

# > METLBOND 1515-4 FILM ADHESIVE

TECHNICAL DATA SHEET



## DESCRIPTION

Metlbond 1515-4 is a 350°F (177°C) curing modified epoxy supported film adhesives. Metlbond 1515-4 can also be cured at 250°F (121°C). Its maximum continuous service temperature range is 275°F to 320°F (135°C to 160°C).

Metlbond 1515-4 is commonly used for Boeing BMS 5-154 metal-to-metal and composite bonding and BMS 8-341 cosmetic surfacing.

## FEATURES & BENEFITS

- Extended shop life of 30 days at up to 90°F (32°C) allows lay up of large components
- Designed for co-curing, secondary bonding, and co-bonding of composite materials
- Provides excellent surfacing characteristics
- Good resistance to pre-cure humidity
- Available in a variety of weights and carriers
- Bonds metal-to-metal, metal-to-core and composites
- Co-cures with most 350°F (177°C) curing prepregs
- Storage life of 12 months at 0°F (-18°C)

## SUGGESTED APPLICATIONS

- Metal-to-metal bonding
- Composite bonding
- Cosmetic surfacing

## CHARACTERISTICS

Table 1 | Metlbond 1515-4 Product Description

Nominal Weight, lb/ft <sup>2</sup> (g/m <sup>2</sup> )	0.030 – 0.100 (146 – 486)
Supporting Carrier	Mat or nylon knit carrier
Roll Length, yds (m)	60 (55)
Roll Width, in (cm)*	36 – 48 (91 – 122)

\* May be slit to your requirements

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**Table 2 | Physical Characteristics**

<b>Color</b>	Blue
<b>Room Temp. Tack</b>	Medium
<b>Shop Life</b>	30 days at 75°F (24°C)
<b>Volatiles</b>	Less than 1%
<b>Tg Dry</b>	338°F (170°C) G' knee by dynamic mechanical analysis
<b>Service Temp. Range</b>	-65 to 320°F (-54 to 160°C)
<b>Cure Temp. Range</b>	250 to 350°F (121 to 177°C)

## PROPERTIES

**Table 3 | Mechanical Properties: Metlbond 1515-4, BMS 5-154, Pre-exposed Film 30 days at 90°F (32°C) and 50% R.H.**

Property	Test Temperature	Grade 03 0.0325 lb/ft <sup>2</sup> (160 g/m <sup>2</sup> )	Grade 05 0.05 lb/ft <sup>2</sup> (225 g/m <sup>2</sup> )	Grade 08 0.08 lb/ft <sup>2</sup> (398 g/m <sup>2</sup> )
<b>Double Lap Shear</b> psi (MPa)	65°F (-54°C)	3727 (25.7)	3458 (23.8)	-
	75°F (24°C)	4703 (32.4)	4752 (32.8)	4744 (32.7)
	160°F (71°C)	4605 (31.8)	4130 (28.5)	-
	270°F (132°C)	1728 (11.9)	1602 (11.0)	-
<b>Double Lap Shear</b> psi (MPa) 14 days at 160°F (71°C), 100% R.H.	160°F (71°C)	3729 (25.7)	3402 (23.5)	4381 (30.2)
<b>Sandwich Beam Shear</b> psi (MPa)	-65°F (-54°C)	734 (5.1)	759 (5.2)	-
	75°F (24°C)	678 (4.7)	702 (4.8)	-
	160°F (71°C)	642 (4.4)	643 (4.4)	-
<b>Honeycomb Flatwise Tensile</b> psi (MPa)	-65°F (-54°C)	821 (5.7)	883 (6.1)	-
	75°F (24°C)	936 (6.5)	1042 (7.2)	-
	160°F (71°C)	886 (6.1)	998 (6.9)	-
<b>Honeycomb Flatwise Tensile</b> psi (MPa) 14 days at 160°F (71°C), 100% R.H.	160°F (71°C)	704 (4.9)	837 (4.8)	-
<b>Double Cantilever Beam</b> in-lb/in <sup>2</sup>	75°F (24°C)	-	4.9	-

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**Table 4 | Mechanical Properties: Metlbond 1515-4, BMS 5-154, Non Pre-exposed Film**

Property	Test Temperature	Grade 03A 0.0325 lb/ft <sup>2</sup> (160 g/m <sup>2</sup> )	Grade 05 0.05 lb/ft <sup>2</sup> (225 g/m <sup>2</sup> )	Grade 08 0.08 lb/ft <sup>2</sup> (398 g/m <sup>2</sup> )
<b>Double Lap Shear</b> psi (MPa)	65°F (-54°C)	3925 (27.1)	3495 (24.1)	-
	75°F (24°C)	4943 (34.1)	4708 (32.5)	6566 (45.3)
	160°F (71°C)	4032 (27.8)	4141 (28.6)	-
	270°F (132°C)	1942 (13.4)	2023 (13.9)	-
<b>Double Lap Shear</b> psi (MPa) 14 days at 160°F (71°C), 100% R.H.	160°F (71°C)	3420 (23.6)	3208 (22.1)	4590 (31.6)
<b>Sandwich Beam Shear</b> psi (MPa)	-65°F (-54°C)	771 (5.3)	776 (5.4)	-
	75°F (24°C)	712 (4.9)	704 (4.9)	-
	160°F (71°C)	620 (4.3)	651 (4.5)	-
<b>Honeycomb Flatwise Tensile</b> psi (MPa)	-65°F (-54°C)	886 (6.1)	1021 (7.0)	-
	75°F (24°C)	916 (6.3)	1091 (7.5)	-
	160°F (71°C)	795 (5.5)	1002 (6.9)	-
<b>Honeycomb Flatwise Tensile</b> psi (MPa) 14 days at 160°F (71°C), 100% R.H.	160°F (71°C)	612 (4.2)	750 (5.2)	-
<b>Double Cantilever Beam</b> in-lb/in <sup>2</sup>	75°F (24°C)	-	4.9	-

