

## PRODUCT TECHNICAL DATA

### Saflex® High Performance (DM) Polyvinyl Butyral Interlayer

Saflex® DM is a tough, resilient film produced from plasticized polyvinyl butyral (PVB). It is designed specifically as an interlayer for applications where increased interlayer rigidity, high glass adhesion, impact performance capability (timber impact), excellent edge stability and improved sealant compatibility are required relative to conventional polyvinyl butyral interlayers. Saflex DM is a semi-rigid interlayer which allows for energy dissipation during impact (by objects or air-blast). The elasticity of the interlayer during impact often makes it an excellent choice when significant load transfer to the framing system is undesirable.

Saflex DM is manufactured to meet the high-performance glazing requirements for architectural applications and was originally designed for the hurricane and tropical storm market. This product combines the advanced performance features described above with sound attenuation, UV screening, low haze and ease of fabrication. Information regarding the safe handling and storage of Saflex DM can be found in the Safety Data Sheet that is available from the Saflex Sales organization or at [www.saflex.com](http://www.saflex.com). When two layers of Saflex DM are layered between two pieces of glass for hurricane impact resistance, the product is known in the industry as “Saflex High Performance (HP)”.

#### Product Overview:

Saflex DM has been specifically formulated and developed to meet the exacting requirements for glass to glass laminates for architectural glazing. This product has demonstrated that when properly laminated and installed at the recommended thickness of 2.54mm (0.100”) it will meet most hurricane applications including large missile applications.

Saflex DM can also be utilized for small missile protection with no size limitations or special glazing techniques required. Dade County, Florida has granted Saflex HP a Component Notice of Acceptance (NOA) under its product approval protocols. Eastman provides this number for the authorized use of qualified laminators and their window manufacturing customers.

Saflex DM can be used with heat-treated and most coated glasses, has excellent edge stability and sealant compatibility and can be used for external laminates with exposed edges.

#### Available Forms:

Saflex DM interlayer is supplied in standard lengths (up to 3.2 m) and widths. Saflex DM interlayer is available in 1.27 mm thicknesses and is supplied on a 15.2 cm (6 in) diameter core in roll form.

Saflex® DM PVB interlayer	
Product Designation	DMJ1
Thickness	1.27 mm (0.050 inch)
Color	Clear

Please contact your Saflex® Sales Manager, Customer Service Representative or visit [www.saflex.com](http://www.saflex.com) for further information.

#### Storage Conditions:

Saflex DM interlayer 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 sticking to itself (blocking) or as rolls interleaved with polyethylene (additional charge applies) that 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 minimize the interlayer adhering to itself (blocking).

**Laminating Conditions:**

A Laminating Guide which details recommended practices for storage, handling, and lamination of Saflex PVB interlayer products 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® DM Select Properties<sup>1</sup>**

	Property	Test Method	Units	Test Conditions	Saflex® DM
<b>Physical</b>	Glass Transition Temperature (Tg)	---	°C	Frequency 1 Hz Heating Rate 3° C/min	37°C±1
	Plasticizer		PHR		30 ± 2
	Roll Length		meter		Ordered Minimum
	Specific Heat	ASTM E 1269	Joules/Kg -°C	50°C	2190
	Specific Gravity		g/cm <sup>3</sup>		1.07
	Thickness	Micrometer	mm	Nominal Gauge	+0.05 mm (0.002 inch) - .025 mm (0.001 inch)
	Width		cm		Ordered Minimum

	Property	Test Method	Units	Test Conditions	Saflex® DM
<b>Mechanical</b>	Elongation at Failure	JIS K6771	%	23°C / 50% RH	190
	Tensile Strength	JIS K6771	Kg/cm <sup>2</sup>	23°C / 50% RH	240
	Shear Modulus	See table below			
	Young's Modulus	See table below			

<sup>1</sup> Saflex® DM properties have been tested with 1.27 mm (0.050 inch) thickness and 3 mm glass unless specifically noted.

