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, ceramic frit, and printed glasses. Compatibility should always be verified through the coating, frit or ink manufacturer.

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 which always starts with an “S” (indicating a single layer). The “S” is followed by the color code (e.g.: #2165). This example would be specified as VCV #S-2165. The use of the “S” is critically important when specifying by the color code. Figure 1 shows the dramatic difference between products with the same numeric code with and without the “S” present.

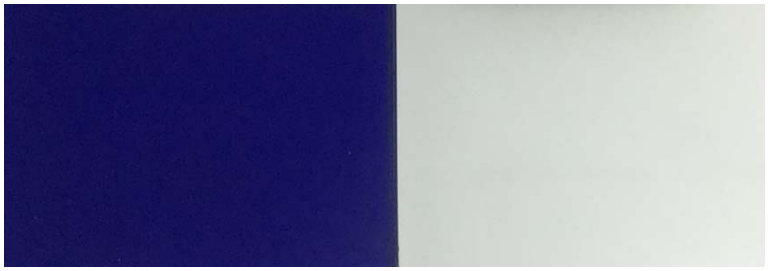

Figure 1: Vanceva Color (left) versus Vanceva Earth Tone (Right, requires “S”) nomenclature for code 2165.

Vanceva Colors and Vanceva Earth Tones, when used as a single layer are also given a descriptive name as outlined in the table below. The table shows only the product nomenclature. A more detailed listing of Vanceva Colors and other formulations as well as solar and optical properties for most transparent layered combinations can be found at www.vanceva.com or by contacting your local Eastman representatives.

Table 1: Vanceva Color and Vanceva Earth Tones – Codes and Descriptive Names

Vanceva Code	Formulation Code	Product Code	Vanceva Name	Color
Vanceva Colors				
1	RB17	807800	Coral Rose	Red
2	RB17	827800	Aquamarine	Blue
3	RB17	837800	Smoke Grey	Black
4	RB17	817800	Sahara Sun	Yellow
5	RB17	805000	Ruby Red	Red
6	RB17	825000	Sapphire	Blue
7	RB17	835000	Evening Shadow	Black
8	RB17	818600	Golden Light	Yellow
9	RB17	216500	Arctic Snow	White
A	RB17	218000	Cool White	White
C	RB17	851500	Deep Red	Red
D	RB17	841400	True Blue	Blue
E	RB17	864100	Tangerine	Orange
F	RB17	220700	Polar White	White
G	RB17	830000	Absolute Black	Black
H	RB17	876100	Ocean Grey	Grey
J	RB45	216500	Illusion White	Gradient White
Vanceva Earth Tones				
S-0828	RB17	082800	Graphite	Grey
S-3609	RB17	360900	Truffle	Brown
S-3628	RB17	362800	Mocha	Brown
S-3655	RB17	365500	Dusk	Brown
S-3773	RB17	377300	Marine	Blue-Green
S-3773	RB47	377300	Marine	Blue-Green
S-5538	RB47	553800	Limestone 38	Bronze (0.76 mm only)
S-5558	RB17	555800	Limestone	Bronze
S-6376	RB17	637600	Glacier	Blue
S-6428	RB17	642800	Gobi	Bronze
S-6452	RB17	645200	Dolomite	Bronze
S-6452	**RB47**	645200	Dolomite	Bronze
S-6544	RB17	654400	Shale	Grey
S-6544	RB47	654400	Shale	Grey
S-7558	RB17	755800	Sky	Blue

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), although some colors are available in 0.76 mm (0.030 inch) thickness.
Vanceva interlayers are produced in one adhesion level. Vanceva colored PVB interlayer 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.

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 roll blocking.

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.

Vanceva® colored PVB interlayer - Select properties[1]:

Test	Property	Test Method	Units	Conditions	Vanceva® interlayer
Flammability[1]	Extent of Burning	ASTM D635	mm	-	7.9
	Heat of Combustion	ASTM E1354 ISO 1716	MJ/kg	-	31
	Rate of Burning	ASTM D 635	mm/min ºC	-	<25
	Self-Ignition	ASTM D1929	ºC	-	404
	Smoke Density	ASTM D2843	%	-	5
Mechanical	Elongation at Failure	ISO 527-3	%	50 mm/min 23ºC|50% RH	270
		JIS K6771	%	20 mm/min 23ºC|50% RH	265
	Poisson's Ratio	ASTM D638	-	23ºC|50% RH	0.5
	Shear Modulus; G(t)	EN 16613	MPa	Relaxation	See Table Below
	Tear Resistance	ASTM D624	N/mm	23ºC|50% RH	-
		ASTM D1004	N/cm	23ºC|50% RH	112
	Tensile strength	ISO 527-3	MPa	50 mm/min 23ºC|50% RH	23
		JIS K6771	MPa	20 mm/min 23ºC|50% RH	20
	Young's Modulus; E(t)	EN 16613	MPa	Relaxation	See Table Below
Optical	Haze	ASTM D1003	%	Clear 3 mm Glass	n/a
	Refractive Index	ASTM D542	-	23ºC	1.479
	Yellowness Index	ASTM E313	YI	Clear 3 mm Glass	n/a

