

LOCTITE EA 9895 WPP AERO

Composite Surfacing Media

(KNOWN AS Hysol EA 9895 Wet Peel Ply)

INTRODUCTION

LOCTITE EA 9895 WPP AERO is a pre-impregnated polyester peel ply product supplied in film form. It is a specially designed resin system capable of curing at 350°F (177°C). It is compatible with state-of-the-art composite prepreg resin systems and provides minimal residual peel ply fibers at the bond surface after curing and removal. No further processing steps are required prior to secondary bond operations, thus eliminating the need for sand and solvent wipe operations.

FEATURES AND BENEFITS

Features

- Generates a bonding surface that provides a more durable bond than dry peel ply fabrics
- Minimal residual polyester fibers left on substrate after removal
- Promotes cohesive failure mode
- Compatible with third generation composites

- No sanding or solvent wiping required for bonding

- Minimal force required to remove peel ply layer

- Cures at 350°F (177°C)
- Long Out-time - 14 days minimum at 23°C

Benefits

- Greater durability over the life of the production article lowers repair costs
- Eliminates contamination of bonding surface by residual fibers
- Provides a consistent bonding surface
- Performs well with tough state of the art composites
- Broadens shop processing conditions
- Minimizes surface preparation time and is ergonomically friendly.
- Reduces cost of use.
- Reduces shop time for fabric removal. Ideal for large parts.
- Fabric strips easily in one piece
- Consistent with current composite cure parameters
- Facilitates shop floor usage and repair applications
- Lowers handling and storage costs

Product Detail

Product Form:	One-part film
Product Color:	Neutral-off white
Areal Weight:	0.033 psf (161 g/m ²)
Support Carrier:	Polyester peel ply
Roll Dimensions:	Nominal 1 m wide by 50.9 m long (3' wide by 167 lineal feet)
Resin Content:	48% nominal

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 before opening for use.

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

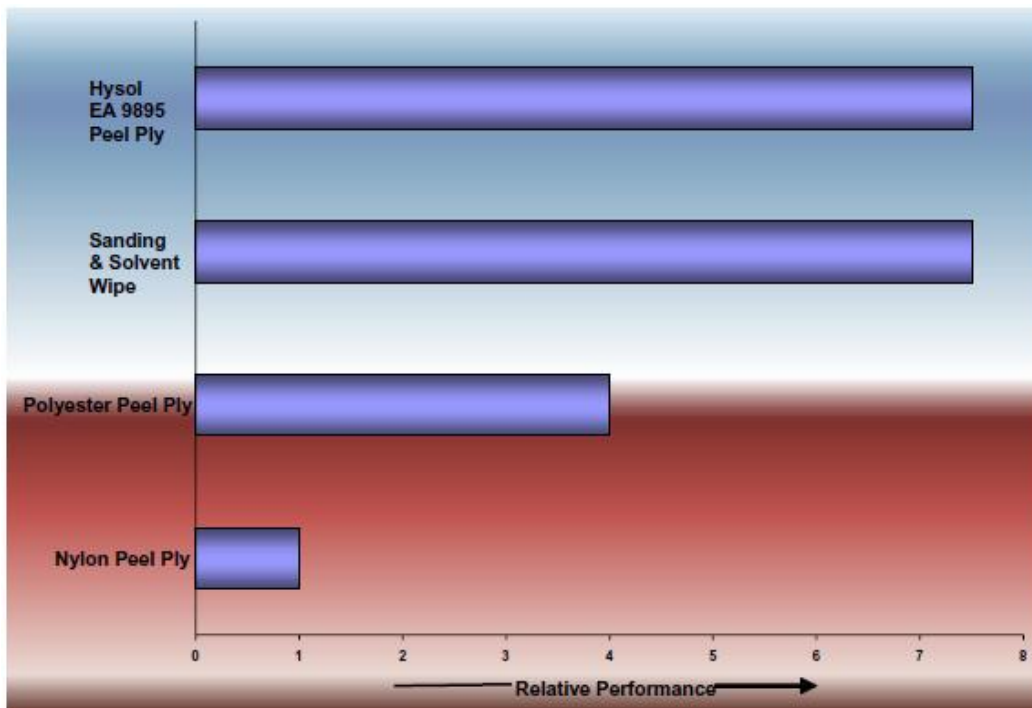
- @ 77°F (25°C) at least 14 days or
- @ 90°F (32°C) at least 10 days

Applying - Tool surface should be clean, dry and properly prepared. LOCTITE EA 9895 WPP AERO, with one liner left on it, may be tacked to the tool. The liner should remain with the product until just before assembly of the composite prepreg. This will minimize contamination of the bond joint.

Curing - This product may be cured for 90 to 120 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.

Removal - Remove LOCTITE EA 9895 WPP AERO just prior to secondary bond operation of composite detail. Starting at one corner, slowly and consistently, peel the LOCTITE EA 9895 WPP AERO away from the part. Peeling in a diagonal (to peel ply yarn) direction seems to facilitate removal. After completely removing LOCTITE EA 9895 WPP AERO, continue immediately with secondary bond operations.