	Property	Test Method	Units	Test Conditions	Saflex® DM
<b>Optical</b>	Haze	ASTM D1003	-	3 mm clear glass (laminated)	0.70
	Refractive Index	ASTM D542	-	23°C	1.488
	Yellowness Index	ASTM D313	-	3 mm clear glass (laminated)	0.78

<b>Thermal</b>	Coefficient of Thermal Expansion	Thermal Mechanic	ppm/°C	30 °C 100 °C	2.0
	Thermal Conductivity, K	ASTM D5930	W/m / (m <sup>2</sup> °K)	65 °C	0.2
	Emissivity	ASTM C1371		19.5 °C	0.94

<b>Solar</b>	Solar Transmittance	D65	Clear 3 mm Glass	78%
	Solar Reflectance	D65	Clear 3 mm Glass	9%
	Solar Absorptance	D65	Clear 3 mm Glass	13%
	Visible Transmittance	D65	Clear 3 mm Glass	90%
	Visible Reflectance	D65	Clear 3 mm Glass	9%
	Visible Absorptance	D65	Clear 3 mm Glass	1%
	UV Screening	280 – 380 nm	Clear 3 mm Glass	>99%

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

### Saflex® DM 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	132	50	13	3.0	1.2	0.8	0.7	0.6	0.6
3 sec	101	28	5.7	1.6	0.9	0.7	0.6	0.6	0.5
30 sec	43	6.8	1.5	0.8	0.6	0.6	0.5	0.5	0.4
1 min	30	4.1	1.1	0.7	0.6	0.5	0.5	0.4	0.4
5 min	11	1.7	0.8	0.6	0.5	0.5	0.4	0.3	0.2
10 min	7.5	1.3	0.8	0.6	0.5	0.4	0.4	0.3	0.2
30 min	3.4	0.9	0.6	0.5	0.4	0.4	0.3	0.2	0.2
1 hour	2.3	0.8	0.6	0.5	0.4	0.3	0.2	0.2	0.1
6 hours	1.1	0.6	0.5	0.4	0.3	0.2	0.1	0.1	0.1
12 hours	0.9	0.6	0.5	0.4	0.3	0.2	0.1	0.1	0.1
1 day	0.8	0.6	0.4	0.3	0.2	0.1	0.1	0.1	--
5 days	0.6	0.5	0.4	0.2	0.1	0.1	0.1	--	--
1 week	0.6	0.5	0.3	0.2	0.1	0.1	0.1	--	--
3 weeks	0.5	0.4	0.2	0.1	0.1	0.1	--	--	--
1 month	0.5	0.4	0.2	0.1	0.1	--	--	--	--
1 year	0.4	0.2	0.1	0.1	--	--	--	--	--
10 years	0.3	0.1	0.1	--	--	--	--	--	--
15 years	0.3	0.1	0.1	--	--	--	--	--	--
50 years	0.2	0.1	--	--	--	--	--	--	--

### Saflex® DM Young's 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	396	150	39	9.0	3.6	2.4	2.1	1.8	1.8
3 sec	303	84	17	4.8	2.7	2.1	1.8	1.8	1.5
30 sec	129	20	4.5	2.4	1.8	1.8	1.5	1.5	1.2
1 min	90	12	3.3	2.1	1.8	1.5	1.5	1.2	1.2
5 min	33	5.1	2.4	1.8	1.5	1.5	1.2	0.9	0.6
10 min	23	3.9	2.4	1.8	1.5	1.2	1.2	0.9	0.6
30 min	10	2.7	1.8	1.5	1.2	1.2	0.9	0.6	0.6
1 hour	6.9	2.4	1.8	1.5	1.2	0.9	0.6	0.6	0.3
6 hours	3.3	1.8	1.5	1.2	0.9	0.6	0.3	0.3	0.3
12 hours	2.7	1.8	1.5	1.2	0.9	0.6	0.3	0.3	0.3
1 day	2.4	1.8	1.2	0.9	0.6	0.3	0.3	0.3	--
5 days	1.8	1.5	1.2	0.6	0.3	0.3	0.3	--	--
1 week	1.8	1.5	0.9	0.6	0.3	0.3	0.3	--	--
3 weeks	1.5	1.2	0.6	0.3	0.3	0.3	--	--	--
1 month	1.5	1.2	0.6	0.3	0.3	--	--	--	--
1 year	1.2	0.6	0.3	0.3	--	--	--	--	--
10 years	0.9	0.3	0.3	--	--	--	--	--	--
15 years	0.9	0.3	0.3	--	--	--	--	--	--
50 years	0.6	0.3	--	--	--	--	--	--	--

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

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