2.3	2.0
	Trosifol® Extra Stiff Pro	29	12	7.9	4.7	3.2	2.5	2.0
	SentryGlas®	229	187	167	143	109	91.6	57
	SentryGlas Xtra®	149	137	120	105	98.0	79.9	44.4
50°C (122°F)	Trosifol® Clear/UltraClear	1.2	1.1	1.0	0.92	0.78	0.69	0.48
	Trosifol® SC Monolayer	0.94	0.80	0.74	0.66	0.52	0.43	0.26
	Trosifol® SC Multilayer							
	Trosifol® Extra Stiff	2.3	2.1	2.0	1.9	1.8	1.7	1.5
	Trosifol® Extra Stiff Pro	2.7	2.3	2.2	2.1	1.9	1.8	1.6
	SentryGlas®	108.6	78	66.3	55.1	40	33.8	21.7
	SentryGlas Xtra®	65.4	37.6	25.0	17.7	14.5	11.5	8.02
60°C (140°F)	Trosifol® Clear/UltraClear	0.95	0.82	0.75	0.66	0.51	0.42	0.24
	Trosifol® SC Monolayer	0.78	0.64	0.58	0.49	0.36	0.29	0.15
	Trosifol® SC Multilayer							
	Trosifol® Extra Stiff	1.9	1.8	1.7	1.6	1.4	1.3	0.96
	Trosifol® Extra Stiff Pro	1.9	1.8	1.7	1.6	1.4	1.3	1.0
	SentryGlas®	35.4	24.5	20.67	17.2	12.8	10.9	7.6
	SentryGlas Xtra®	14.5	11.2	9.86	7.51	6.36	5.57	4.14
70°C (158°F)	Trosifol® Clear/UltraClear	0.78	0.63	0.56	0.47	0.34	0.26	0.14
	Trosifol® SC Monolayer	0.61	0.47	0.41	0.33	0.23	0.17	0.080
	Trosifol® SC Multilayer							
	Trosifol® Extra Stiff	1.6	1.4	1.3	1.2	0.97	0.83	0.52
	Trosifol® Extra Stiff Pro	1.6	1.4	1.4	1.2	1.0	0.88	0.53
	SentryGlas®	11.31	8.8	8.13	7.3	6.3	5.64	4.2
	SentryGlas Xtra®	6.51	5.12	4.23	3.85	3.11	2.66	2.01
80°C (176°F)	Trosifol® Clear/UltraClear	0.62	0.48	0.41	0.33	0.22	0.17	
	Trosifol® SC Monolayer	0.46	0.34	0.29		0.14	0.099	
	Trosifol® SC Multilayer							
	Trosifol® Extra Stiff	1.3	1.1	1.0	0.8	0.6	0.48	
	✶ Trosifol® Extra Stiff Pro							
	SentryGlas®	4.65	4.0	3.66	3.31	2.9	2.5	1.7
	SentryGlas Xtra®	0.92	0.80	0.68	0.53	0.30	0.27	0.18

✶ Still being tested

TAB 6 ➔ E(t) was calculated according E(t) = 2 x G(t) x (1+v) for isotropic materials with: v = 0.47 (Trosifol® Extra Stiff, Trosifol® Extra Stiff Pro), 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.

