



Hysol® EA 9673

Modified BMI Film Adhesive

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Description

Hysol EA 9673 is a modified bismaleimide film adhesive with superior strength to 550°F/288°C. It is moisture resistant and processes like conventional high temperature epoxies.

Features

Film Adhesive
Processes Like Epoxy
Service to 550°F/288°C
No Volatiles During Cure

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 - Hysol EA 9673 requires refrigerated storage. Store @ 0°F/-18°C or below for maximum storage life. Warranty life @ 0°F/-18°C is greater than 6 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 Hysol 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 /172 to 345 kPa is sufficient to assure proper mating.

Open Assembly Time - Hysol EA 9673 may be used within the following schedule after removing from cold storage:

@ 77°F/25°C at least 30 days
@ 90°F/32°C at least 15 days

Curing - Hysol EA 9673 may be cured for 1 hour @ 350°F/177°C plus a post cure of 2 hours @ 475°F/246°C. Heat up rate to the cure temperature is not critical, but should be between 2° and 7°F (1° and 4°C) per minute. Pressure should be applied before heating the parts to be bonded and maintained until cool down of the assembly. No bonding pressure is required during the post cure. A step cure of 60-90 minutes @ 250°F/121°C under low pressure of 5-15 psi (34.5 to 103 kPa) followed by one hour @ 350°F/177°C with full pressure will reduce adhesive flow during cure.

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

Tensile Lap Shear Strength

Tensile lap shear strength tested per ASTM D1002. Adherends are 2024-T3 bare aluminum treated with an FPL etch. Unless otherwise noted, all the following were cured 1 hour @ 350°F/177°C (25 psi/ 172.3 kPa) plus 2 hours post cure @ 475°F/ 246°C.

| <u>Test Temperature,</u> °F/°C | Typical Results | |
|-----------------------------------|-------------------------------------|--|
| | 0.100 psf Film <u>psi</u> | 488 g/m² <u>MPa</u> |
| 77/25 | 2,000 | 13.8 |
| 250/121 | 2,100 | 14.5 |
| 350/177 | 2,400 | 16.5 |
| 450/232 | 2,300 | 15.8 |
| 500/260 | 2,200 | 15.2 |
| 550/288 | 1,900 | 13.1 |
| 600/316 | 600 | 4.1 |

| After Exposure to: | Typical Results | | |
|----------------------------|-----------------------------------|-------------------------------------|--|
| | <u>Test Temperature,</u> °F/°C | 0.100 psf Film <u>psi</u> | 488 g/m² <u>MPa</u> |
| 420°F/216°C-Air-500 hours | 450/232 | 1,500 | 10.3 |
| 200°F/93°C-100% RH-7 days | 350/177 | 2,800 | 19.3 |
| 200°F/93°C-100% RH-7 days | 450/232 | 2,000 | 13.8 |
| 200°F/93°C-100% RH-14 days | 450/232 | 1,400 | 9.6 |
| 170°F/77°C-99% RH-30 days | 400/204 | 2,100 | 14.5 |

Composite Bond Strength

Tensile shear strength using precured V-378A/Graphite prepreg with isotropic lay-up.

| <u>Test Temperature, °F/°C</u> | Typical Results | |
|--------------------------------|------------------------|------------|
| | <u>psi</u> | <u>MPa</u> |
| 77/25 | 1,800 | 12.4 |
| 350/177 | 1,800 | 12.4 |
| 450/232 | 2,200 | 15.2 |
| 500/260 | 1,800 | 12.4 |
| 550/288 | 1,800 | 12.4 |
| 600/316 | 600 | 4.1 |

Tensile shear strength on pre-cured PMR-15/woven graphite. Bonds were cured 1 hour @ 350°F/177°C with post cure as noted.

| <u>Test Temperature, °F/°C</u> | Typical Results | | | |
|--------------------------------|----------------------------|------------|----------------------------|------------|
| | Post Cure | | Post Cure | |
| | 2 hrs @ 475°F/246°C | | 2 hrs @ 550°F/288°C | |
| | psi | MPa | psi | MPa |
| 77/25 | 1,900 | 13.1 | 1,600 | 11.0 |
| 350/177 | 2,300 | 15.8 | | |
| 500/260 | | | 1,500 | 10.3 |
| 550/288 | 2,500 | 17.2 | | |

Honeycomb Sandwich Performance

Honeycomb sandwich strength tested after curing 1 hour @ 350°F/177°C plus a post cure of 2 hours @ 475°F/246°C. Adherends are 2024-T3 Alclad aluminum with honeycomb cell size as shown.

Honeycomb Climbing Drum Peel Strength

| <u>Test Temperature, °F/°C</u> | Typical Results | | | |
|--------------------------------|------------------------------|--------------|-------------------------------|--------------|
| | 1/4 in (6.35 mm Cell) | | 3/16 in (4.75 mm Cell) | |
| | in lb/3 in | M•n/m | in lb/3 in | M•n/m |
| 77/25 | 8.0 | 11.8 | 13.6 | 20.2 |

Flatwise Tensile Strength

| <u>Test Temperature, °F/°C</u> | Typical Results | | | |
|--------------------------------|------------------------------|------------|-------------------------------|------------|
| | 1/4 in (6.35 mm Cell) | | 3/16 in (4.75 mm Cell) | |
| | psi | MPa | psi | MPa |
| 77/25 | 600 | 4.1 | 700 | 4.8 |
| 350/177 | 400 | 2.8 | | |

Service Temperature

Service temperature is defined as that temperature at which this adhesive still retains 1000 psi (6.9 MPa) using test method ASTM D1002 and is approximately 550°F/288°C.

Handling Precautions

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

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. Empty containers retain product residue and vapors so obey all precautions when handling empty containers.

ONE PART

CAUTION! This material may cause eye and skin irritation or allergic dermatitis. It contains epoxy resins.

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Rev. 1/01

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Users should review the Materials Safety Data Sheet (MSDS) and product label for the material to determine possible health hazards, appropriate engineering controls and precautions to be observed in using the material. Copies of the MSDS and label are available upon request.



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