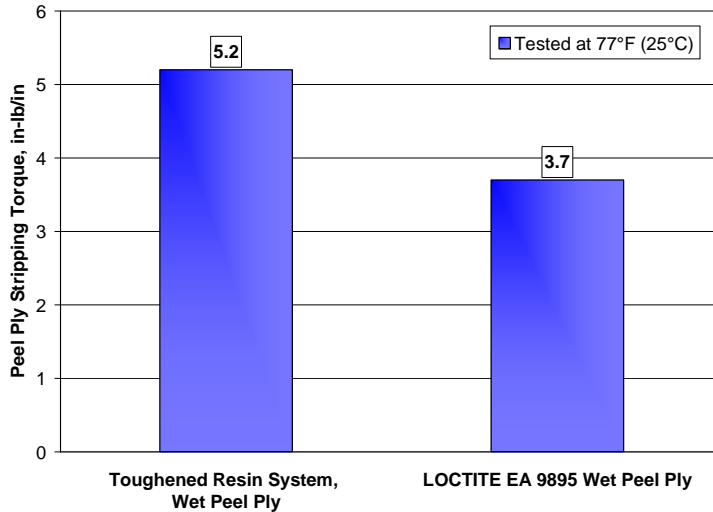
Bond Strength Performance - Relative bond strength is indicated below for the various surface preparations methods. LOCTITE EA 9895 WPP AERO prepared surfaces produce equivalent bond strengths to sanding and solvent surfaces without their additional processing steps.



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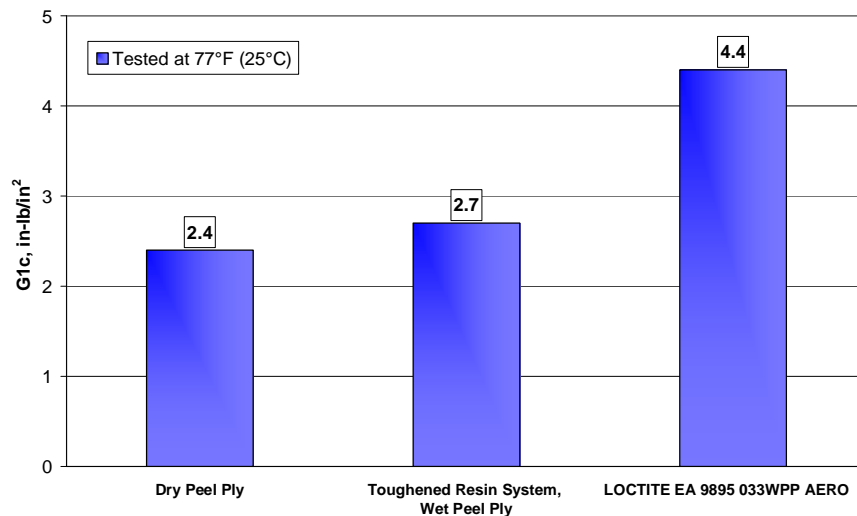
Stripping Force - LOCTITE EA 9895 WPP AERO has been formulated to require less stripping force for removal of the peel ply fabric over a model system containing a peel ply fabric pre-impregnated with a “toughened” resin system.

Cured Peel Ply Stripping Force



Bond Strength Performance - LOCTITE EA 9895 WPP AERO improves bonded joint durability of composite structures over model systems containing either a dry peel ply fabric or a peel ply fabric pre-impregnated with a resin system. LOCTITE EA 9695 AERO 0.05K is the composite film adhesive used in the secondary bond operation.

Surface Characterization

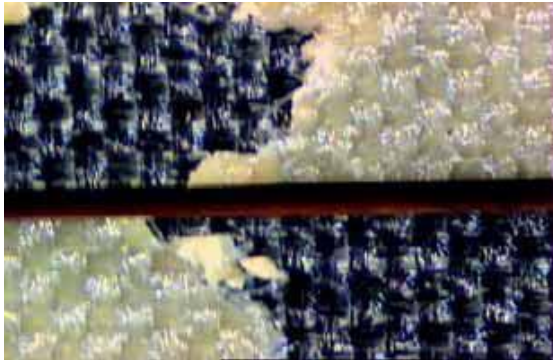


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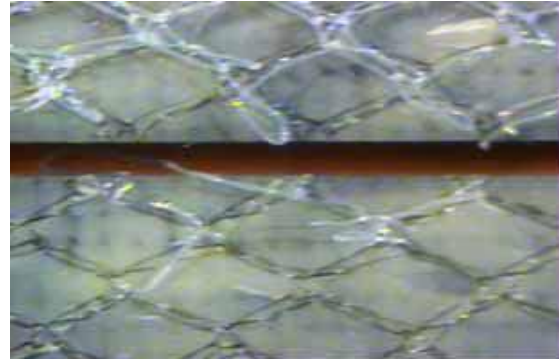
Failure Mode Examination - Failure modes are improved (from adhesive to cohesive) by the use of LOCTITE EA 9895 WPP AERO over a model system containing a “dry” peel ply fabric.

