Technical Process Bulletin

LOCTITE EA 9658 AERO
Epoxy Film Adhesive
(KNOWN AS Hysol EA 9658)

INTRODUCTION
LOCTITE EA 9658 AERO is a new technology, nacelle film adhesive. It combines high temperature strength controlled flow to minimize hole blockage and flash/flow clean up in the shop. It features approximately three times the toughness of LOCTITE EA 9689 AERO and is suitable for metal, composite and honeycomb bonding where continuous exposure to temperatures up to 350°F/177°C is important. The unsupported version may be reticulated for optimum bond strength. LOCTITE EA 9658 AERO is offered with the companion low VOC, water-based nacelle primer LOCTITE EA 9258.1 AERO.

FEATURES
- Increased toughness with high temperature performance
- Designed for composite, metal or honeycomb
- State of the art flow control to minimize hole blockage and excess flash/flow
- Thermally stable - tested for 6000 hours at 350°F/177°C
- Offered with a companion low VOC water based corrosion inhibiting primer
- SAMPE Paper - HIGH STRENGTH AND DURABILITY NACELLE FILM ADHESIVE, LOCTITE® EA 9658 AERO
- Film weights offered 0.060-0.100 psf (290-490 g/m^2)

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. 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 - LOCTITE EA 9658 AERO requires refrigerated storage. Store @ 0°F/-18°C or below for maximum storage life. Warranty life @ 0°F/-18°C is 9 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.

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 to 50 psi /1.2 to 2.4 kPa is sufficient to assure proper mating.

Open Assembly Time - LOCTITE EA 9658 AERO may be used within the following schedule after removing from cold storage:

@ 77°F/25°C at least 15 days
@ 90°F/32°C at least 10 days

LOCTITE EA 9658 AERO
Epoxy Film Adhesive
(KNOWN AS Hysol EA 9658)

Curing - LOCTITE EA 9658 AERO may be cured for 1 hour @ 350°F/177°C. Heat up rate to the cure temperature is not critical, but should be between 4° and 7°F (2.2° and 4°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 a ketone solvent in a well-ventilated area. Saturate a clean cloth or industrial wiper with solvent and apply just enough to do the job. 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 Strength - tested per EN 2243-2 after curing 1 hour at 350°F (177°C). Adherends are 2024-T3 AlClad 0.020 inch (0.51 mm) & 0.063 inch (1.6 mm) thick aluminum and treated with Phosphoric Acid Anodizing per ASTM D3933 and primed with companion low VOC water based corrosion inhibiting primer LOCTITE EA 9258.1 AERO. The primer was cured 60 minutes at 350°F/177°C.

LOCTITE EA 9258.1 AERO Primer Thickness		Test Temp.		LOCTITE EA 9658 AERO 0.10 psf (490 g/m^2) NWG	
mils	**microns**	**°F**	**°C**	**lb/in**	**N/25mm**
0.12	3	77	25	13	58
0.24	6	77	25	15	65
0.39	10	77	25	14	62

Honeycomb Sandwich Performance - tested per EN 2243-3 after curing 1 hour @ 350°F (177°C). Adherends are 2024-T3 Alclad 0.020 ich (0.51 mm) thick aluminum treated with phosphoric acid anodizing per ASTM D3933 and primed with companion low VOC water based corrosion inhibiting primer LOCTITE EA 9258.1 AERO. The primer was cured 60 minutes at 350°F/177°C. Nominal primer thickness was 0.020-0.24 mils (5-6 microns). The honeycomb core was 3/8 inch (9.50 mm) cell 5052 non-perforated aluminum core.

The 0.060 psf (290 g/m^2) unsupported film was reticulated onto the core.

