

PRODUCT TECHNICAL DATA

Saflex® Acoustic (Q series) PVB Interlayer

Saflex® interlayers are plasticized polyvinyl butyral (PVB) sheeting produced by Eastman Chemical Company. These interlayers are permanently bonded through a heat and pressure process to two or more pieces of glazing to produce laminates with impact and glass containment properties. Laminated glass with Saflex interlayers can be classified as safety glazing in accordance with, but not limited to, various regulations such as ANSI Z26.1, ANSI Z97.1, AS/NZS 2208; CNS 1183, CPSC 16 CFR 1201, EN 12600 and ISO 29584.

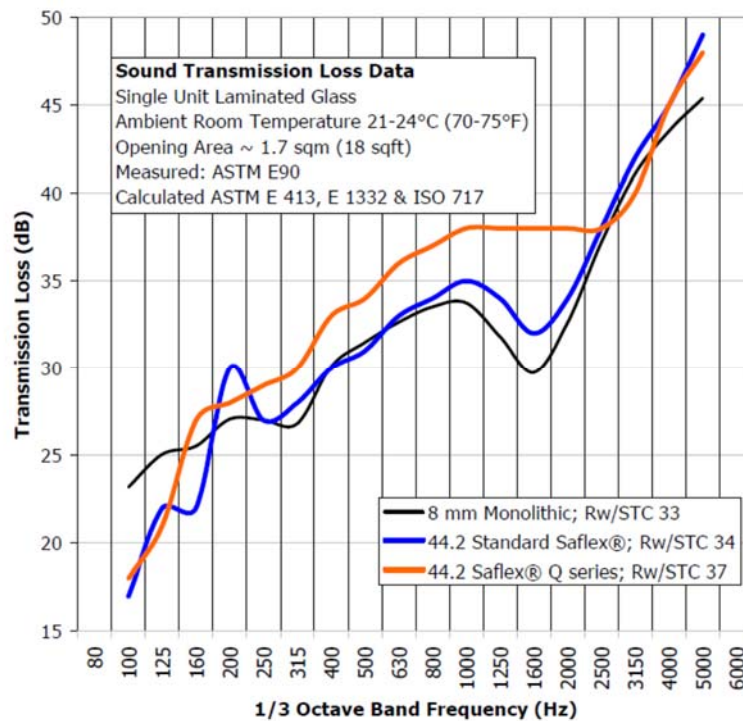
Product Overview:

Saflex Acoustic, Q series interlayer, is a multi-layer product designed to produce glass laminates with enhanced acoustical properties compared to monolithic glass and laminates made with standard polyvinyl butyral (PVB) interlayer. Saflex Acoustic has demonstrably met or exceeded many regulations for laminated safety glazing (including those listed above) when properly selected, laminated, and installed. Saflex Acoustic was specifically formulated to provide exceptional durability when exposed to natural weathering.

Saflex Acoustic suppresses the coincident effect of glass and is ideal for use in exterior laminated glazing to reduce rail, traffic, speech and other airborne noise, and to improve building sound comfort. It's also ideal for interior applications requiring sound reduction such as cubical dividers, office partitions and enclosed mall storefronts. Other Saflex Acoustic benefits:

- Delivers up to 10dB noise reduction (transmission loss) in the critical frequency range, compared to laminated glass made with conventional PVB interlayer.
- Designed to achieve noise reduction in the building using the same traditional overall glass thicknesses and may be able to achieve desired acoustical performance with thinner configurations allowing for more flexibility in the air space for increased energy conservation.
- Provides laminators with superior handling and processing as compared to monolithic acoustic interlayers.
- Meets most safety glazing impacts requirements globally and can therefore be used in areas deemed as hazardous locations by the building code such as doors, skylights and overhead glazing. Extensive application testing has been conducted, including vibration damping measurements and sound transmission loss measurements.

For more information on Saflex Acoustic, please contact your Eastman representative. The ability to reduce noise as perceived by the human ear can be measured. This measurement involves sending specific frequencies of sound through a material, in this case, laminated glass with Saflex Acoustic, and re-measuring what comes "through" the glass to determine what gets "filtered" out. The transmission loss is recorded and can be illustrated in graphical form as indicated in the chart below:



Available Forms:

All Saflex Acoustic is supplied in roll form on 15.2 cm (6 inch) diameter cores.

Saflex Acoustic is supplied in thicknesses; 0.64 mm (0.025 inch), 0.76 mm (0.030 inch) and 1.52 mm (0.060 inch), and a variety of roll lengths and widths. Most common standard roll length is 250 meters (820 feet) in thicknesses of 0.76mm (0.030 inch). Saflex Acoustic 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.

Saflex Acoustic is produced in clear form only; however, they can be layered with Saflex and/or Vanceva® colors to achieve almost any desired color with enhanced acoustical damping.

Please contact your Saflex Sales Manager, Customer Service Representative or visit www.saflex.com for further information.