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
360	290	250	160	130	99	75	49	41	22	19	4.3	2.0	1.6
170	120	93	43	29	20	15	9.4	8.1	5.2	4.9	2.0	1.4	1.2
790	660	570	360	300	240	180	110	93	46	38	6.0	2.8	2.3
818	815	809	806	804	801	798	795	795	792	786	772	749	720
670	672	669	654	631	619	568	554	551	544	522	471	411	388
160	120	95	42	30	21	14	8.2	6.8	4.0	3.5	1.8	1.4	1.3
7.7	4.9	3.6	2.1	1.8	1.6	1.5	1.4	1.3	1.2	1.2	0.91	0.63	0.42
580	450	380	210	150	110	71	38	30	13	10	3.1	2.3	2.0
714	708	703	680	668	665	654	648	645	639	636	605	579	559
500	474	426	367	317	299	282	252	248	222	209	162	127	115
21	11	7.0	3.0	2.4	2.1	1.8	1.6	1.5	1.4	1.4	1.1	0.83	0.62
1.6	1.4	1.3	1.2	1.1	1.0	0.94	0.83	0.79	0.66	0.62	0.32	0.13	
430	310	250	110	70	46	28	14	11	5.5	4.7	2.5	2.1	1.8
650	530	470	270	210	150	100	59	44	17	14	3.2	2.2	1.9
618	629	597	574	560	553	543	516	519	498	499	467	448	421
423	373	355	271	252	199	170	138	126	109	101	66.9	48.8	39.1
1.9	1.6	1.5	1.3	1.2	1.2	1.1	0.98	0.94	0.80	0.77	0.42	0.19	
1.1	0.98	0.90	0.67	0.59	0.50	0.42	0.32	0.28	0.19	0.17			
140	77	50	12	7.7	5.4	4.0	3.1	2.9	2.5	2.4	1.9	1.6	1.4
350	240	185	68	41	22	13	6.5	5.3	3.2	2.9	2.1	1.8	1.5
525	511	493	458	438	428	406	380	368	336	330	282	256	223
340	296	237	163	148	118	109	87.3	79.6	62.8	54.4	32.9	19.8	14.9
1.4	1.3	1.2	1.0	0.94	0.86	0.77	0.65	0.60	0.46	0.42	0.17		
0.90	0.76	0.68	0.44	0.37	0.30	0.23	0.16	0.14	0.080	0.072			
37	16	9.6	3.7	3.1	2.8	2.5	2.3	2.2	2.0	2.0	1.7	1.3	0.96
94	47	26	6.2	4.4	3.2	2.8	2.4	2.3	2.1	2.0	1.6	1.3	1.0
334	308	294	263	250	234	206	177	160	131	123	93.3	70.6	52.6
187	136	110	79.9	62.2	55.1	53.0	45.6	42.0	32.9	31.4	16.6	9.80	7.22
1.2	1.0	0.97	0.74	0.64	0.56	0.46	0.35	0.31	0.21	0.19			
0.70	0.56	0.47	0.27	0.21	0.16	0.11	0.075						
4.2	3.0	2.7	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.1	0.62	0.35
7.1	3.8	2.9	2.3	2.1	2.0	1.9	1.8	1.8	1.6	1.6	1.1	0.65	0.35
220	194	178	162	153	146	105	72	66.0	38	35	20.3	15	11.9
148	113	77.0	48.0	31.4	26.6	24.7	21.1	18.3	16.4	15.3	9.09	5.86	4.47
0.95	0.81	0.72	0.47	0.38	0.31	0.24	0.17	0.15					
0.52	0.39	0.31	0.15	0.11	0.081								
2.3	2.1	2.0	1.8	1.7	1.6	1.5	1.3	1.3	1.0	1.0	0.49		
2.6	2.2	2.1	1.8	1.7	1.6	1.5	1.4	1.4	1.1	1.1	0.56		
141	122	103	78.2	68.4	60.1	48.9	36.7	33.8	24.6	22.1	14.7	12.2	9.03
65.1	40.0	29.6	13.6	11.8	9.80	9.56	8.17	7.79	6.87	6.35	4.47	3.11	2.58
0.73	0.58	0.49	0.27	0.21	0.16								
0.38	0.26	0.20	0.086										
1.9	1.8	1.7	1.4	1.3	1.1	1.0	0.81	0.75	0.54	0.49			
1.9	1.8	1.7	1.4	1.3	1.2	1.1	0.94	0.88	0.68	0.62			
46.9	34	27.8	17.1	15.0	13.5	12.3	11	10.9	10	9.9	9.3	8.84	6.86
35.5	20.7	15.4	7.81	5.89	5.51	5.45	4.65	4.11	3.52	3.28	2.07	1.39	1.10
0.39	0.27	0.20											
0.20	0.12	0.086											
1.3	1.1	1.0	0.63	0.50	0.4	0.29							
1.5	1.3	1.2	0.79	0.65	0.53	0.38							
18.57	14.6	12.6	9.72	8.94	8.4	8.01	7.2	7.26	6.5	6.5	6.3	6	5.46
7.25	5.92	5.03	3.55	3.26	3.11	2.96	2.72	2.20	1.81	1.59	1.27	0.68	0.50
0.18													
0.11													
0.82	0.60	0.48											
0.88	0.65	0.53											
6.75	5.5	5.1	4.26	4.05	3.8	3.78	3.6	3.54	3.3	3.3	3	2.9	2.22
3.70	2.96	2.66	2.01	1.81	1.72	1.27	1.18	1.13	0.92	0.84	0.53	0.36	0.27
0.40													
0.41													
3.45	2.9	2.5	1.95	1.89	1.8	1.74	1.6	1.62	1.5	1.5	1.4	1.3	1.05
1.92	1.33	1.18	0.83	0.77	0.71	0.59	0.49	0.41	0.36	0.32	0.21	0.15	0.12
1.35	1.1	1.0	0.9	0.9	0.8	0.87	0.7	0.75	0.6	0.8	0.6	0.5	0.48
0.15	0.12	0.12	0.09	0.09	0.06	0.03	0.03	0.03					

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
Trosifol® Extra Stiff Pro	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	0.76	30	Clear	88	< 1	16
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.