Sample Conditioning	Test Temp.		LOCTITE EA 9658 AERO 0.060 psf (290 g/m^2) UNS		LOCTITE EA 9658 AERO 0.10 psf (490 g/m^2) NWG	
	°F	**°C**	**in·lbs/3in**	**N·m/m**	**in·lbs/3in**	**N·m/m**
Dry	77	25	14	21	26	39

LOCTITE EA 9658 AERO
Epoxy Film Adhesive
(KNOWN AS Hysol EA 9658)

Tensile Lap Shear Strength - Tensile lap shear strength tested per ASTM D1002 after curing 1 hour @ 350°F/177°C. Adherends are 2024-T3 bare aluminum treated with phosphoric acid anodizing per ASTM D3933 and primed with companion low VOC water based corrosion inhibiting primer LOCTITE EA 9258.1 AERO. The primer was cured 60 minutes at 350°F/177°C. Nominal primer thickness was 0.020-0.24 mils (5-6 microns).

Sample Conditioning	Test Temp.		LOCTITE EA 9658 AERO 0.060 psf (290 g/m^2) UNS		LOCTITE EA 9658 AERO 0.10 psf (490 g/m^2) NWG	
	°F	°C	psi	MPa	psi	MPa
Dry	-67	-55	4350	30.0	4370	30.2
	77	25	5200	35.9	5290	36.5
	250	121	3960	27.3	4030	27.8
	350	177	3110	21.4	3000	20.7
Wet 750 hrs. at 158°F (70°C) & 95% R.H.	77	25	3870	26.7	3790	26.1
	250	121	3430	23.6	3390	23.4
	350	177	1760	12.1	1840	12.7
1000 hrs. at 350°F (177°C)	77	25	3910	27.0	3670	25.3
	350	177	2760	19.0	2640	18.2
3000 hrs. at 350°F (177°C)	77	25	3230	22.3	3170	21.8
	350	177	2710	18.7	2690	18.6
6000 hrs. at 350°F (177°C)	77	25	2780	19.2	2750	19.0
	350	177	2530	17.4	2190	15.1

LOCTITE EA 9658 AERO
Epoxy Film Adhesive
(KNOWN AS Hysol EA 9658)

Flatwise Tension Strength - tested per ASTM C297 after curing 1 hour @ 350°F/175°C. Adherends are 2024-T3 bare aluminum treated with phosphoric acid anodizing per ASTM D3933 and primed with companion low VOC water based corrosion inhibiting primer LOCTITE EA 9258.1 AERO. The primer was cured 60 minutes at 350°F/177°C. Nominal primer thickness was 0.020-0.24 mils (5-6 microns). The honeycomb core was 3/8 inch (9.50 mm) cell 5052 non-perforated aluminum core.

The 0.060 psf (290 g/m^2) unsupported film was reticulated onto the core.

Thermally aged samples were drilled through each cell wall with a 0.10 inch (2.5mm) diameter drill for thermal exposure.

Sample Conditioning	Test Temp.		LOCTITE EA 9658 AERO 0.060 psf (290 g/m^2) UNS		LOCTITE EA 9658 AERO 0.10 psf (490 g/m^2) NWG	
	°F	°C	psi	MPa	psi	MPa
Dry	-67	-55	1350	9.3	1310	9.1
	77	25	1260	8.7	1220	8.4
	250	121	1020	7.0	1010	7.0
	350	177	700	4.8	640	4.4
Wet: 750 hrs. at 158°F (70°C) & 95% R.H.	77	25	980	6.7	930	6.4
	250	121	770	5.3	690	4.8
1000 hrs. at 350°F (177°C)	77	25	1140	7.8	1130	7.8
	350	177	450	3.1	420	2.9
3000 hrs. at 350°F (177°C)	77	25	1070	7.4	1060	7.3
	350	177	420	2.9	410	2.8
6000 hrs. at 350°F (177°C)	77	25	1000	6.9	930	6.4
	350	177	300	2.1	320	2.2

LOCTITE EA 9658 AERO
Epoxy Film Adhesive
(KNOWN AS Hysol EA 9658)

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.

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
The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Henkel Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel Corporation's products. Henkel Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Henkel Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications.

Rev. 9/2013

Henkel Corporation Aerospace | 2850 Willow Pass Road | Bay Point, CA 94565
PHONE: +1.925.458.8000 | FAX: +1.925.458.8030| www.henkel.com/aerospace