



Redux® 609

Adhesive film for bonding metallic and composite components

Product Data

Description

Redux 609 is a 120°C curing modified epoxy film adhesive containing a cotton scrim for easy handling and glue-line thickness control. It is available at standard areal weights of 300g/m² and 200g/m² and is also available unsupported at 282 gsm.

Features

- Flexible cure cycle
- Good lap shear performance at temperatures ranging from -55°C to 80°C
- Good peel properties from -55°C to 80°C
- Good properties in sandwich structures from -55°C to 80°C
- Good tack to assist in adhesive joint assembly
- Less than 1% volatile content
- Suitable for bonding a wide range of substrates

Applications

- Aluminium to aluminium bonding
- Sandwich bonding with a variety of skins and cores

Form

Blue, supported, flexible film adhesive having the following dimensions:

Product Description	Areal Weights g/m ²	Support	Roll Width mm	Standard Roll m ²
Redux 609	200	Cotton Scrim	1250	100
Redux 609	300	Cotton Scrim	1250	100
Redux 609U	282	None	1250	100

The film is protected on one side by blue polythene and on the other side by release paper.

Instructions For Use

Pretreatment

It is essential that all substrates to be used are free of contamination and are in as ideal a state for bonding as possible. As pretreatment will significantly vary dependent on substrates being used, please refer to the Hexcel Composites publication Redux Bonding Technology for optimum procedures.

If there will be a delay between pretreatment and bonding of aluminium, the pretreated surface can be protected with Redux 112 or Redux 140 to conserve the good bonding surface. Bonding can be delayed for 2-3 weeks without deterioration of the pretreated surface.

Application

1. Allow sufficient time for the adhesive to warm to room temperature (15°C to 27°C) 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.
Please refer to the Redux Bonding Technology Manual for further details.



Redux 609

Curing

Redux 609 should be cured at $120 \pm 5^\circ\text{C}$ for 60 minutes to obtain optimum properties, alternative cure cycles are given below. 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 350 kPa and heat up rate of approximately 5°C per minute is recommended during cure. After curing it is recommended that components are cooled to below 70°C before releasing the pressure.

Alternative Cure Cycles

Temperature ($^\circ\text{C}$)	180	170	160	150	140	130	120	110	100
Time (min)	5	7	8	10	20	30	60	120	240

Mechanical Properties

All the performance values given in this data sheet are based on experimental results obtained during testing under laboratory conditions. They are typical values expected for Redux 609 prepared and cured as recommended and under the conditions indicated. They do not and should not constitute specification minima.

Metal Bonding Strengths

Redux 609 was used to bond Alclad 2024-T3 Aluminium test specimens; the Aluminium was pretreated in accordance with DTD 915B (ii) [chromic/ sulphuric acid pickling]. The honeycomb tests used Hexcel's 7.9-1/4-40(5052)T Aluminium honeycomb.

Test	Environmental Conditioning	Test Temperature $^\circ\text{C}$	Redux 609 300g/m ²	Redux 609 200g/m ²	Redux 609U
Lap Shear Strength MPa	None	22	33	31	31
		50	31	31	
80		24			
100		15			
	70 $^\circ\text{C}$ 95% RH (1000 hrs.)	22	24		
		80	3		
Bell Peel N/25mm	None	22	76		
		50	110		
80		114			
100		136			
	70 $^\circ\text{C}$ 95% RH (1000 hrs.)	22	71		
		80	50		
Climbing Drum Peel N/76mm	None	22	193	165	170
		50	250		
		80	250		
		100	288		
Flatwise Tensile MPa	None	22	7.0	4.5	

Storage

Redux 609 has been formulated for maximum storage life consistent with its high performance. Certain precautions, however, will help to enhance that storage life as follows:

1. When stored at room temperature (less than 27°C) it 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. 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.

On receipt, Redux 609 will have a storage life of at least 12 months at -18°C plus an additional shop life of 1 month at below 27°C.

Volatile content

Redux 609 has 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.

Handling precautions

In common with all Redux adhesives in film form, Redux 609 is particularly free from handling hazards for the following reasons:

- 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.
- Redux 609 is tacky at normal room temperature and assists the placement of the adhesive. The film is dependent on elevated temperature for wetting-out the adherend surfaces.
- Volatile-free at normal room temperature.
- 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 609 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 609 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.

©Copyright Hexcel Composites
Publication RTC 019a (November 1998)

For More Information

Hexcel Composites is a leading worldwide supplier of composite materials to aerospace and other demanding industries. Our comprehensive product range includes:

- Carbon, glass, aramid and hybrid prepregs
- Honeycomb cores
- Structural film adhesives
- Honeycomb sandwich panels
- Special process honeycombs
- RTM materials

For technical assistance, applications & procedures, or further information, please contact:

Hexcel Composites
Duxford, Cambridge
CB2 4QD
United Kingdom
Tel: **44** 1223 833141
Fax: **44** 1223 838808

Hexcel Composites
ZI La Plaine, B.P.27 Dagneux
F-01121 Montluel Cedex
France
Tel: **33** 4 72 25 26 27
Fax: **33** 4 72 25 27 30

Hexcel Composites
Industriestr. 1
A-4061 Pasching
Austria
Tel: **43** 7229 772-0
Fax: **43** 7229 772-299

Hexcel Composites
Rue Trois Bourdons, 54
B-4840 Welkenraedt
Belgium
Tel: **32** 87 307 411
Fax: **32** 87 882 895

Hexcel Composites
Bruselas, 10 - 16
Políg. Ind. "Ciudad de Parla"
28980 Parla, Madrid, **Spain**
Tel: **34** 91 664 49 00
Fax: **34** 91 698 49 14

Hexcel Composites
5794 W.Las Positas Blvd.
P.O. Box 8181, Pleasanton,
CA 94588-8781 **USA**
Tel: **1** 925 847 9500
Fax: **1** 925 734 9676

Hexcel Composites GmbH
Am Westpark 1
D-81373 Munich
Germany
Tel: **49** 89 743525 0
Fax: **49** 89 743525 20

Hexcel Composites
Via San Cristoforo, 44
21047 Saronno (VA)
Italy
Tel: **39** 02 967 09082
Fax: **39** 02 960 0809