HexBond™ 319

High Performance Modified epoxy film adhesive

HEXCEL

Product Data Sheet

Description

HexBond™ 319 is a high performance modified epoxy film adhesive curing at 350°F. It is available in both supported and unsupported versions at areal weights between 0.03 and 0.08psf. The supported versions contain a woven nylon carrier for glueline thickness control and improved handleability. HexBond™ 319 is a hot melt film which is free from solvents and consequently it has a very low volatile content.

Features

- Cures in 60 minutes at 350°F
- Good performance at temperatures ranging from -67°F to 300°F
- Good short-term exposure performance at 350°F
- Excellent peel properties
- Good drape at ambient temperatures
- Less than 1% volatile content

Applications

- Aluminum to aluminum bonding
- Fibre-reinforced composite to composite bonding
- Aluminum honeycomb sandwich bonding
- Aramid honeycomb sandwich bonding

Forms

Grey flexible film adhesive, available unsupported or with a woven nylon carrier.

Product Description	Areal Weights psf	Support	Standard Roll ft²
HexBond™ 319L	0.036	Unsupported	540
HexBond™ 319	0.07		430
HexBond™ 319A	0.05	Woven nylon carrier	430
HexBond™ 319A	0.06		430
HexBond™ 319A	0.08		430

Instructions For Use

Pretreatment

It is essential that all substrates for bonding are free of contamination and in as ideal a state as possible. As pretreatment varies significantly depending on the substrates being used, please refer to the Hexcel publication HexBond™ Bonding Technology for optimum procedures.

If there is to be a delay between the pretreatment and bonding of aluminum, the pretreated surface should be protected with HexBond™ 119 surface pretreatment protection solution to conserve the optimum bonding surface. This will enable bonding to be delayed for up to 2 months without deterioration of the pretreated surface. The correct application of HexBond™ 119 should not alter the bonding performance of HexBond™ 319 (for full application details consult the relevant data sheet).

Application

1. If stored cold allow sufficient time for the adhesive to warm to room temperature (66-80°F) before removing the protective polythene.
2. Cut the film to the shape and size required.
3. Remove the release paper and position the adhesive on the prepared bonding surface.
4. Remove the polythene backing sheet.
5. Complete the joint assembly and apply pressure while the adhesive is being cured. For sandwich structures the pressure application should be selected to suit the type of core used.

Curing

HexBond™ 319 adhesives should be cured at 350 ± 5°F for 60 minutes to obtain optimum properties. Enough time should be allowed for heat to penetrate through the assembled parts to ensure that the adhesive reaches that temperature before timing starts. A cure pressure of around 20.3 – 101.5 psi and heat up rate of approximately 9°F per minute is recommended during cure. After curing it is recommended that components are cooled to below 158°F before releasing the pressure.

Cure Time (hours)	1	2	4
Cure Temperature °F	350	320	300

Mechanical Properties

All the performance values given in this data sheet are based on experimental, routine Quality Control and Specification testing results obtained under laboratory conditions. They are typical values expected for the HexBond™ 319 series prepared and cured as recommended and under the conditions indicated. They do not and should not constitute specification minima.

Metal Bonding Strengths

HexBond™ 319 series adhesives were used to bond Alclad 2024-T3 aluminum test specimens; the aluminum was pretreated (chromated/sulphuric acid pickling) in accordance with Method O of BSI Code of Practice CP 3012 (Method O of DEF Standard 03-2/1).

The honeycomb tests used HexWeb® 7.9-1/4-40 (5052) T aluminum honeycomb.

Test	Test Temperature °F	HexBond™ 319L 0.036 psf	HexBond™ 319 0.07 psf	HexBond™ 319A 0.05 psf	HexBond™ 319A 0.06 psf	HexBond™ 319A 0.08 psf
Lap Shear Strength psi	72	6090	**6525**	4495	**5220**	**5510**
	300	3190	**3770**		2320	2320
Bell Peel lbs/in	72	39	40	31.4	38.1	38.1
			42			**39.2**
Climbing Drum Peel lb/3in	72	60.58	134.6	44.8	74.0	103.2
			139.1			**107.7**
Flatwise Tensile ps	72		1290			1290
			1348			**1305**

(Figures in bold refer to results on substrates primed with HexBond™ 119).

