



# Automotive Structural Adhesive Films

## SAF6045

Data Sheet

August 2002

**General Description** 3M™ Automotive Structural Adhesive Film SAF6045 is a modified epoxy film adhesive for structural bonding of metals. Examples of applications include door hinge washers, reinforcement plates and bracket attachments requiring load-carrying capability. Its low degree of initial tack (in the non-cured state) makes it ideal for repositioning into a final location.

Product Features	Performance Advantages	Customer Benefits
Epoxy Chemistry	High bond strength (in shear and peel) with cohesive failure mode  E-coat compatible  Environmental durability (to heat, humidity, salt water, solvents)	Robust, structural bonding performance   Dependable performance under extreme operating conditions
Low Tack (non-cured)	Can be repositioned  Ease of handling	Accurate and easy placement
Thermoset Cure	Cures to structural strength	Assist in load carrying applications
98+% Solids	Reduced emissions/vapor/odor	Low regulatory concerns

### Typical Physical Properties (non-cured adhesive)

Nominal thickness (mm)	0.3
Color	Green
Form	Roll or diecut
% Solids	98+%

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## Handling/Process Properties

### SAF 6045

Shelf Life	72°F (23°C)	Minimum 3 months (store in sealed plastic bags)
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## Dispensing

Surfaces	Typically applied as strips or die-cut pieces onto treated/lubricated or non-treated/non-lubricated surfaces.	
Application	Manual	

## Final Cure

Cure conditions	15 minutes at 329°F (165°C)
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**Health and Safety Information:** Read all Health Hazard, Precautionary, and First Aid statements found in the Material Safety Data Sheet and/or product label prior to handling or use.

## Typical Performance Properties

(Cured Adhesive)

Aluminum Alcan 5754/PT2 2 mm AL070 (g/m <sup>2</sup> )	Low Bake <sup>2</sup>	Failure Mode	High Bake <sup>3</sup>	Failure Mode
<b>Overlap Shear<sup>1</sup></b>				
Initial 23°C	19.0 MPa	Cohesive	17.9 MPa	Cohesive
Initial 80°C	16.9 MPa	Cohesive	13.0 MPa	Cohesive
Initial -40°C	15.8 MPa	Cohesive	14.1 MPa	Cohesive
10 Thermal Cycles @ 23°C <sup>4</sup>	19.8 MPa	Cohesive	18.5 MPa	Cohesive
Environmental Cycles @ 23°C <sup>5</sup>	20.4 MPa	Cohesive	18.1 MPa	Cohesive
10 APGE <sup>6</sup> Cycles @ 23°C	17.4 MPa	Cohesive	17.4 MPa	Cohesive
30 APGE <sup>6</sup> Cycles @ 23°C	13.7 MPa	Cohesive	13.7 MPa	Cohesive
<b>T-Peel</b>				
Initial 23°C	46.8 piw	Cohesive	40.0 piw	Cohesive
Initial 80°C	51.0 piw	Cohesive	39.8 piw	Cohesive
Initial -40°C	38.2 piw	Cohesive	18.0 piw	Cohesive
<b>Stress Durability</b> (% to failure load)				
20% APGE	75 Cycles	Cohesive	66 Cycles	Cohesive
40% APGE	41 Cycles	Cohesive	27 Cycles	Cohesive
<b>Fracture Toughness</b>				
Initial 23°C	0.771 kJ/m <sup>2</sup>	Cohesive	0.589 kJ/m <sup>2</sup>	Cohesive
Initial 80°C	1.013 kJ/m <sup>2</sup>	Cohesive	0.921 kJ/m <sup>2</sup>	Cohesive
Initial -40°C	0.207 kJ/m <sup>2</sup>	Cohesive	0.313 kJ/m <sup>2</sup>	Cohesive

**Typical Performance Properties**

(Cured Adhesive)

<b>National G60 61MAL</b> (0.8 mm 60G60G-HD, 4.3g/m <sup>2</sup> Ferrocoate 61 MALHCL1)	<b>Low Bake</b> <sup>2</sup>	<b>Failure Mode</b>	<b>High Bake</b> <sup>3</sup>	<b>Failure Mode</b>
<b>Overlap Shear</b> <sup>1</sup>				
Initial 23°C	15.3 MPa	Cohesive	14.1 MPa	Cohesive
Initial 80°C	13.6 MPa	Cohesive	13.1 MPa	Cohesive
Initial -40°C	16.4 MPa	Cohesive	14.6 MPa	Cohesive
Salt Spray (1000h @ 23°C)	11.3 MPa	Cohesive	10.7 MPa	Cohesive
10 Thermal Cycles @ 23°C <sup>4</sup>	14.1 MPa	Cohesive	13.4 MPa	Cohesive
Environmental Cycles @ 23°C <sup>5</sup>	14.8 MPa	Cohesive	14.0 MPa	Cohesive
Aged 2 weeks at 90°C	15.5 MPa	Cohesive	14.7 MPa	Cohesive
Aged 2 weeks at 38°C 100%R.H.	13.6 MPa	Cohesive	12.6 MPa	Cohesive
10 APGE <sup>6</sup> Cycles @ 23°C	12.8 MPa	Cohesive	11.9 MPa	Cohesive
30 APGE <sup>6</sup> Cycles @ 23°C	13.1 MPa	Cohesive	11.0 MPa	Cohesive
<b>T-Peel</b>				
Initial 23°C	30.8 piw	Cohesive	27.2 piw	Cohesive
Initial 80°C	26.4 piw	Cohesive	26.0 piw	Cohesive
Initial -40°C	22.6 piw	Cohesive	19.2 piw	Cohesive
<b>Stress Durability</b> (% to failure load)				
20% APGE <sup>7</sup>	40 Cycles <sup>7</sup>	Cohesive	40 Cycles <sup>7</sup>	Cohesive
40% APGE <sup>8</sup>	20 Cycles <sup>8</sup>	Cohesive	20 Cycles <sup>8</sup>	Cohesive

**Note:** These properties are representative of the product's performance on a specific draw lubricant. However, the values are not intended to be used for specification purposes.

<sup>1</sup> Measured on 1 in (25.4 mm) wide coupons using 0.5 in (12.7 mm) overlap bonds. Thickness of the bond line was approximately 0.0098 in (0.25 mm). Crosshead speed was 0.5 in/min (13 mm/min). Metal thickness was approximately 0.030 in (0.8 mm).

<sup>2</sup> Low bake = 165°C at 15 min plus 10 min oven ramp

<sup>3</sup> High bake = 205°C at 30 min plus 10 min oven ramp

<sup>4</sup> Thermal cycles 90 ± 1°C for 4 h PLUS 38 +/- 1°C and 98 ± 2% R.H. for 4 h PLUS -40 ± 1°C for 16 h.

<sup>5</sup> Environmental Cycle, -40 ± 1°C for 7 d PLUS 38 ± 1°C for 98 +/- 2 % R.H. for 7 d PLUS 40 ± 1°C for 7 d PLUS 23 ± 2°C for 1 d.

<sup>6</sup> One APGE cycle = 15 min salt water immersion (5% salt solution) plus 1 h and 45 min drip dry at RT 22 h at 50 ± 2°C and 90 ± 5% R.H.

<sup>7</sup> No failures after 40 cycles. Testing discontinued after 40 cycles.

<sup>8</sup> No failures after 20 cycles. Testing discontinued after 20 cycles.

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*Minimum 30% Post-Consumer Fiber*

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