TROSIFOL® GLASGLOBAL
For performing structural analysis for glass.

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

Structural & Security Interlayers* – 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	1000-3210	39-126	250	820
Trosifol® Extra Stiff Pro	0.76	30	Clear	1000-3210	39-126	250	820
SentryGlas®/SGX® *1	0.76	30	Clear	1050-3300*2	41-130*2	250	820
SentryGlas®	0.76	30	Clear	1530	60	50	164
SentryGlas®/SGX®	0.76	30	Clear	1050-3300*2	41-130*2	60	197
SentryGlas®/SGX®	0.89	35	Clear	1220-3300*2	48-130*2	200	656
SentryGlas®/SGX®	0.89	35	Clear	1530-3300*2	60-130*2	50	164
SentryGlas® Translucent White	0.80	31	Transl. White	1220/1830 1530/3300	48/72 60/130	200 200/50	656 656/164

TAB 9 ➔ *1 SGX® = SentryGlas Xtra®
*2 Only available in standard width. Other sizes available on request with minimum order quantities and binding purchase commitment.

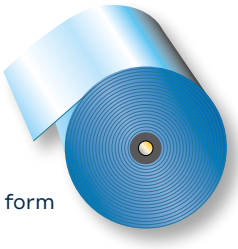
Structural & Security Interlayers* – dimensions for sheet products

Type	Thickness [mm]	[mil]	Sheet widths [mm]	Sheet widths [in]	Sheet lengths [m]	[ft]
SentryGlas®	0.89	35	610-2160*3	24-85*3	6	19
SentryGlas®	1.52	60	610-2160*3	24-85*3	6	19
SentryGlas®	2.28	90	610-2160*3	24-85*3	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*3	24-85*3	6	19
SentryGlas Xtra®	1.52	60	610-2160*3	24-85*3	6	19
SentryGlas Xtra®	2.28	90	610-2160*3	24-85*3	6	19
SentryGlas Xtra®	2.53	100	610-2160*3	24-85*3	6	19

TAB 10 ➔ *3 Oversize shipment possible up to 2500 mm/99 inches

➔ King Power Mahanakhon, Bangkok, Thailand

➔ * The table shows the global product program. Not all products are available in all regions.



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 [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 11 ➔ * LSG with 2 x 4 mm Floatglass according EN 410/ISO 9050

Photo: © Dubova/shutterstock.com

Photo: © One Works

➔ Marco Polo Airport, Venice, Italy

Acoustic Interlayers – dimensions

Type	Film thickness [mm]	[mil]	Roll widths [mm]	[in]	Roll length refrigerated [m]	[ft]	Roll length PE interleaved [m]	[ft]
Trosifol® SC Monolayer	0.76	30	1000-3210*	39-126*	–	–	230/450	754/1476
Trosifol® SC Monolayer	1.52	60	1000-3210*	39-126*	–	–	100	328
Trosifol® SC Multilayer	0.50	20	3210	126	350/700	1148/2296	370/700	1214/2296
Trosifol® SC Multilayer	0.76	30	1000-3210*	39-126*	470	1542	230	754

TAB 12 ➔ * 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.

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_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

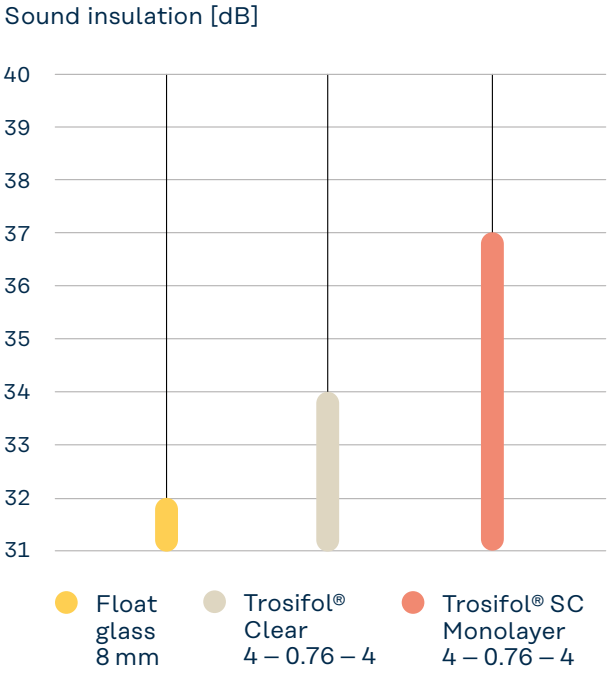
TAB 13 ➔ * SC Mono = Trosifol® SC Monolayer