Storage Conditions:

Saflex Acoustic 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 this blocking tendency.

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® Acoustic - Select Properties

Test	Property	Test Method	Units	Conditions	Saflex® Acoustic 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	ASTM D1929	°C	-	360
	Smoke Density ¹	ASTM D2843	%	-	5
Mechanical	Elongation at Failure	ISO 527-3	%	50 mm/min 23°C 50% RH	269
		JIS K6771	%	20 mm/min 23°C 50% RH	250
	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	36
		ASTM D1004	N/cm	23°C 50% RH	-
	Tensile strength	ISO 527-3	MPa	50 mm/min 23°C 50% RH	22
		JIS K6771	MPa	20 mm/min 23°C 50% RH	21
	Young's Modulus; E(t)	EN 16613	MPa	Relaxation	n/a

Test	Property	Test Method	Units	Conditions	Saflex® Acoustic interlayer
Optical	Haze	ASTM D1003	%	0.76 mm Clear 3 mm Glass	<1
	Refractive Index	ASTM D542	-	23°C	1.476
	Yellowness Index	ASTM E313	YI	0.76 mm Clear 3 mm Glass	<1
Physical	Hardness	ASTM D2240	Shore A	cut/stacked to 12.5 mm	63
	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	1.06
	Specific Heat	ASTM E1269	J/Kg -°K	50°C	2050
	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)	0.64 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® Acoustic interlayer	
Solar ³	Solar Transmittance	LBNL WINDOW 7.0 NFRC 100	%	75	
	Solar Reflectance		%	8	
	Solar Absorptance		%	17	
	Visible Transmittance		%	89	
	Visible Reflectance		%	8	
	Solar Heat Gain Coefficient	NFRC 300	SHGC g value	0.81	
	Sun Protection Factor	Calculated	SPF ⁴	50+	
	Light to Solar Gain	Calculated	LSG	1.10	
	U Factor	NFRC 100	W/m ² -K	5.68	
	UV Factors	Damage Weighted (Tdw-K)	300 - 500 nm	0.30	
		Damage Weighted (Tdw-ISO)	300 - 600 nm	0.62	
		Transmitted UV	300 - 380 nm	<1%	
Test	Property	Test Method	Units	Conditions	Saflex® Acoustic interlayer
Thermal	Coefficient of Thermal Expansion	ASTM E831	ppm/°C	-20°C to 20°C	171
	Thermal Conductivity	ASTM D5930	W/m*K	65°C	0.21
	Emissivity	ASTM C1371	-	19.5°C	0.94
1 - Data based on NOA for Saflex formulation					
2 – Safety Glazing impact – 0.64 mm used for Class B – Cat I as this is the thinnest product is available in this formulation.					
3 - Solar, Thermal, Optical and Color data based on 0.76 mm clear Saflex Acoustic 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® Acoustic (Q series PVB interlayer) for a given load duration at temperature is provided for use in calculating structural capacity of laminated glass containing this product. Due to the multi-layer characteristic of this product, it is not feasible to report Young's Modulus values that are relevant for glass design.

	Saflex® Acoustic shear relaxation modulus G(t) (MPa)										
Load Duration	Temperature (°C)										
	10	15	20	25	30	35	40	45*	50*	55*	60*
3 sec	3.5	2.9	1.9	1.1	0.61	0.35	0.29	0.26	0.19	0.15	0.13
10 sec	3.1	2.1	1.3	0.67	0.38	0.29	0.26	0.20	0.15	0.13	0.09
30 sec	2.5	1.5	0.78	0.44	0.30	0.27	0.21	0.15	0.13	0.10	0.04
1 min	2.0	1.2	0.61	0.34	0.29	0.24	0.17	0.14	0.12	0.06	0.01
5 min	1.2	0.61	0.33	0.28	0.23	0.16	0.14	0.11	0.04		
10 min	0.86	0.47	0.30	0.27	0.20	0.15	0.13	0.07	0.01		
30 min	0.58	0.31	0.28	0.22	0.15	0.13	0.08	0.02			
1 hour	0.44	0.29	0.26	0.18	0.14	0.11	0.05				
6 hours	0.29	0.25	0.17	0.14	0.10	0.03					
12 hours	0.28	0.21	0.15	0.12	0.06						
1 day	0.26	0.17	0.14	0.10	0.03						
5 days	0.18	0.14	0.10	0.02							
1 week	0.16	0.13	0.08	0.01							
3 weeks	0.14	0.10	0.02								
1 month	0.14	0.09	0.01								
1 year	0.04										
10 years											
15 years											
50 years											
* values not validated											
Applicable to Saflex Acoustic QS31 and QS41 formulations.											
Note: If FEM modelling software requires the input of both E and the Poisson's ratio, the formula $E = 3G$ will yield the calculated values which can be used for modelling. These are the closest approximations currently available.											

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