

PRODUCT TECHNICAL DATA

Saflex® Structural (DG) - Polyvinyl Butyral Interlayer

Saflex® Structural (DG) polyvinyl butyral (PVB) interlayer is a tough, resilient film produced from plasticized polyvinyl butyral (PVB) resin. It is designed specifically for applications where increased interlayer rigidity and high glass adhesion are required relative to conventional glazing interlayers. The designed high adhesion may render this product inappropriate for lamination with thin annealed lites of glass when used as a single layer interlayer if penetration resistance is required.

Product Overview:

Saflex Structural PVB combines stiffer rheology, versus conventional PVB interlayers, with features such as glass containment upon breaking, UV screening, low haze and the ability to laminate thick multiply glass. Storage, assembly and lamination properties similar to other Saflex® brand PVB interlayer products, along with the aforementioned properties, make Saflex Structural interlayer an excellent choice for most structural applications. Information regarding the safe handling and storage of Saflex Structural can be found in the Safety Data Sheet that is available from Eastman or at www.saflex.com. Lamination procedures are documented in the Saflex lamination guide, which is available by contacting your Eastman Technical Service representative.

Specific applications of Saflex Structural PVB interlayer include its use in structural glass applications such as: balconies, floors, fins and stair treads. It may also be used, to adhere the glass spall shield layer for bullet resistant glazing, glass applications where creep at higher temperatures is a concern and areas where the edge effects from sealants or exposed laminate edges need to be minimized. When used as part of a multi-interlayer laminate glazing system in place of one layer of standard PVB, Saflex Structural interlayer can provide increased infill retention due to lower deflection as compared to a similar laminate system without Saflex Structural interlayer. Saflex Structural interlayer can be layered with Vanceva colors and other architectural Saflex products. When layering with other Saflex architectural interlayers, the modulus of the Saflex Structural interlayer should be adjusted accordingly for calculations, and color mottle should be verified through mockup panels.

Available Forms:

Saflex Structural interlayer is supplied in standard lengths and widths (up to 3.2 m). Saflex Structural interlayer is available in 0.76 mm thicknesses and is supplied on a 15.2 cm (6 in) diameter core in roll form. Saflex Structural is supplied in rolls as refrigerated or interleaved with polyethylene that do not require refrigeration (additional charge applies). Interleaving is not available for all products. All interleaved product is special order and subject to lead times.

Saflex® Structural interlayer		
Product Designation	DG41	DG41 XC
Thickness	0.76 mm (0.030 inch)	0.76 mm (0.030 inch)
Color	Clear	Extra Clear

Please contact your Saflex Sales Manager, Customer Service Representative or visit www.saflex.com for further information as all formulations and sizes may not be available in your region

Storage Conditions:

Saflex Structural PVB interlayer should be stored inside the moisture barrier bag that the roll is shipped in and maintained within the temperatures recommended in the Saflex Laminating Guide. It is recommended that the interlayer be used within a two-year period from purchase to minimize the interlayer adhering to itself (blocking).

Laminating Conditions:

A Laminating Guide which details recommended practices for storage, handling, and lamination is available to Eastman's laminating partners. This technical guide is available only from your Saflex Technical Service (TS) Representative or Saflex Sales Manager.

Saflex® Structural - Select Properties

Test	Property	Test Method	Units	Conditions	Saflex® Structural interlayer
Flammability	Extent of Burning ¹	ASTM D635	mm	-	7.9
	Heat of Combustion	ASTM E1354 ISO 1716	MJ/kg	-	31
	Rate of Burning ¹	ASTM D 635	mm/min °C	-	<25
	Self-Ignition ¹	ASTM D1929	°C	-	404
	Smoke Density ¹	ASTM D2843	%	-	5
Mechanical	Elongation at Failure	ISO 527-3	%	50 mm/min 23°C 50% RH	196
		JIS K6771	%	20 mm/min 23°C 50% RH	180
	Poisson's Ratio	ASTM D638	-	23°C 50% RH	0.5
	Shear Modulus; G(t)	EN 16613	MPa	Relaxation	See Table Below
	Tear Resistance	ASTM D624	N/mm	23°C 50% RH	106
		ASTM D1004	N/cm	23°C 50% RH	76
	Tensile strength	ISO 527-3	MPa	50 mm/min 23°C 50% RH	33
		JIS K6771	MPa	20 mm/min 23°C 50% RH	27
	Young's Modulus; E(t)	EN 16613	MPa	Relaxation	See Table Below

Test	Property	Test Method	Units	Conditions	Saflex® Structural interlayer
Optical	Haze	ASTM D1003	%	Clear 3 mm Glass	<1
	Refractive Index	ASTM D542	-	23°C	1.488
	Yellowness Index	ASTM E313	YI	Clear 3 mm Glass	<1
Physical	Glass Transition Temperature	-	°C	Frequency 1 Hz Heating Rate 3° C/min	46°C±1
	Hardness	ASTM D2240	Shore D	cut/stacked to 12.5 mm	50
	Moisture	EMN	%	-	Target ± 0.05
	Plasticizer	EMN	PHR	-	Target ± 2
	Roll Length	EMN	m	-	ordered minimum
	Specific Gravity/Density	ASTM D792	g/cm3	23°C	1.08
	Specific Heat	ASTM E1269	J/Kg -°K	37°C	2195
	Thickness	EMN	mm	0.76	±0.025 mm
	Width	EMN	cm	-	Ordered minimum
Safety Glazing Impact	2.2 kg (5 lb) Ball	ANSI Z26.1; ASTM F3006, ECE R43	-	0.76 mm	Comply
	Twin Tyre	EN 12600; ISO 29584	1B1	0.76 mm	Comply
	45 kg (100 lb) Shot Bag	ANSI Z97.1; CPSC 16 CFR 1201	Class B Cat I; 667 N (150 ftlb)	0.76 mm ²	Comply
	45 kg (100 lb) Shot Bag	ANSI Z97.1; CPSC 16 CFR 1201	Class A; Cat II; 1779 N (400 ftlb)	0.76 mm	Comply