0.50 mm (20 mil) Multilayer products – test results

Glass [mm]				Cavity air or argon [mm]	Glass [mm]	Cavity [mm]	Glass [mm]	R_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

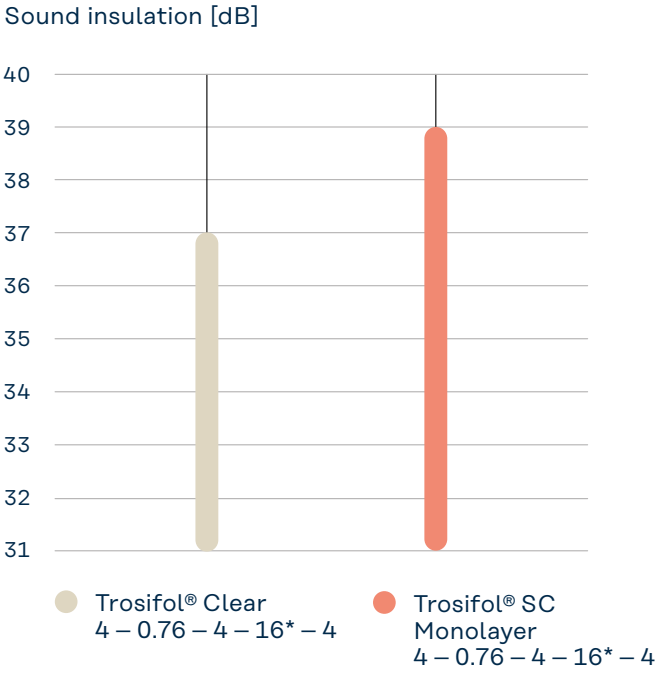
TAB 14 ➔ ** SC Multi = Trosifol® SC Multilayer

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_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 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

➔ Samples

Decorative Interlayers

Brilliant colors

DECORATIVE INTERLAYERS – HIGHLIGHTS

- Interior and exterior applications thanks to outstanding 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 [mm]	[mil]	Color code	RAL code	Light trans-mittance* [%]	UV trans-mittance* [%]	Solar absorp-tion* [%]
Tints								
Trosifol® Light Blue-Green	medium	0.38[1]	15[1]	84073	6034	71	< 1	29
Trosifol® Bronze	medium	0.76	30	36038	8002	36	< 1	55
Trosifol® Medium Bronze	medium	0.38[1]	15[1]	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[1]	15[1]	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	-
Black & White								
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[2]	30[2]	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
SentryGlas® Translucent White	high	0.80	31	-	9002	76	43	26

TAB 16 ➔ [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.

Frankfurt Airport Terminal 1, Germany

Decorative Interlayers – dimensions

Product	Film thickness [mm]	Film thickness [mil]	Roll widths [mm]	Roll widths [in]
Tints				
Trosifol® Light Blue-Green	0.38 0.76*1	15 30*1	1000-3210*2	39-126*2
Trosifol® Bronze	0.76	30	1000-3210*2	39-126*2
Trosifol® Medium Bronze	0.38*1	15*1	1000-3210*2	39-126*2
Trosifol® Light Brown	0.38	15	1000-3210*2	39-126*2
Trosifol® Medium Brown	0.38	15	1000-3210*2	39-126*2
Trosifol® Grey	0.38 0.76	15 30	1000-3210*2	39-126*2
Trosifol® Asahi Grey	0.38	15	1000-3210*2	39-126*2
Trosifol® Solar Grey	0.76	30		
Black & White				
Trosifol® Brilliant Black	0.76	30	1000/1600/2250	39/63/88
Trosifol® Diamond White	0.76	30	1000/1600/2250	39/63/88
Trosifol® Shining White	0.38	15	1000/1600/2250	39/63/88
Trosifol® Translucent White	0.38 0.76	15 30	1000-3210*2	39-126*2
Trosifol® Translucent White	0.76 high adhesion	30	1000-2400*2	39-94*2
Trosifol® Sand White	0.38	15	1000-3210*2	39-126*2
SentryGlas® Translucent White	0.80	31	1220-3300	48-126

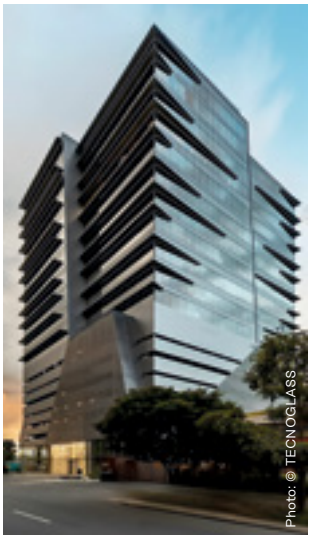
TAB 17

*1 Product also available as 0.76 mm (30 mil) version with comparable optics and enhanced safety features
*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.

