



# Redux® 319

High performance modified epoxy film adhesive

## Product Data

### Description

Redux 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. Redux 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
- Fiber-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 ft <sup>2</sup>
Redux 319L	0.036	Unsupported	540
Redux 319	0.07		430
Redux 319A	0.05	Woven nylon carrier	430
Redux 319A	0.06		430
Redux 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 Redux Bonding Technology for optimum procedures.



# Redux 319

If there is to be a delay between the pretreatment and bonding of aluminum, the pretreated surface should be protected with Redux 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 Redux 119 should not alter the bonding performance of Redux 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 (59-80°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

Redux 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 Redux 319 series prepared and cured as recommended and under the conditions indicated. They do not and should not constitute specification minima.

#### Metal Bonding Strengths

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

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

**Environmental Resistance**

Redux 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 Redux 319 0.08 psf	Test Temp. (°F)	Lap Shear Strength Unprimed (psi)	Lap Shear Strength Primed (psi)
None	72	6380	<b>6525</b>
None	300	3335	<b>3335</b>
12 months at 300°F	72 300	30 22	
1000 hrs in Silcodyne 'H' at 72°F	72	6235	<b>6525</b>
1000 hrs in synthetic esters at 72°F	72	6380	<b>6380</b>
1000 hrs in Skydrol 500A at 72°F	72	6090	<b>6380</b>
1000 hrs in Kerosene fuel at 72°F	72	6525	<b>6525</b>
1000 hrs in distilled water at 72°F	72	6090	<b>6235</b>
1000 hrs in anti-icing fluid at 72°F	72	6380	<b>6670</b>
1000 hrs in hydraulic oil at 72°F	72	6235	<b>6670</b>
1000 hrs in water/methanol at 72°F	72	6090	<b>6235</b>

**Storage**

It is recommended to store Redux 319 at -0°F. At this temperature the shelf life will be 18 months. The maximum permissible outlife at 65 - 80°F is 3 months.

Redux 319 adhesives have been formulated for maximum storage life consistent with their high performance. Certain precautions, however, will help to enhance that storage life as follows:

1. When stored Redux 319 adhesives should be kept on a horizontal mandrel passed through the tube core on which the roll is wound. This avoids the risk of local thinning of the film under the weight of the roll.
2. When storing under refrigeration the original packaging should be retained if possible. When returning to the refrigerator after use it is essential to protect the film with a water vapour barrier packaging material such as polythene.
3. On withdrawal from the refrigerator the water vapour barrier packaging should 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).
4. The film should be handled with care whilst in the frozen state since it will be brittle and easily cracked.



## **Volatile Content**

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Redux 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**

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Redux 119 surface pretreatment protection solution (primer)  
Redux 219/2-NA and 219/3-NA foaming film adhesives

## **Handling and safety precautions**

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When used properly Redux 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 Material Safety Data Sheet for Redux 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 Redux 319 on request.

## **Important**

All information is believed to be accurate but is given without acceptance of liability. Users should make their own assessment of the suitability of any product for the purposes required. All sales are made subject to our standard terms of sale which include limitations on liability and other important terms.

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