



Lightning Strike Products

SynSkin® Composite Surfacing Film & Hysol® Film Adhesives with Conductive Screens

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Description

Henkel laminates SynSkin® composite surfacing film and Hysol® film adhesives with lightweight conductive screens to provide a family of singular films that can be used as a conductive lightning strike surfacing layer for composites. Many customers purchase bare copper or aluminum plus a separate surfacing film and lay up each ply separately. The bare copper or aluminum is very fragile and difficult to handle. These LS (Lightning Strike) products provide the user with much easier handling and lay-up, improved surface quality of the cured composite part, greater protection of the composite surface as well as protection of the conductive screen during sand and fill operations.

Conductive Foil

Henkel Lightning Strike Products are currently offered with a nonwoven metallic mesh that is produced from a solid foil and is perforated and processed to create outstanding formability and excellent adhesion to composite laminate structures. Since it begins as a solid foil, it can be produced from nearly pure metals for maximum electrical conductivity. In contrast, most woven options must be alloyed in order for the metal to have enough strength to withstand the weaving operation. Alloys traditionally used by the aerospace industry typically have conductivity levels of approximately fifty percent of the solid foil base metals. Woven products tend to have a high resistivity at every cross over point due to the localized double thickness, and are not as uniform in thickness.

Henkel LS Products are currently offered with copper screens that have an areal weight of 0.015, 0.022, 0.029 or 0.040 lb/ft² (73, 107, 141 or 195 grams/m²). The bare copper screen is very fragile, especially the low areal weight versions. The addition of a surfacing film makes it much easier to position and handle the copper without distortion.

Features

Provides protection for the fragile metal screen, especially during sand and fill operations

Improved handling of conductive screen

Combined surfacing and lightning strike protection for composites in one product:

SynSkin versions:

- provide maximum protection of the copper mesh. Synskin contains a unique combination of filler materials in a resin matrix. It is nearly impossible to sand through cured SynSkin. It protects the copper much better than an all epoxy film adhesive.
- provide high quality paintable surfaces.
- can greatly reduce the cost of surface preparation for painting.

Reduce raw material part numbers and kitting time

Co-curable with prepregs

Lightning Strike Testing

High current tests were performed on flat, carbon fabric, solid laminate panels and a splice joint to evaluate the ability of Synskin 9837.1LS .030/.029 and /.022 to protect composites from the damage of Zone 1A lightning strike attachments.

Each of the test articles showed Zone 1A strike point damage over a 6 to 7 inch diameter area, with delamination over a two inch diameter area. No damage was observed on the back sides of the panels. The splice panels exhibited a similar size of damage area, as well as damage along the splice where current transitioned from one side of the panel, across the splice joint of the LS film, to the opposite side. No damage was observed on the back surfaces of the panels and the splice joints remained intact. These results were considered to be functionally acceptable so Zone 2 strikes, which are less severe, were not tested. A detailed report is available upon request through your local Technical Sales Representative.

Henkel QC Acceptance Testing

QC testing is performed on the unlaminated composite surfacing film/adhesive film. A certification is obtained from the supplier of the conductive screen, and its areal weight is confirmed during Receiving Inspection testing. Final QC on the laminate is limited to appearance and areal weight, thereby reducing the costs of redundant QC. Users interested in establishing values and tests for routine QC acceptance should request the Henkel standard acceptance tests which will provide details on test methods and values used to certify the surfacing film of interest.

Handling

This product is supplied in roll form and is ready to use as received. The film should be removed from cold storage and allowed to warm to room temperature prior to opening sealed bag. The indicator on the desiccant should be blue. The conductive side of the film should be positioned and co-cured on the prepreg side of the part. This will allow easy repositioning of prepreg if necessary and provide maximum surfacing protection of the screen.

Lightning Strike Product Listing

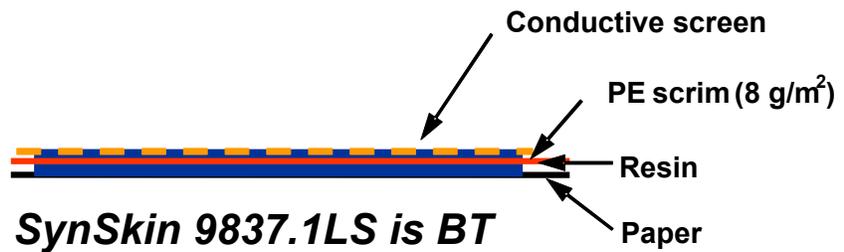
Below are Henkel's standard film/screen combinations. Custom laminates are available subject to viable volumes, minimum order and pre-approval for manufacturability. Please contact your local Henkel sales representative for samples and details.