➔ New Headquarters Building, Seattle, USA

Roll lengths refrigerated [m]		Roll lengths refrigerated [ft]		Roll lengths PE interleaf [m]		Roll lengths PE interleaf [ft]	
400/500	200/250	1312/1640	656/250	400	200	1312	656
200		656		200		656	
400		1312		400		1312	
400		1312		400		1312	
400		1312		400		1312	
400/500	200/250	1312/1640	656/820	400	200	1312	656
400		1312		400		1312	
–		–		60/250		197/820	
–		–		60/250		197/820	
–		–		60/250		197/820	
400/1000	250/500	1312/3280	820/1640	400	200	1312	656
–		–		250		820	
400		1312		400		1312	
–		–		200	200/50	656	656/164



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

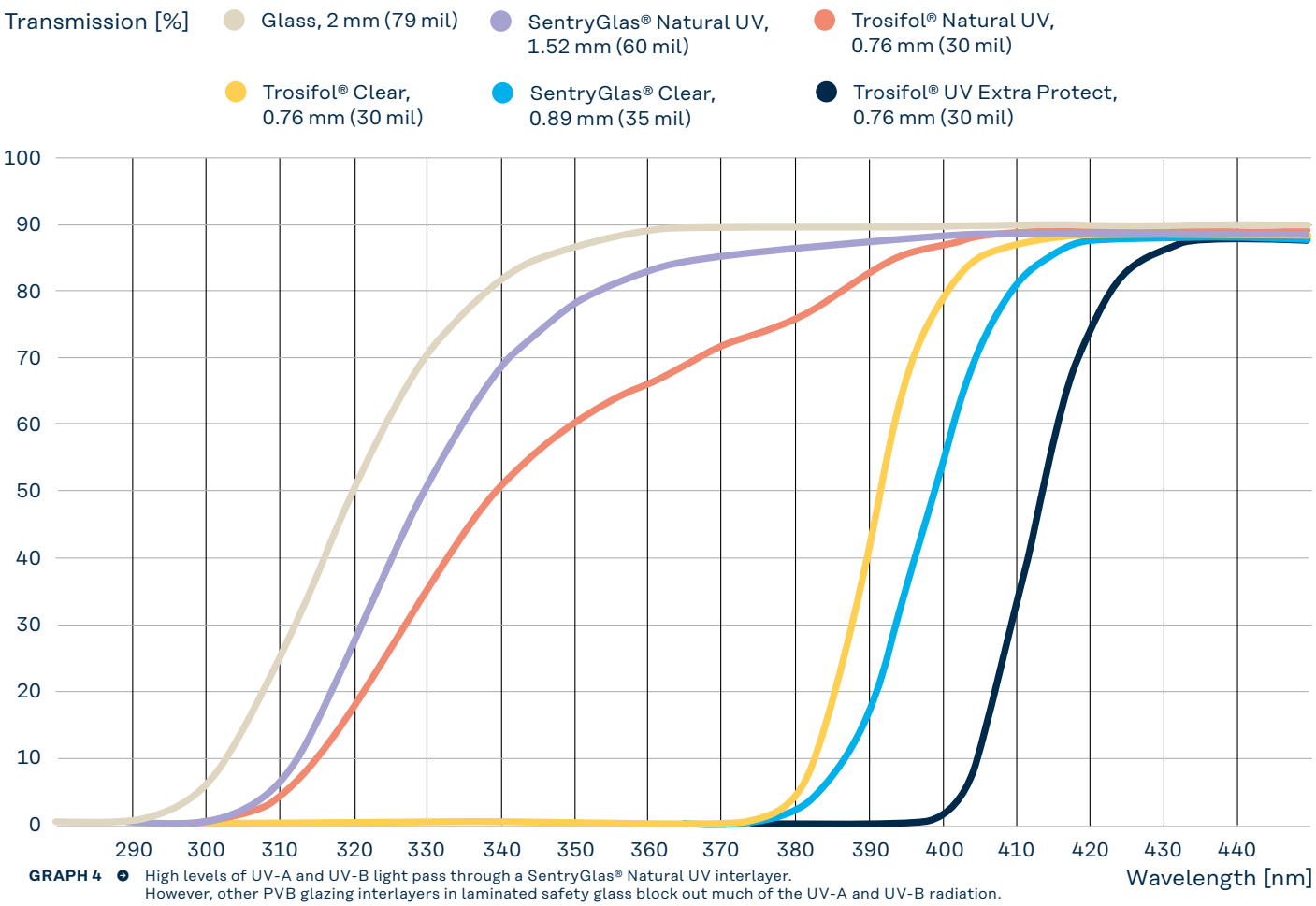
Type	Thickness [mm]	[mil]	Roll widths [mm]	Roll widths [in]	Roll lengths [m]	[ft]
Trosifol® HR	0.76	30	1000-3210	39-126	200	656
Trosifol® UV Extra Protect	0.76	30	1000-3210	39-126	50/200	164/656
Trosifol® Natural UV	0.76	30	1000-3210	39-126	250	820
Trosifol® XT UltraClear	2.28	90	1000-3210	39-126	95	312
SentryGlas® Natural UV	0.89	35	1220/1530/1830/3300	48/60/72/130	50/200	164/656
SentryGlas® Natural UV	1.52*[2]	60*[2]	–	–	–	–
Trosifol® Spallshield® CPET	0.18	7	1530	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.

