



# Redux<sup>®</sup> 312

## Modified epoxy film adhesive



Product Data Sheet

### Description

Redux<sup>®</sup> 312 is a high strength 120°C curing film adhesive, suitable for metal to metal bonding and sandwich constructions, where operating temperatures of up to 100°C may be experienced.

A supported version, Redux<sup>®</sup> 312/5, is available with a woven nylon carrier for bond line thickness control.

### Features

- Short cure cycle - cures in 30 minutes at 120°C
- Good mechanical performance up to 100°C
- Suitable for composite to composite bonding
- Low volatile content (solventless process)

### Applications

- Metal to metal bonding
- Sandwich constructions
- Composite to composite bonding

### Forms

Grey flexible film adhesive, available in 5 areal weights; 4 in unsupported form and one with a woven nylon carrier.

| Product Description      | Areal Weights g/m <sup>2</sup> | Roll Width mm | Standard Roll m <sup>2</sup> |
|--------------------------|--------------------------------|---------------|------------------------------|
| Redux <sup>®</sup> 312   | 70                             | 533           | 60                           |
| Redux <sup>®</sup> 312UL | 100                            | 533           | 60                           |
| Redux <sup>®</sup> 312L  | 150                            | 533           | 50                           |
| Redux <sup>®</sup> 312   | 300                            | 533           | 40                           |
| Redux <sup>®</sup> 312/5 | 293                            | 533           | 40                           |

### 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 varies significantly depending on the substrates used, please refer to the Hexcel Composites publication Redux<sup>®</sup> Bonding Technology for optimum procedures.

If there is to be a delay between the pretreatment and bonding of aluminium, the pretreated surface should be protected with Redux<sup>®</sup> 112 surface pretreatment protection solution to conserve the optimum bonding surface. This will enable bonding to be delayed for up to 3 months without deterioration of the pretreated surface. The correct application of Redux<sup>®</sup> 112 should not alter the bonding performance of Redux<sup>®</sup> 312 (for full application details consult the relevant data sheet).



### Application

1. Allow sufficient time for the adhesive to warm to room temperature (19°C - 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. For sandwich structures the pressure application should be selected to suit the type of core used. After the adhesive has cured it is advisable to maintain pressure on the bonded assembly until it has cooled sufficiently to be handled without discomfort.

### Curing

Redux<sup>®</sup> 312 should be cured at 120 ± 5°C for 30 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. Cure pressures of around 100 - 350 kPa and heat up rates of approximately 5°C per minute are recommended during cure. After curing it is recommended that components are cooled to below 70°C before releasing the pressure.

### 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<sup>®</sup> 312 prepared and cured as recommended and under the conditions indicated. They do not and should not constitute specification minima.

### Metal Bonding Strengths

Redux<sup>®</sup> 312 at areal weights of 70, 100, 150 and 300 g/m<sup>2</sup>, and Redux<sup>®</sup> 312/5 at areal weight 293 g/m<sup>2</sup>, were 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                         | Test Temperature °C | Redux <sup>®</sup> 312 70g/m <sup>2</sup> | Redux <sup>®</sup> 312 100g/m <sup>2</sup> | Redux <sup>®</sup> 312 150g/m <sup>2</sup> | Redux <sup>®</sup> 312 300g/m <sup>2</sup> | Redux <sup>®</sup> 312/5 |
|------------------------------|---------------------|---|--|--|--|--------------------------|
| Lap Shear Strength<br>MPa    | 22                  | 37  | 39   | 42   | 43   | 38                       |
|                              | 70                  | 33  | 32   | 38   | 39   | 29                       |
|                              | 80                  | 27  | 32   | 35   |  |                          |
|                              | 100                 |   |  | 17   | 30   |                          |
| Bell Peel<br>N/25mm          | 22                  |   | 230  | 245  | 230  | 245                      |
| Climbing Drum Peel<br>N/76mm | 22                  |   | 190  | 350  | 710  | 510                      |
| Flatwise Tensile<br>MPa      | 22                  |   | 5.4  | 7.0  | 9.1  | 8.3                      |



# Redux<sup>®</sup> 312

Modified epoxy film adhesive



Product Data Sheet

## Adhesives storage life

Shelf Life: 18 months at -18°C

Out Life: 30 days at 19-27°C

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 Redux<sup>®</sup> adhesives from date of manufacture, when stored continuously in a sealed moisture-proof bag at -18°C.

**Out life:** The maximum accumulated time allowed at 19-27°C between removal from the freezer for use and return to freezer after use.

## Storage Conditions

Redux<sup>®</sup> 312 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 -18°C 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

Redux<sup>®</sup> 312 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.

## Associated products

Redux<sup>®</sup> 112 surface pretreatment protection solutions (primer)

Redux<sup>®</sup> 212/NA foaming film adhesive

## Handling and safety precautions

In common with all Redux<sup>®</sup> adhesives in film form, Redux<sup>®</sup> 312 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.
- Virtually tack-free (dry) at normal room temperature. 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<sup>®</sup> 312 is available on request.



# Redux® 312

Modified epoxy film adhesive



Product Data Sheet

## 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® 312 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® molding compounds
- HexFlow® RTM resins
- Redux® adhesives
- HexTool® tooling materials
- HexWeb® honeycombs
- Acousti-Cap® sound attenuating honeycomb
- Engineered core
- Engineered products

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/salesoffice>

©2017 Hexcel Corporation – All rights reserved. Hexcel Corporation and its subsidiaries ("Hexcel") believe that the technical data and other information provided herein was materially accurate as of the date this document was issued. Hexcel reserves the right to update, revise or modify such technical data and information at any time. Any performance values provided are considered representative but do not and should not constitute a substitute for your own testing of the suitability of our products for your particular purpose. **Hexcel makes no warranty or representation, express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose, and disclaims any liability arising out of or related to, the use of or reliance upon any of the technical data or information contained in this document.**