Henkel Product	Cu 0.015 psf (75g/m ²)	Cu 0.022 psf (110g/m ²)	Cu 0.029 psf (145g/m ²)	Cu 0.040 psf (200g/m ²)
SynSkin 9837.1 BT Supported 0.030 psf (150 g/m ²)	X	X	X	X
SynSkin 9837.1 Unsupported 0.030 psf (150 g/m ²)	X			
Hysol EA 9695 NW Supported 0.030 psf (150 g/m ²)	X	X	X	X
Hysol EA 9673 NW Supported 0.050psf (250g/m ²)			X	
X = pre-approved				

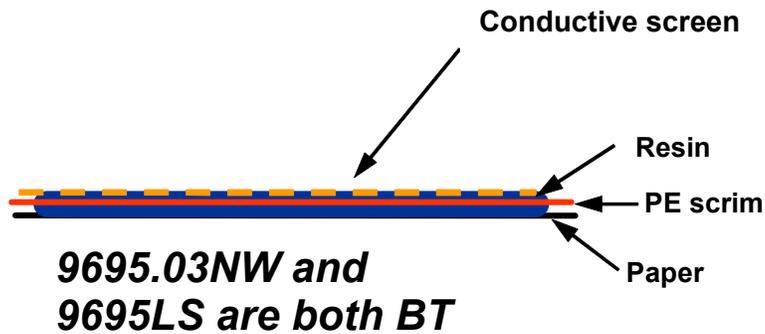
Henkel Product	Product Features	Cure Temperature
SynSkin 9837.1 BT Supported 0.030 psf (150 g/m ²)	<ul style="list-style-type: none"> - True composite surfacing film: it consists of a unique combination of filler materials in a proprietary resin matrix. - Provides the maximum protection for the conductive screen - cannot sand through 9837.1 resin/filler system during sand and fill 	250°F/350°F
SynSkin 9837.1 Unsupported 0.030 psf (150 g/m ²)		
Hysol EA 9695 NW Supported 0.030 psf (150 g/m ²)	<ul style="list-style-type: none"> - May work better for some designs - Higher resin content results from no fillers vs SynSkin 9837.1 	250°F/350°F
Hysol EA 9673 NW Supported 0.050psf (250g/m ²)	- Modified BMI resin matrix	350°F 475°F postcure

Product Form

SynSkin 9837.1 and SynSkin 9837.1LS are not manufactured the same way. The LS version is a BT (Balanced Tack) configuration, whereas the regular product is a OST (One-Side-Tacky) configuration. Resin is needed on the conductive screen side of the polyester scrim, so that the mesh has something to adhere to. Hysol film adhesives are typically designed to be a BT configuration, so the LS versions can be made using existing film adhesives.



(Unsupported would not include the PE scrim)



Open Assembly Time – Please see the separate SynSkin or film adhesive data sheet for detailed out-times. The copper mesh may tend to detach from the surface film if left exposed to room temperature for a long time. Although the material may have an excellent out-time, we recommend that the LS products be used as soon as possible following cutting or kitting.

Lay-up - Application of the surfacing film should be with the resin side facing the tool and the copper mesh side facing up / adjacent to the prepreg plies. Please refer to the Henkel *SynSkin Handling Procedures* brochure for instructions on best lay-up methods for composite surfacing. Tools pre-treated with Frekote[®] Sealer B-15 and Frekote[®] 700 NC Release Agent are recommended.

Curing - Please see the separate data sheet for the unlaminated surfacing film or film adhesive of interest.

Surface Preparation for Painting - Light sanding (150 grit) followed by solvent wipe to remove release chemicals and some imperfections. 28C1 Magna Static Conditioner Filler¹ or other suitable pinhole filler should be applied to fill minor surface imperfections.

Cleanup - It is important to remove excess adhesive from the work area and application equipment before it hardens. Denatured alcohol and many common industrial solvents are suitable for removing uncured adhesive. Consult your supplier's information pertaining to the safe and proper use of solvents.

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.

128C1 Magna Static Conditioner Filler available from Akzo Nobel Aerospace Coatings, East Water Street, Waukegan, IL, USA. Tel: (847)623-4200, Fax: (847)625-3200.

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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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