Not all products are available in all regions.

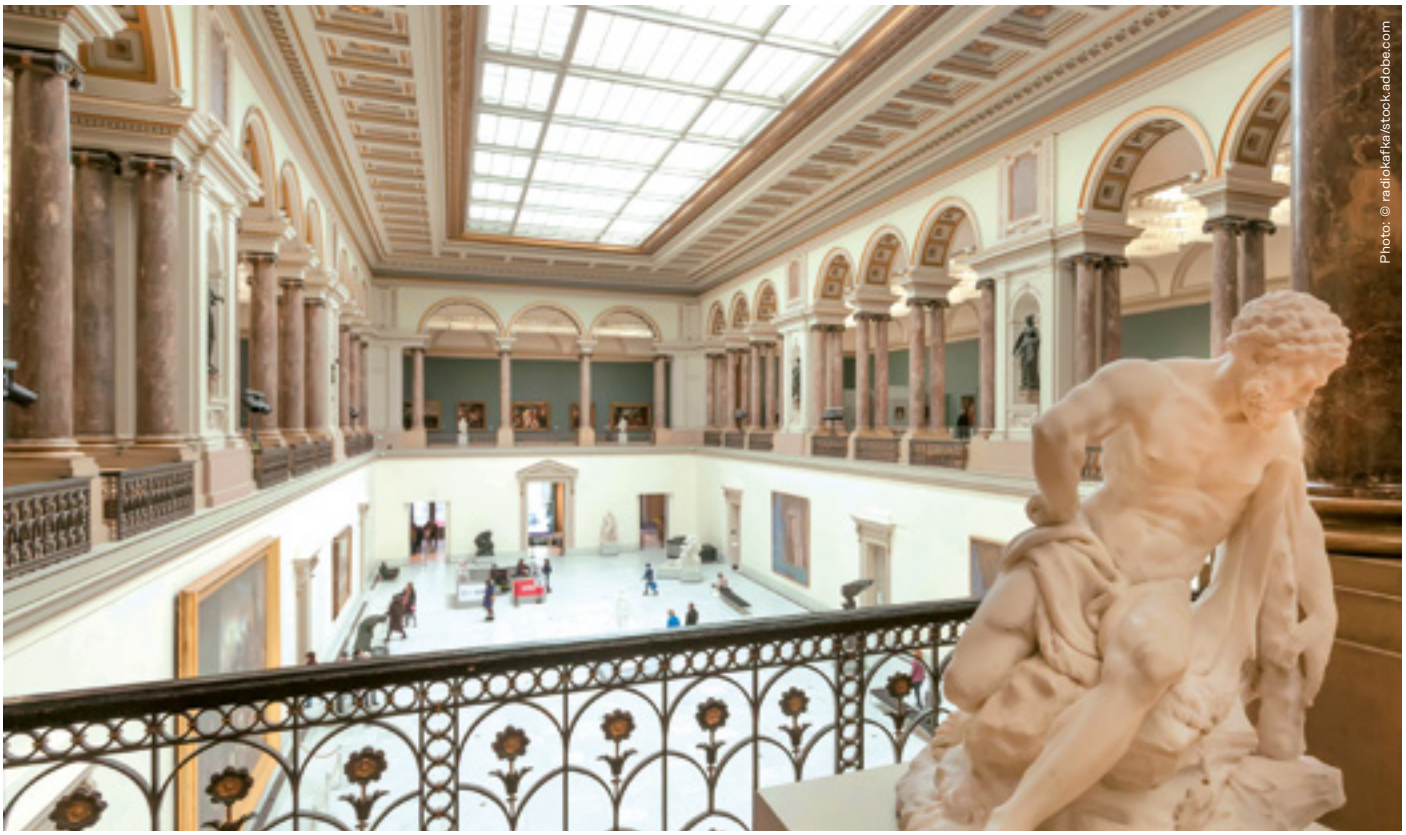
➔ Trosifol® Spallshield® CPET impact test

