

PRODUCT TECHNICAL DATA

Saflex® Structural (DG) Polyvinyl Butyral Interlayer

Saflex® Structural polyvinyl butyral (PVB) interlayers are tough, resilient films produced by Eastman Chemical Company. They are designed specifically for applications where increased interlayer rigidity and high glass adhesion are required relative to conventional laminated 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 should penetration resistance be required.

Saflex Structural 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 multi-ply glass. Storage, assembly and lamination properties similar to other Saflex® brand PVB interlayer products, along with the aforementioned properties, make Saflex Structural 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 (TS) representative.

Specific applications of Saflex Structural 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, in glass applications where creep at higher temperatures is a concern, in laminates where visual disruption from interlayer seams are unwanted, 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 can provide increased infill retention due to lower deflection as compared to a similar laminate system with conventional PVB. Saflex Structural can be layered with Vanceva Colours and Earth Tones collections of interlayers. When layering with other Saflex or Vanceva interlayers, the modulus of the interlayer should be adjusted accordingly for glass strength calculations and colour mottle should be verified through mock up panels.

Available Forms:

Saflex Structural is supplied in standard lengths and widths (up to 3.2 m). Saflex Structural is available in 0.76 mm thicknesses and is supplied on a 15.2 cm (6 in) diameter core in roll form. Saflex Structural can be supplied interleaved with polyethylene sheeting. All interleaved product is special order and subject to lead times.

Saflex® Structural (DG) interlayer	
Product Designation	DG
Thickness	0.76 mm (0.030 inch)
Color	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 should be stored inside the moisture barrier bag that the roll is shipped in. Saflex interlayers are supplied as refrigerated rolls that must be stored between 5°C and 10°C (41°F to 50°F) to prevent the material from adhering to itself (blocking). Interleaved rolls with polyethylene (additional charge and lead time applies) may be available and do not require refrigeration. Interleaving is not available for all products.

It is recommended that the interlayer be used within a two-year period from purchase to prevent the interlayer from blocking. Interleaved materials extend the “best if used by” date an additional 12 months.

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® DG Mechanical and Physical Properties

Saflex Structural is known as Saflex DG and Saflex DG XC formulation. The properties are consistent across the types except for a slight difference in the Optical properties. Saflex DG in the extra clear formulation are indicated in the below charts.

	Property	Test Method	Units	Test Conditions	Saflex® Structural
Physical	Glass Transition Temperature (T _g)	---	°C	Frequency 1 Hz Heating Rate 3° C/min	46°C±1
	Moisture	EMN	%	---	0.43% ± 0.05%
	Roll Length	EMN	m	---	Ordered Minimum
	Specific Heat	ASTM E1269	Joules/Kg -°C	41-80°C	2150
	Specific Gravity	ASTM D792	g/cm ³	25°C	1.09
	Thickness	EMN	mm	Nominal Gauge	±0.025 mm
	Width	EMN	cm		Ordered Minimum

	Property	Test Method	Units	Test Conditions	Saflex® Structural
Mechanical	Elongation at Failure	JIS K6771	%	23°C / 50% RH	190
	Tear Strength	ASTM D624	N/mm	23°C / 50% RH	106
		ASTM D1004	N.mm	23°C / 50% RH	76
	Tensile Strength	JIS K6771	Kg/cm ²	23°C / 50% RH	330
	Shear Modulus	See table below			
	Young's Modulus	See table below			

	Property	Test Method	Units	Test Conditions	Saflex® Structural
Optical	Haze	ASTM D1003	-	3 mm clear glass (laminate)	<1
	Refractive Index	ASTM D542	-	23°C	1.488
	Yellowness Index	ASTM D313	DG41	3 mm clear glass (laminate)	<1
			DG41 XC	3 mm clear glass (laminate)	<1

Thermal	Coefficient of Thermal Expansion	ASTM E831	ppm/°C	-18°C to 30°C	129
	Thermal Conductivity	ASTM D5930	W/m*K	63°C	0.196
	Emissivity	ASTM C1371		19.5°C	0.94

	Property	Test Method	Laminate Configuration	Saflex® Structural
Solar	Solar Transmittance	LBNL* WINDOW 6.3 NFRC 100	0.76 mm interlayer Clear 3 mm Glass	76%
	Solar Reflectance			8%
	Solar Absorptance			17%
	Visible Transmittance			88%
	Visible Reflectance			8%
	Solar Heat Gain Coefficient (SHGC) [g value]			0.81
	Light to Solar Gain (LSG)			1.10
	UV Screening (300 – 380 nm)			>99%

*Lawrence Berkeley National Laboratory OPTICS and WINDOW programs and data used to calculate solar values.