Test	Property	Test Method	Units	Conditions	Vanceva® interlayer
Physical	Glass Transition Temperature	-	ºC	Frequency 1 Hz Heating Rate 3º C/min	25ºC±1
	Hardness	ASTM D2240	Shore A	cut/stacked to 12.5 mm	77
	Moisture	EMN	%	-	Target ± 0.05
	Plasticizer	EMN	PHR	-	Target ± 2
	Roll Length	EMN	m	-	ordered minimum
	Specific Gravity/Density	ASTM D792	g/cm3	23ºC	1.07
	Specific Heat	ASTM E1269	J/Kg -ºK	50ºC	1980
	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)	0.38 mm	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	Vanceva® interlayer
Solar[2]	Solar Transmittance	LBNL WINDOW 7.0 NFRC 100	%	varies
	Solar Reflectance		%	varies
	Solar Absorptance		%	varies
	Visible Transmittance		%	varies
	Visible Reflectance		%	varies
	Solar Heat Gain Coefficient	NFRC 300	SHGC | g value	varies
	Sun Protection Factor	Calculated	SPF[3]	50+
	Light to Solar Gain	Calculated	LSG	varies
	U Factor	NFRC 100	W/m2-K	varies
	UV Factors (maximum)	Damage Weighted (Tdw-K)	300 - 500 nm	0.33
		Damage Weighted (Tdw-ISO)	300 - 600 nm	0.65
		Transmitted UV	300 - 380 nm	<1%

Test	**Property**	**Test Method**	**Units**	**Conditions**	**Vanceva® interlayer**
Thermal	Coefficient of Thermal Expansion	ASTM E831	ppm/°C	30ºC to 100ºC	155
	Thermal Conductivity	ASTM D5930	W/m*K	65ºC	0.2
	Emissivity	ASTM C1371	-	19.5ºC	0.94

1 - Data based on NOA for Saflex formulation

2 - **Solar Data –** 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. Calculations are performed using OPTIC and WINDOW 7.0 by Lawrence Berkeley National Laboratory.

3 - SPF is a calculated value based on the spectral data from a clear laminate and not a result of direct testing.

The relaxation modulus and calculated Young's modulus for Vanceva (colored PVB interlayer) based on relaxation modulus values for a given duration at temperature is provided for use in calculating structural capacity of laminated glass containing this product.

Load duration	Vanceva® shear relaxation modulus G(t) (MPa)										
	Temperature (°C)										
	10	15	20	25	30	35	40	45	50	55	60
3 sec	52	29	11	4.2	1.7	0.82	0.56	0.46	0.40	0.36	0.31
10 sec	36	16	6.1	2.1	0.94	0.61	0.47	0.40	0.36	0.31	0.25
30 sec	25	8.6	2.9	1.2	0.69	0.49	0.42	0.37	0.32	0.26	0.16
1 min	18	6.2	2.1	0.90	0.58	0.46	0.39	0.35	0.29	0.21	0.10
5 min	7.3	2.3	1.0	0.59	0.46	0.39	0.34	0.28	0.19	0.07	
10 min	5.0	1.7	0.77	0.51	0.42	0.37	0.32	0.24	0.13	0.02	
30 min	2.4	1.0	0.59	0.45	0.39	0.33	0.27	0.16	0.03		
1 hour	1.8	0.78	0.51	0.42	0.37	0.31	0.22	0.10			
6 hours	0.81	0.51	0.42	0.36	0.30	0.20	0.06				
12 hours	0.68	0.47	0.39	0.34	0.26	0.15	0.02				
1 day	0.57	0.44	0.37	0.31	0.22	0.08					
5 days	0.46	0.38	0.32	0.22	0.08						
1 week	0.44	0.37	0.31	0.20	0.05						
3 weeks	0.39	0.33	0.25	0.10							
1 month	0.38	0.32	0.22	0.07							
1 year*	0.30	0.17	0.02								
10 years*	0.14										
15 years*	0.10										
50 years*	0.02										
*values not validated											

Load duration	Vanceva® Young's relaxation modulus E(t) (MPa)										
	Temperature (°C)										
	10	15	20	25	30	35	40	45	50	55	60
3 sec	156	86	33	13	5.2	2.5	1.7	1.37	1.19	1.07	0.93
10 sec	109	48	18	6.3	2.8	1.8	1.4	1.21	1.08	0.94	0.74
30 sec	75	26	8.7	3.7	2.1	1.5	1.3	1.11	0.97	0.77	0.49
1 min	53	19	6.2	2.7	1.7	1.4	1.2	1.04	0.88	0.64	0.29
5 min	22	6.8	2.9	1.8	1.4	1.2	1.0	0.85	0.58	0.21	
10 min	15	5.1	2.3	1.5	1.3	1.1	1.0	0.73	0.40	0.06	
30 min	7.3	2.9	1.8	1.4	1.2	1.0	0.80	0.48	0.10		
1 hour	5.4	2.3	1.5	1.3	1.1	0.93	0.67	0.29			
6 hours	2.4	1.5	1.3	1.1	0.90	0.61	0.19				
12 hours	2.1	1.4	1.2	1.0	0.79	0.44	0.06				
1 day	1.7	1.3	1.1	0.94	0.66	0.24					
5 days	1.4	1.1	1.0	0.67	0.23						
1 week	1.3	1.1	0.92	0.60	0.15						
3 weeks	1.2	1.00	0.74	0.31							
1 month	1.2	0.96	0.67	0.20							
1 year*	0.89	0.52	0.06								
10 years*	0.42										
15 years*	0.30										
50 years*	0.05										

*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