UV Light transmittance curves



GRAPH 4 ➔ 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



➔ Old sculpture in a museum

Parque Toreo, Mexico

Photo: © Paul Ozitron

BirdSecure® Pro

Bird-Friendly solutions

BIRDSECURE® PRO HIGHLIGHTS

- Outstanding threat level
- Relevant safety features remain unchanged
- Outstanding optic in combination with BirdSecure®
- Solar control performance

APPLICATIONS & RECOMMENDATIONS

- Reflective façades
- Glazed balcony walls and balustrades
- Transparent noise barriers, glazed entrances or winter gardens with ineffective black silhouettes
- Transparent aerial walkways
- Transparent building corners
- Attractive green spaces in front of reflective façades

1 Transparent aerial walkways

2 Plants behind transparent surfaces

3 Transparent noise barriers, glazed entrances or winter gardens with ineffective black silhouettes

4 Glazed balcony walls and balustrades

5 Reflective façades

6 Attractive green spaces in front of reflective façades

7 Transparent building corners

Trosifol®

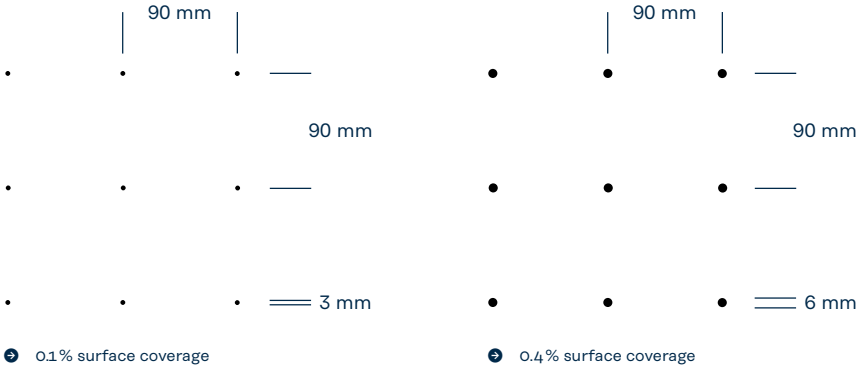
BirdSecure® Pro 90/3
BirdSecure® Pro 90/6

- Dot pattern on Trosifol® UltraClear

SentryGlas®

BirdSecure® Pro 90/3
BirdSecure® Pro 90/6

- Dot pattern on SentryGlas®



TECHNICAL DATA – BIRDSECURE® PRO

Physical properties

Design	Light transmittance [%]	Light reflexion outside [%]	g-value [%]	Absorption outer pane [%]
Monolithic glass				
6 mm - 0.76 mm BirdSecure® Pro 90/6 + 0.76 mm Ultra Clear - 6 mm	87	8	74	26
6 mm - 0.76 mm BirdSecure® Pro 90/3 + 0.76 mm Ultra Clear - 6 mm	87	8	74	26

Product	Threat factor
BirdSecure® Pro 90/6	14
BirdSecure® Pro 90/3	29

TAB 20 ➔ Estimated values based on calculations

BIRDSECURE® PRO

- **Faster delivery times (esp. for replacements)**
- **Thinner glass combinations**
- **Combination with annealed glasses for better opticial properties**

Trosifol® BirdSecure® Pro and SentryGlas® BirdSecure® Pro – Dimensions

Product	Thickness [mm]	[mil]	Roll widths [mm]	[in]	Roll lengths [m]	[ft]
Trosifol® BirdSecure® Pro 90/3	0.76	30	1220/1830/2500	48/72/98	50	164
Trosifol® BirdSecure® Pro 90/6	0.76	30	1220/1830/2500	48/72/98	50	164
SentryGlas® BirdSecure® Pro 90/3	0.76	30	1220/1830/2500	48/72/98	50	164
SentryGlas® BirdSecure® Pro 90/6	0.76	30	1220/1830/2500	48/72/98	50	164

