

PRODUCT TECHNICAL DATA

Vanceva® - Colored Polyvinyl Butyral Interlayer

Vanceva® interlayers are premium colored plasticized polyvinyl butyral (PVB) sheets produced by Eastman Chemical Company and its affiliates. 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 the properly selected type of Saflex interlayer are capable of being classified as safety glass 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:

Vanceva interlayers, including Vanceva Colors, Vanceva Earth Tones and Vanceva Illusion White, are Saflex R formulation products. Vanceva Colors and Vanceva Earth Tones have premium colorants uniformly distributed throughout the sheeting. Vanceva Illusion White has a white gradient band of 30 cm with a gentle fade to clear in the width of a single roll. All Vanceva products have demonstrably met or exceeded many regulations for laminated safety glazing (including those listed above) when properly selected, laminated, and installed. Vanceva interlayers are specifically formulated to provide exceptional durability when exposed to natural weathering, especially when laminate edges are left unprotected from the elements. Vanceva interlayers have been shown to be compatible and durable when laminated in intimate contact with most infrared reflective, metal coated glasses.

Color Designations:

Vanceva Colors are typically an assembly of interlayer layers, up to 4 layers, between two pieces of glass and are designated by the abbreviation "VCV" followed by a four-digit color code (e.g. #0234) so the designation for the above example would be VCV #0234. Vanceva Illusion White is designated in the Vanceva Colors system as layer code "J".

Vanceva Earth Tones are designed to match traditional colored float glass. They are typically a single layer of colored interlayer and are designated with the abbreviation "VCV" followed by a five-digit code that always starts with an "S" to indicate the subsequent color code (e.g.: #3773) is a single layer of interlayer. The typical designation for the above examples of a Vanceva Earth Tone laminate is VCV #S3773.

A more detailed listing of Vanceva Colors and other formulations can be found at www.vanceva.com or by contacting your local Eastman representatives.

Available Forms:

All Vanceva interlayers are supplied in roll form on 15.2 cm (6 inch) diameter cores.

Vanceva interlayers are supplied in a variety of roll lengths and widths. Most common standard roll length is 100 meters (328 feet). The most common thickness is 0.38 mm (0.015 inch).

Vanceva interlayers are produced in one adhesion level. Please contact your Saflex Sales Manager, Technical Service Representative, Customer Service Representative or visit www.saflex.com for further information.

Storage Conditions:

Vanceva interlayers 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:

Eastman makes available to our fabricating customers a Saflex® Laminating Guide which details nominal

methods for storage, handling, and lamination of both Saflex and Vanceva PVB interlayer products. This technical guide is available only from a Saflex Technical Service (TS) Representative or Saflex Sales Manager. To find the name of the Saflex representative for your organization, call 1-800-636-8670.

Select Vanceva® Properties¹:

Test	Technical Data Property	Test Method	Units	Conditions	Vanceva® interlayer
Flammability	Extent of Burning	ASTM D635	mm	-	7.9
	Flame Spread Index	ASTM E84	-	-	10
	Heat of Combustion	ASTM E1354	Joules/Kg	-	37
	Rate of Burning	ASTM D 635	mm/min °C	-	<25
	Self-Ignition	ASTM D1929	°C	-	760
	Smoke Density	ASTM D2843	%	-	5
Mechanical	Coefficient of Thermal Expansion	ASTM E831	10-6/°C	30-100°C	155
	Conductivity, Thermal, K	ASTM F433	W/m-°K	65°C	0.20
	Elongation at Failure	JIS K6771	%	23°C/50% RH	205
	Emissivity	ASTM C1371		19.5°C	0.94
	Modulus of Elasticity (E)	Calculated	MPa	60°C/1 Hz	1.56
	Poisson's Ratio	ASTM D638		23°C/50% RH	0.5
	Shear Modulus (G) ²	See Table Below			
	Tear Resistance	ASTM D1004	N/cm	-	112
	Tensile strength	JIS K6771	MPa	23°C/50% RH	27
	Young's Modulus (E) ²	See Table Below			

1 - Data supplied on Saflex RB (0.76 mm) formulation in 3 mm clear glass unless otherwise specified.

2 - Shear modulus (G) and Young's modulus data for other temperatures and durations are provided in a separate table at the end of this document.

Technical Data	Property	Test Method	Units	Test Conditions	Vanceva® interlayers
Optical	Haze	ASTM D1003	-	Clear 3 mm Glass	<1
	Refractive Index	ASTM D542		23°C	1.478
	Visible Transmittance	NFRC 300	D65	Clear 3 mm Glass	89%
	Yellowness Index	ASTM E313	-	Clear 3 mm Glass	<1
Physical	Glass Transition Temperature	---	°C	Frequency 1 Hz Heating Rate 3° C/min	30°C±1
	Hardness	ASTM2240	Shore D	cut/stacked to 12.5 mm	52
	Moisture	EMN	%	-	Target ± 0.05
	Plasticizer	EMN	PHR	-	Target ± 2
	Roll Length	EMN	m	-	ordered minimum
	Specific Gravity/Density	ASTM D792	g/cm ³	23°C	1.07
	Specific Heat	ASTM E1269	Joules/Kg -°K	50°C	1980
	Thickness	EMN	mm	0.38, 0.76	±0.025 mm
Width	EMN	cm	-	Ordered minimum	