Test	Property	Test Method	Units	Saflex® Structural (DG)	Saflex® Structural (DG XC)
Solar ³	Solar Transmittance	LBNL WINDOW 7.0 NFRC 100	%	72	72
	Solar Reflectance		%	7	6
	Solar Absorptance		%	21	22
	Visible Transmittance		%	88	86
	Visible Reflectance		%	6	6
	Solar Heat Gain Coefficient	NFRC 300	SHGC g value	0.79	0.79
	Sun Protection Factor	Calculated	SPF ⁴	50+	50+
	Light to Solar Gain	Calculated	LSG	1.11	1.09
	U Factor	NFRC 100	W/m2-K	5.56	5.56
	UV Factors	Damage Weighted (Tdw-K)		300 - 500 nm	0.27
Damage Weighted (Tdw-ISO)			300 - 600 nm	0.59	0.58
Transmitted UV			300 - 380 nm	<1%	<1%
Test	Property	Test Method	Units	Conditions	Saflex® Structural interlayer
Thermal	Coefficient of Thermal Expansion	ASTM E831	ppm/°C	-40°C to 110°C	129
	Thermal Conductivity	ASTM D5930	W/m*K	63°C	0.196
	Emissivity	ASTM C1371	-	19.5°C	0.94
1 - Data based on NOA for Saflex formulation					
2 - Safety Glazing impact - 0.76 mm used for Class B - Cat I as this is the thinnest product available in this formulation.					
3 - Solar, Thermal, Optical and Color data based on 0.76 mm clear Saflex Structural PVB interlayer with clear nominal 3 mm glass. Calculations performed using OPTIC and WINDOW 7.0 by Lawrence Berkeley National Laboratory.					
4 - SPF is a calculated value based on the spectral data from the laminate and not a result of direct testing.					

The shear relaxation modulus and calculated Young's modulus of Saflex® Structural (DG PVB interlayer) for a given load duration at temperature is provided for use in calculating structural capacity of laminated glass containing this product.

Load Duration	Saflex® Structural shear relaxation modulus G(t) (MPa)										
	Temperature (°C)										
	10	15	20	25	30	35	40	45	50	55	60
3 sec	576	528	335	163	46	8.3	1.8	0.74	0.47	0.40	0.39
10 sec	574	473	276	106	24	4.0	1.1	0.53	0.40	0.39	0.38
30 sec	571	424	216	69	11	1.9	0.68	0.43	0.40	0.39	0.35
1 min	566	389	185	46	6.3	1.3	0.56	0.40	0.39	0.38	0.32
5 min	533	308	108	19	2.4	0.68	0.42	0.40	0.38	0.31	0.24
10 min	505	272	85	11	1.5	0.57	0.40	0.39	0.36	0.27	
30 min	452	213	48	5.0	0.97	0.45	0.40	0.38	0.30		
1 hour	422	182	31	3.5	0.72	0.41	0.39	0.36	0.26		
6 hours	329	99	10.0	1.2	0.47	0.40	0.37	0.27			
12 hours	297	76	5.9	0.90	0.42	0.39	0.34	0.24			
1 day	259	53	4.1	0.67	0.40	0.39	0.31				
5 days	180	22	1.4	0.47	0.39	0.35					
1 week	163	17	1.2	0.44	0.39	0.33					
3 weeks	110	7.1	0.80	0.40	0.38	0.26					
1 month	97	5.6	0.69	0.40	0.37	0.25					
1 year*	27	1.3	0.41	0.38							
10 years*	5.4	0.56	0.39	0.29							
15 years*	4.4	0.52	0.39	0.27							
50 years*	2.0	0.41	0.37								
*values not validated											

Load Duration	Saflex® Structural Young's relaxation modulus E(t) (MPa)										
	Temperature (°C)										
	10	15	20	25	30	35	40	45	50	55	60
3 sec	1727	1585	1005	489	138	25	5.5	2.2	1.4	1.19	1.18
10 sec	1723	1419	828	317	72	12	3.2	1.6	1.2	1.18	1.14
30 sec	1713	1272	649	208	33	6	2.0	1.3	1.2	1.16	1.05
1 min	1698	1168	556	139	19	4	1.7	1.2	1.2	1.13	0.95
5 min	1600	924	324	57	7.1	2.0	1.25	1.2	1.1	0.93	0.71
10 min	1514	816	254	34	4.5	1.7	1.20	1.17	1.07	0.81	
30 min	1356	639	143	15	2.9	1.4	1.19	1.13	0.91		
1 hour	1265	546	94	10	2.2	1.2	1.18	1.08	0.79		
6 hours	988	296	30	3.5	1.40	1.19	1.11	0.80			
12 hours	891	229	18	2.7	1.25	1.18	1.03	0.71			
1 day	776	158	12	2.0	1.20	1.16	0.92				
5 days	539	65	4.2	1.4	1.18	1.04					
1 week	489	52	3.7	1.3	1.18	0.99					
3 weeks	330	21	2.4	1.2	1.14	0.79					
1 month	292	17	2.1	1.2	1.12	0.74					
1 year*	81	3.8	1.2	1.1							
10 years*	16	1.7	1.2	0.9							
15 years*	13	1.6	1.2	0.8							
50 years*	5.9	1.2	1.1								

*values not validated

Values calculated using $E = 3G$ as per EN 16613 par 5.1; for exact values of the Young's modulus available actual Poisson's ratio can be used

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