Environmental Resistance

HexBond™ 319A - 0.08 psf was used to prepare lap-shear specimens which were then exposed to a variety of "harsh" environments in accordance with DTD 5577 (Type 4 Class 4PH) and MMM-A-132, respectively. The specimens were subsequently tested and single overlap shear results in psi were as follows:

Conditioning of HexBond™ 0.08 psf	Test Temp. (°F)	Lap Shear Strength Unprimed (psi)	Lap Shear Strength Primed (psi)
None	72	6380	6525
None	300	3335	3335
12 months at 150°C	72 300	30 22	
1000 hrs in Silcodyne 'H' at 22°C	72	6235	6525
1000 hrs in synthetic esters at 22°C	72	6380	6380
1000 hrs in Skydrol 500A at 22°C	72	6090	6380
1000 hrs in Kerosene fuel at 22°C	72	6525	6525
1000 hrs in distilled water at 22°C	72	6090	6235
1000 hrs in anti-icing fluid at 22°C	72	6380	6670
1000 hrs in hydraulic oil at 22°C	72	6235	6670
1000 hrs in water/methanol at 22°C	72	6090	6235

Adhesives storage life

Shelf Life: 18 months at 0°F
Out Life: 120 days at 66 – 80°F

The storage life is considered to have expired when either of these conditions has elapsed.
Refer to the box label to determine the specific batch expiry date.

Definitions

Shelf life: The maximum storage time for HexBond™ adhesives from date of manufacture, when stored continuously in a sealed moisture-proof bag at 0°F.

Out life: The maximum accumulated time allowed at 66 – 80°F between removal from the freezer for use and return to freezer after use.

Storage Conditions

HexBond™ 319 has been formulated for maximum storage life consistent with its high performance. However certain precautions can help to enhance storage life as follows:

1. When not in use rolls of film adhesive should be stored at 0°F in their original, sealed packaging.
2. To avoid the risk of local thinning of the film under its own weight, the roll should be kept on a horizontal mandrel passed through the tube core on which the roll is wound.
3. When returning rolls to refrigeration it is essential to protect the film by sealing it within a water vapour barrier packaging material such as polythene. Original packaging should be used where possible.
4. On withdrawal from refrigeration the water vapour barrier packaging must not be removed until the roll of adhesive has reached room temperature. This may take up to 24 hours depending on the size of the roll and the temperature involved. Failure to observe this will result in the film becoming damp.
5. The film must be handled with care whilst in the frozen state since it will be brittle and easily cracked.

Volatile Content

HexBond™ 319 adhesives have a very low volatile content, usually well below 1%. In practice, the loss in weight when cured is negligible and emission of volatile products is not of practical significance.

Associated products

HexBond™ 119 surface pretreatment protection solution (primer)
HexBond™ 219/2-NA foaming film adhesive

Handling and safety precautions

When used properly HexBond™ 319 film adhesives presents a low risk of handling hazard for the following reasons:

- The film is covered on both sides by protective release paper and polythene sheet which are not removed until final component assembly. It should be cut to shape before removing the protective coverings and virtually no handling of the film is necessary.
- It is virtually tack-free (dry) at normal room temperature. The film is dependent on elevated temperature for wetting-out the adherend surfaces.
- It is volatile-free at normal room temperature.
- It is splash-free, leak-free, spillage-free.

However, the usual precautions necessary when handling synthetic resins should be observed. A Safety Data Sheet for HexBond™ 319 is available on request.

Release Certification

The Quality System at Hexcel Composites Duxford has been certified to ISO 9001 by Lloyd's Register Quality Assurance, and is approved by the UK Civil Aviation Authority and Ministry of Defence. Certificates of Conformity and Test Reports can be issued for batches of HexBond™ 319 on request.

For more information

Hexcel is a leading worldwide supplier of composite materials to aerospace and industrial markets.
Our comprehensive range includes:

- HexTow® carbon fibers
- HexForce® reinforcements
- HiMax™ multiaxial reinforcements
- HexPly® prepregs
- HexMC®-i molding compounds
- HexFlow® RTM resins
- HexBond™ adhesives
- HexTool® tooling materials
- HexWeb® honeycombs
- Acousti-Cap® sound attenuating honeycomb
- Engineered core
- Engineered products
- Polyspeed® laminates & pultruded profiles
- HexAM™ additive manufacturing

For US quotes, orders and product information call toll-free 1-800-688-7734. For other worldwide sales office telephone numbers and a full address list, please go to:

http://www.hexcel.com/contact

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