TAB 21 ➔

Distance: 1 m

Distance: 2 m

Distance: 3 m

TECHNICAL DATA – PRODUCTS

Technical data

Property	Test method	Unit	Trosifol® Clear	Trosifol® UltraClear	Trosifol® SC Monolayer
Density	DIN EN ISO 1183-1	g/cm^3	1.07	1.07	1.06
Refractive index	DIN EN ISO 489	-	1.480	1.480	1.477
Thermal conductivity	DIN EN 993-15	W/mK	0.21	0.21	0.20
Thermal expansion coefficient	ISO 11359-2	1/K	$1.7E^{-4}$	$1.7E^{-4}$	$2.0E^{-4}$
Specific heat capacity		J/g K	1.9	1.9	1.9
Surface resistivity	DIN 53482	Ω	$> 10^{12}$	$> 10^{12}$	1×10^{11}
Tensile strength	ISO 527-3 ASTM D638	N/mm^2 Mpa (kpsi)	> 20	> 20	> 13
Elongation at break	ISO 527-3 ASTM D638	%	> 250	> 250	> 300
Tg	DMA, 3K/min, 1 Hz	°C	32	32	21

TAB 22

Photo: © Lena Serditova / shutterstock.com

Trosifol® SC Multilayer	Trosifol® Extra Stiff	Trosifol® Extra Stiff Pro	Trosifol® XT UltraClear	Trosifol® Natural UV	Trosifol® UV Extra Protect	SentryGlas®	SentryGlas Xtra®
1.06	1.08	1.08	1.07	1.07	1.07	0.97	0.97
1.480	1.486	1.488	1.480	1.480	1.482	1.499	1.497
0.20	0.22	0.22	0.21	0.21	0.21	0.26	0.25
$2.0E^{-4}$	$1.2E^{-4}$	1.2×10^{-4}	$1.7E^{-4}$	$1.7E^{-4}$	$1.7E^{-4}$	$1.30E^{-4}$	$1.30E^{-4}$
1.9	1.9	1.6	1.9	1.9	1.9	1.5	1.5
$> 10^{12}$	$> 10^{12}$	$> 10^{12}$	$> 10^{12}$	$> 10^{12}$	$> 10^{12}$	$> 10^{12}$	$> 10^{12}$
> 20	> 30	> 32	> 20	> 20	> 20	- 34.5 (5.0)	42.9 (6.2) 43.5 (6.3)
> 250	> 180	> 170	> 250	> 250	> 250	- 400 (400)	600 320
N/A	47	50	32	32	32	N/A	N/A

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

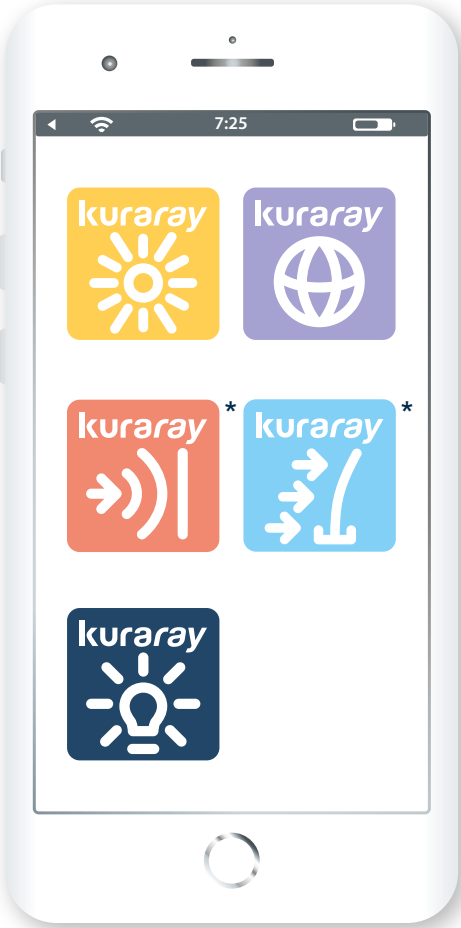
TAB 23 ➔

Tools & Apps

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

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

SOLUTION FINDER
For finding the right product of your project.



GLASGLOBAL
For performing structural analysis for glass.

STRENGTH LAB AI
The goal of the Strength Lab AI tool is to provide designers, engineers, and architects with an efficient tool to facilitate the design and evaluation of glazing systems in terms of structural properties. This tool provides rapid analysis of virtually any glazing configuration, dimension and load case. Additionally, standard modules allow easy evaluation of results according to ASTM, EN and DIN standards.

* Only available as web app

Contact

FOR FURTHER INFORMATION
on products from Kuraray, please visit www.kuraray.com.
You can find further information on our Trosifol® and SentryGlas® products at 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
Kronenstr. 55
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

7/2024

WORLD OF INTERLAYERS

What is the next project you are dreaming of?

trosifol@kuraray.com
www.trosifol.com