Impact Data³

Test	Test Method	Conditions	Vanceva® interlayers
5-lb (2,227g) Ball Impact	ANSI Z26.1; ASTM F3006; ECE R43	ANSI Z26.1; ASTM F3006; ECE R43	Comply
Twin Tyre	ISO 29584; EN12600	1B1	Comply
100 lb (45,359g) Shot Bag Impact	ANSI Z97.1; CPSC 16 CFR 1201	Class B; Cat I 667 N (150 ftlb)	Comply
100 lb (45,359g) Shot Bag Impact	ANSI Z97.1; CPSC 16 CFR 1201	Class A; Cat II 1779 N (400 ftlb)	Comply

3 - Impact data tested on nominal 0.76 mm Saflex R series interlayer.

Solar Data⁴ – Due to the colorants in Vanceva products, the solar, thermal, optical and color data will vary. Visit www.vanceva.com for this data in thousands of combinations in 3 mm clear glass. Eastman also supplies calculated data upon request for most transparent configurations.

4 - Solar, Thermal, Optical and Color calculations are done using OPTIC and WINDOW by Lawrence Berkeley National Laboratory.

Vanceva® - PVB interlayer Shear Storage Modulus

Load Duration	Temperature								
	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
	MPa								
1 sec	26	6.9	2.1	1	0.7	0.6	0.5	0.5	0.4
3 sec	14	3.4	1.2	0.8	0.6	0.5	0.5	0.4	0.4
30 sec	3.5	1.1	0.7	0.5	0.5	0.4	0.4	0.3	0.3
1 min	2.4	1	0.6	0.5	0.5	0.4	0.4	0.3	0.3
5 min	1.1	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2
10 min	0.9	0.6	0.5	0.4	0.4	0.3	0.2	0.2	0.2
30 min	0.7	0.5	0.4	0.4	0.3	0.2	0.2	0.2	0.1
1 hour	0.6	0.5	0.4	0.4	0.3	0.2	0.2	0.1	0.1
6 hours	0.5	0.4	0.4	0.3	0.2	0.1	0.1	0.1	0.1
12 hours	0.5	0.4	0.3	0.2	0.2	0.1	0.1	0.1	--
1 day	0.5	0.4	0.3	0.2	0.1	0.1	0.1	--	--
5 days	0.4	0.3	0.2	0.1	0.1	--	--	--	--
1 week	0.4	0.3	0.2	0.1	0.1	--	--	--	--
3 weeks	0.3	0.2	0.1	0.1	0.1	--	--	--	--
1 month	0.3	0.2	0.1	0.1	--	--	--	--	--
1 year	0.2	0.1	0.1	--	--	--	--	--	--
10 years	0.1	0.1	--	--	--	--	--	--	--
15 years	0.1	0.1	--	--	--	--	--	--	--
50 years	0.1	--	--	--	--	--	--	--	--

Vanceva® - PVB interlayer Young's Modulus⁵

Load Duration	Temperature								
	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
	MPa								
1 sec	78	21	6.3	3.0	2.1	1.8	1.5	1.5	1.2
3 sec	42	10	3.6	2.4	1.8	1.5	1.5	1.2	1.2
30 sec	11	3.3	2.1	1.5	1.5	1.2	1.2	0.9	0.9
1 min	7.2	3.0	1.8	1.5	1.5	1.2	1.2	0.9	0.9
5 min	3.3	1.8	1.5	1.2	1.2	0.9	0.9	0.6	0.6
10 min	2.7	1.8	1.5	1.2	1.2	0.9	0.6	0.6	0.6
30 min	2.1	1.5	1.2	1.2	0.9	0.6	0.6	0.6	0.3
1 hour	1.8	1.5	1.2	1.2	0.9	0.6	0.6	0.3	0.3
6 hours	1.5	1.2	1.2	0.9	0.6	0.3	0.3	0.3	0.3
12 hours	1.5	1.2	0.9	0.6	0.6	0.3	0.3	0.3	--
1 day	1.5	1.2	0.9	0.6	0.3	0.3	0.3	--	--
5 days	1.2	0.9	0.6	0.3	0.3	--	--	--	--
1 week	1.2	0.9	0.6	0.3	0.3	--	--	--	--
3 weeks	0.9	0.6	0.3	0.3	0.3	--	--	--	--
1 month	0.9	0.6	0.3	0.3	--	--	--	--	--
1 year	0.6	0.3	0.3	--	--	--	--	--	--
10 years	0.3	0.3	--	--	--	--	--	--	--
15 years	0.3	0.3	--	--	--	--	--	--	--
50 years	0.3	--	--	--	--	--	--	--	--

5 - Young's modulus E' is calculated using formula $E' = 2G/(1+\nu)$ where ν = Poisson's ratio of approximately 0.50 for isotropic polymeric material.

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