The shear storage modulus and calculated Young's modulus of Saflex Structural for a given load duration at temperature is provided for use in calculating structural capacity of laminated glass containing this product.

Saflex® Structural PVB interlayer - Shear Storage Modulus

Load Duration	Temp								
	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
	MPa								
1 sec	373	265	152	52	9.2	2.3	1.1	0.8	0.7
3 sec	341	237	108	27	3.7	1.3	0.8	0.7	0.6
30 sec	275	158	39	4.5	1.0	0.8	0.6	0.6	0.5
1 min	249	131	25	2.8	0.9	0.7	0.6	0.5	0.5
5 min	202	72	6.8	1.2	0.7	0.6	0.5	0.5	0.4
10 min	180	54	4.2	1.0	0.7	0.6	0.5	0.4	0.4
30 min	140	28	1.9	0.8	0.6	0.5	0.4	0.4	0.3
1 hour	107	16	1.4	0.7	0.6	0.5	0.4	0.3	0.2
6 hours	54	4.0	0.8	0.6	0.5	0.4	0.3	0.2	0.1
12 hours	37	2.5	0.8	0.6	0.5	0.3	0.3	0.2	0.1
1 day	22	1.7	0.7	0.5	0.4	0.3	0.2	0.1	0.1
5 days	6.5	0.9	0.6	0.5	0.3	0.2	0.1	0.1	--
1 week	4.8	0.9	0.6	0.5	0.3	0.2	0.1	--	--
3 weeks	2.3	0.7	0.5	0.4	0.3	0.2	0.1	--	--
1 month	1.8	0.7	0.5	0.4	0.2	0.1	0.1	--	--
1 year	0.8	0.6	0.4	0.2	0.1	--	--	--	--
10 years	0.6	0.5	0.3	0.1	--	--	--	--	--
15 years	0.6	0.4	0.2	0.1	--	--	--	--	--
50 years	0.6	0.4	0.2	--	--	--	--	--	--

NOTE: Saflex DG (0.76mm) PVB interlayer was used to develop shear modulus properties.

Saflex® Structural PVB interlayer - Young's Modulus

Load Duration	Temp								
	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
	MPa								
1 sec	1101	782	449	154	27	6.8	3.2	2.4	2.1
3 sec	1007	700	319	80	11	3.8	2.4	2.1	1.8
30 sec	812	466	115	13	3.0	2.4	1.8	1.8	1.5
1 min	735	387	74	8.3	2.7	2.1	1.8	1.5	1.5
5 min	596	213	20	3.5	2.1	1.8	1.5	1.5	1.2
10 min	531	159	12	3.0	2.1	1.8	1.5	1.2	1.2
30 min	413	83	5.6	2.4	1.8	1.5	1.2	1.2	0.9
1 hour	316	47	4.1	2.1	1.8	1.5	1.2	0.9	0.6
6 hours	159	12	2.4	1.8	1.5	1.2	0.9	0.6	0.3
12 hours	109	7.4	2.4	1.8	1.5	0.9	0.9	0.6	0.3
1 day	65	5.0	2.1	1.5	1.2	0.9	0.6	0.3	0.3
5 days	19	2.7	1.8	1.5	0.9	0.6	0.3	0.3	--
1 week	14	2.7	1.8	1.5	0.9	0.6	0.3	--	--
3 weeks	6.8	2.1	1.5	1.2	0.9	0.6	0.3	--	--
1 month	5.3	2.1	1.5	1.2	0.6	0.3	0.3	--	--
1 year	2.4	1.8	1.2	0.6	0.3	--	--	--	--
10 years	1.8	1.5	0.9	0.3	--	--	--	--	--
15 years	1.8	1.2	0.6	0.3	--	--	--	--	--
50 years	1.8	1.2	0.6	--	--	--	--	--	--

Young's modulus E' is calculated using formula $E' = 2G' (1+\nu)$ where ν = Poisson's ratio of approximately 0.476 for isotropic polymeric material as measured in accordance with ASTM D638.

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