

LOCTITE EA 9686 AERO

Epoxy Film Adhesive

(KNOWN AS Hysol EA 9686)

INTRODUCTION

LOCTITE EA 9686 AERO is a modified epoxy film adhesive designed for applications requiring both toughness and service temperatures between -67°F to 300°F (-55°C to 149°C). It features the ability to cure at various temperatures (250°F to 350°F/121°C to 177°C), balanced flow, excellent environmental resistance, and long shop out-time, which makes it suitable for a variety of metal, composite, and honeycomb bonding applications.

FEATURES

- Balanced high peel strength and high shear strength in the -67°F/-55°C to 300°F/149°C service temperature range.
- Balanced flow, enabling use of one adhesive for honeycomb and metal to metal applications.
- Allows from 230°F/110°C to 350°F/177°C cure, which broadens material application and widens shop floor processing.
- Excellent environmental resistance.
- Optimized reticulation properties.
- Long out-time facilitates shop floor usage and repair applications.
- Wide cure and process tolerance. Oven curable (under vacuum or pressure).

Product Detail

Typical Technical Data	LOCTITE EA 9686 AERO
Type:	Modified epoxy film
Carrier:	Polyester Knit or Unsupported
Film Weight:	0.030-0.085 psf (146-415 g/m ²)
Color:	Maroon or Black for selective film weights
Width:	Standard 36 inch (91 cm) wide
Volatiles:	<1%
Tack:	Moderate

Handling

This product is in film form and is ready to use as received. The adhesive should be removed from cold storage and allowed to warm to room temperature (77°F/25°C). All moisture should be removed from the protective packaging before opening. The adhesive film has a protective liner(s) on it which must be removed prior to parts assembly (see "Applying" below). The liner(s) will always be a contrasting color from the adhesive to allow the user easy confirmation of removal.

Application

Storage Life - This product requires refrigerated storage. Store @ 0°F/-18°C or below for maximum storage life. Warranty life @ 0°F/-18°C is 12 months from date of shipment. Store only in sealed containers to prevent moisture contamination. Allow all moisture to evaporate from container before opening for use.

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Applying - Bonding surfaces should be clean, dry and properly prepared. For optimum surface preparation, consult the LOCTITE Surface Preparation Guide. The adhesive film, with one liner left on it, may be tacked to the detail part for cutting to shape and size. The liner should remain with the adhesive until just before assembly of the detail to the other faying surface. This will minimize contamination of the adhesive bond. The bonded parts should be held in contact until the adhesive has cured. Usually 25-50 psi/172-345 kPa is sufficient to assure proper part mating.

Open Assembly Time - This adhesive may be used within the following schedule after removing from cold storage:

- @ 77°F/25°C at least 90 days
- @ 90°F/32°C at least 45 days

Curing - This product may be cured for 60-90 minutes at 250°F/121°C or for 60-90 minutes at 350°F/177°C. Heat up rate to the cure temperature is not critical, but should be between 1-10°F (0.6-5.6°C) per minute. Pressure should be applied before heating the parts to be bonded and maintained until cool down of the assembly.

Cleanup - It is important to remove excess adhesive from the part and bonding tools before it hardens. Once the adhesive is cured, it is difficult to remove except by mechanical abrasion. Uncured adhesive may be removed with denatured alcohol and many common industrial solvents. Be careful to prevent any solvent from entering the uncured bondline as solvent will degrade the final bond performance. Consult with your supplier's information pertaining to the safe and proper use of solvents.

Bond Strength Performance

Floating Roller Bell Peel

Peel Strength tested per ASTM D3167 after curing as shown below. Adherends are 2024-T3 Bare aluminum treated with phosphoric acid anodizing per ASTM D3933 and primed with BR-127.

Adhesive Cure: 4°F (2°C) per minute to 250°F (121°C) held for 75 minutes at 250°F (121°C) under 40 psi (2.8 bar) and a cool down rate of 4°F (2°C) per minute to 32°C (90°F) prior to releasing pressure.