LOCTITE EA 9895 AERO Peel Ply vs. Dry Peel Ply LOCTITE EA 9695 AERO Toughened Film Adhesive

G_{1C} Fracture Surfaces Tested at 77°F (25°C)



Polyester Dry Peel Ply
Toughened Film Adhesive
“Adhesive Failure”



LOCTITE EA 9895 WPP WPP AERO
Toughened Film Adhesive
“Cohesive Failure”

Glass Transition Temperature (T_g) = 228°F (109°C)

- Cure Cycle: 120 min. at 350°F (177°C)
- DMTA (E' Curve) ▪ Heating rate: 9°F (5°C) per minute ▪ Strain 0.015%

Determination of the Extent of Cure by Differential Scanning Calorimetry (DSC)

- Heating rate: 18°F (10°C) per minute ▪ Temperature range: 104-536°F (40-280°C)

Cure Cycle	Degree of Cure
Uncured	-
60 min. at 250°F (121°C)	37%
90 min. at 250°F (121°C)	33%
120 min. at 250°F (121°C)	35%
120 min. at 270°F (132°C)	84%
30 min. at 300°F (149°C)	90%
120 min. at 300°F (149°C)	97%
120 min. at 350°F (177°C)	100%



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Bond Strength Performance on Composite Bonding Film Adhesive

The following table shows the performance of a film adhesive LOCTITE EA 7000 .050NW AERO over a composite made from 350°F (177°C) curing prepreg with LOCTITE EA 9895 AERO.

Prepreg Type: Epoxy Style 3K-70-PW, RC 40%

Laminate and Film Adhesive Cure:

3°F (2°C) per minute to 350°F (177°C), hold for 120 min. at 350°F (177°C) under 45 psi (0.31 MPa) pressure, vent to atmosphere at 20 psi (0.14 MPa) pressure. Cool down at 5°F (3°C) per minute.

Test Property	Specimen Conditioning	Test Temperature, °F (°C)	LOCTITE EA 9895 AERO
Double Lap Shear, psi (MPa)	Dry	-67 (-55)	4882 (33.7)
		77 (25)	5369 (37.0)
		160 (71)	5340 (36.8)
ASTM D3528	1000 hrs. at 160°F (71°C) & 95% R.H.	160 (71)	4385 (30.2)
Double Cantilever Beam (in·lbs/in ²) BSS 7273	Dry	77 (25)	4.6

Storage Life and Out Time Performance

Test Property	Storage Time at 0°F (-18°C)	Out time at 75±5°F (22±3°C) & <55% R.H.	LOCTITE EA 9895 AERO
Double Cantilever Beam (in·lbs/in ²) BSS 7273 Tested at 77°F (25°C)	Initial	None	4.6
	Initial	240 hours	5.1
	Initial	480 hours	4.8
	12 months	None	4.3
	12 months	480 hours	4.9
	12 months	1000 hours	5.1
	18 months	None	4.4
	26 months	None	4.6





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Bond Strength Performance on Composite Bonding Film Adhesive

The following table shows the performance of a film adhesive LOCTITE EA 9695 .050K AERO over a composite made from 350°F (177°C) curing prepreg with LOCTITE EA 9895 AERO.

Prepreg Type: Cycom 977-2/HTS 0.061 psf (297 g/m²)

Pre-Cured & Co-bonded Composite Laminate Cure Cycle: 5°F (3°C) per minute to 350°F (177°C), hold for 120 min. at 350°F (177°C) under 85 psi (0.59 MPa) pressure, vent to atmosphere at 20 psi (0.14 MPa) pressure. Cool down at 5°F (3°C) per minute.

Bonded Composite Laminate Adhesive Cure Cycle: 5°F (3°C) per minute to 350°F (177°C), hold for 120 min. at 350°F (177°C) under 58 psi (0.40 MPa) pressure, vent to atmosphere at 20 psi (0.14 MPa) pressure. Cool down at 5°F (3°C) per minute.

Test Property	Test Temperature, °F (°C)	LOCTITE EA 9895 AERO	
		Lot #	Result
Single Slotted Lap Shear, psi (MPa) AITM 1-0019 Type S7, T=4 (Co-bonded)	77 (25)	3147	5345 (36.8)
		3148	5263 (36.3)
		3233	5219 (36.0)
		4128	5372 (37.0)
Interlaminar Fracture Toughness (G1c), lb/in (N/m) AITM 1-0053 (Bonded)	77 (25)	3147	4.86 (851)
		3148	4.58 (801)
		3233	4.61 (807)
		4128	4.49 (785)

Cleanup - It is important to remove excess material from the part and bonding tools prior to curing. Uncured product may be trimmed and removed with a sharp object. Residual resin may be removed with denatured alcohol or many common industrial solvents. Be careful to prevent any solvent from entering the uncured bondline, as solvent will degrade the final performance. Consult with your supplier's information pertaining to the safe and proper use of solvents.

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.

Before using this product refer to container label and HENKEL TECHNOLOGIES MATERIAL SAFETY DATA SHEET for additional precautionary, handling and first aid information.

Note

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