Film Exposure	Test Temperature °F/°C	0.035 psf (171 g/m ²) UNSUPPORTED		0.085 psf (415 g/m ²) Knit	
		lb/in	N/25mm	lb/in	N/25mm
None	77/25	66	294	65	289
	250/121	74	329	72	320
14 days at 77°F/25°C & 55% R.H.	77/25	60	267	53	236
	250/121	77	342	70	311

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Tensile Lap Shear

Tensile Lap Shear Strength tested per ASTM D1002 after curing as shown below. Adherends are 2024-T3 Bare aluminum treated with phosphoric acid anodizing per ASTM D3933 and primed with BR-127.

Adhesive Cure: 4°F (2°C) per minute to 250°F (121°C) held for 75 minutes at 250°F (121°C) under 40 psi (2.8 bar) and a cool down rate of 4°F (2°C) per minute to 32°C (90°F) prior to releasing pressure.

Film Exposure	Specimen Conditioning	Test Temperature	0.035 psf (171 g/m ²) UNSUPPORTED		0.085 psf (415 g/m ²) Knit	
		°F/°C	psi	MPa	psi	MPa
None	None	77/25	5900	40.7	6240	43.0
		250/121	2780	19.2	3440	23.7
	32 days at 160°F/71°C & 95% RH	250/121	1280	8.8	806	5.6
14 days at 77°F/25°C & 55% R.H.	None	77/25	6390	44.1	6790	46.8
		250/121	2820	19.4	3360	23.2
	32 days at 160°F/71°C & 95% RH	250/121	1340	9.2	706	4.9
Aircraft Test Fluid Soak: 14 days at 77°F/25°C						
None	JP-4	250/121	2585	17.8	3177	21.9
	Gearbox Oil		3030	20.9	3175	21.9
	Anti-icing fluid		2388	16.5	3018	20.8
	Skydrol LD4		2950	20.3	3497	24.1
	Detergent		2476	17.1	3000	20.7
14 days at 77°F/25°C & 55% R.H.	JP-4	250/121	2671	18.4	3180	21.9
	Gearbox Oil		3061	21.1	3368	23.2
	Anti-icing fluid		2529	17.4	2995	20.7
	Skydrol LD4		3095	21.3	3637	25.1
	Detergent		2318	16.0	2959	20.4

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Flatwise Tension

Flatwise Tension Strength tested per ASTM C297 after curing as shown below. Adherends are 2024-T3 Bare aluminum treated with phosphoric acid anodizing per ASTM D3933 and primed with BR-127.

Honeycomb Core: Texas Alment, Inc. CR111 - 5052, 4.3 pcf/69 kg/m³, 1/4"6.35 mm cell, .002N foil thickness, 1.0"/12.7 mm thick.

Unsupported film adhesive was reticulated to one side of the honeycomb core. Failure was against the unsupported side.

Adhesive Cure: 4°F (2°C) per minute to 250°F (121°C) held for 75 minutes at 250°F (121°C) under 40 psi (2.8 bar) and a cool down rate of 4°F (2°C) per minute to 32°C (90°F) prior to releasing pressure.

Film Exposure	Test Temperature °F/°C	0.035 psf (171 g/m ²) UNSUPPORTED		0.085 psf (415 g/m ²) Knit	
		psi	MPa	psi	MPa
None	250/121	603	4.2	684	4.7
14 days at 77°F/25°C & 55% R.H.	250/121	507	3.5	698	4.8

Bulk Resin Properties

Glass Transition Temperature (T_g) - Storage Modulus (E') via DMTA IV

Adhesive Cure	Dry	Wet
5 hrs, at 230°F/110°C - Vacuum Cure	255°F/124°C	190°F/88°C
75 min. at 250°F/121°C - Pressure Cure	252°F/122°C	-
90 min. at 275°F/135°C - Pressure Cure	250°F/121°C	192°F/89°C

Wet Exposure: 7 days at 158°F/70°C & 95% R.H.

Handling Precautions

Do not handle or use until the Material Safety Data Sheet has been read and understood. For industrial use only.

DISPOSAL INFORMATION

Dispose of spent remover and paint residue per local, state and regional regulations. Refer to HENKEL TECHNOLOGIES MATERIAL SAFETY DATA SHEET for additional disposal information.





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PRECAUTIONARY INFORMATION

General:

As with most epoxy based systems, use this product with adequate ventilation. Do not get in eyes or on skin. Avoid breathing the vapors. Wash thoroughly with soap and water after handling.

Note

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