## Materials and Procedures per BMS 5-154A Specification

### Substrates

- Double Lap Shear: 8 and 16 ply panels of precured BMS 8-212 prepreg
- Honeycomb Flatwise Tensile: Face Sheets - 3 plies of co-cured BMS 8-212 prepreg, Core - BMS 8-124, Type 1, Class 1, Grade 8, 0.5 inch thick
- Sandwich Beam Shear: Face Sheets - 3 plies of co-cured BMS 8-212 prepreg, Core - BMS 8-124, Type 1, Class 1, Grade 8, 0.5 inch thick

### Adhesive Cure Cycle

1. Apply 22 inches Hg vacuum
2. Heat to 355°F (179°C) at a rate of 5°F (3°C)/min
3. Apply 45 psi pressure; vent vacuum at 20 psi
4. Hold at 355°F (179°C) for 120 minutes
5. Cool under pressure below 140°F (60°C)

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### Composite Prepreg BMS 8-212 Type IV, Class 2, Style 3K-70-PW Cure Cycle for Pre-cured Double Lap Shear Panels

1. Apply 22 inches Hg vacuum
2. Heat to 355°F (179°C) at a rate of 5°F (3°C)/min
3. Apply 85 psi pressure; vent vacuum at 20 psi
4. Hold at 355°F (179°C) for 120 minutes
5. Cool under pressure below 140°F (60°C)

Cure double lap shear prepreg panels using BMS 8-308 peel ply on all surfaces to be bonded.

## APPLICATIONS NOTES

### Cure Cycle

Recommended standard autoclave cure cycle for Metlbond 1515-4 is:

1. Apply full vacuum, 26 in Hg (88kPa) and 45 psi (310 autoclave pressure)
2. Vent vacuum to atmosphere at 20 psi (139 kPa)
3. Heat to 350°F (177°C) at a rate of 1 – 5°F/minute (0.5 – 3°C/minute)
4. Hold at 350 ± 10°F (177 ± 5.5°C) for 120 minutes
5. Cool under pressure to < 140°F (60°C)

For recommendations on other cure cycles and processes contact your Cyttec Engineered Materials representative.

## Surface Preparation

### Cured Composite Substrates

Most high performance composites employ a removable peel ply of nylon or Dacron<sup>®</sup> fabric. Good bonding can be achieved with no surface preparation. Remove the peel ply and bond immediately.

For surfaces without peel ply prepare as follows:

1. Lightly sand the surface to be bonded using 240 – 280 grit sandpaper
2. Clean the composite using a clean, lint-free cotton cloth and MEK or acetone
3. Dry thoroughly at room temperature

### Aluminum Skins

A clean, dry, grease-free surface is required for bonding. All standard cleaning techniques may be used with Metlbond 1515-3 including those involving solvent degreasing, alkaline cleaning, surface abrading, chemical deoxidizing, alodining, anodizing and/or priming. General guidance can be found in ASTM D 2651.

Best results for aluminum are obtained by a five step procedure:

1. Solvent degreasing
2. Alkaline cleaning
3. Chemical deoxidizing (etching)
4. Phosphoric acid anodizing\*
5. Priming with BR<sup>®</sup> 6747-1, BR 6725-1 or BR 127 primer.

\* Boeing patent 4,085,012, April 1978. It is now being used by a large number of aircraft manufacturers due to the improved surface bond durability it provides

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### Aluminum Core

No cleaning is necessary unless the core has been contaminated by foreign matter. If contaminated, solvent clean or vapor degrease with MEK, acetone or trichloroethylene.

### Other Substrates

Information concerning the surface treatment of substrates other than aluminum is given in MIL-A-9067.

### Primer

The use of a primer is not a prerequisite for obtaining a structural bond. However, assemblies are commonly primed to improve production flow. Use BR 6747-1, BR 6725-1 or BR 127 primer. Consult the primer's datasheet for details.

### Storage of Primed Surface

Primed details may be stored for extended periods, but must be protected from contamination by wrapping in non-waxed Kraft paper.

### Prefitting of Details

Faying surfaces should have good contact over the entire surface area to be bonded and should be free from burrs, waves and other imperfections. Where feasible, details should be prefitted prior to assembly bonding.

### Layup procedure

1. When Metlbond 1515-4 is removed from refrigerated storage, it must be allowed to reach room temperature before the roll is unpackaged.
2. Remove either of the interliners and place the adhesive against the surface to be bonded. Care should be taken to prevent air entrapment between the film adhesive and substrates, especially in large area bonds.
3. If additional tack is desired, the adhesive may be heated to as high as 140°F (60°C) without altering the adhesive properties. Before heat tacking be sure the film is in the proper position; removal will be difficult.
4. Remove the other interliner and complete the assembly.

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### PRODUCT HANDLING AND SAFETY

Cytec Engineered Materials recommends wearing clean, impervious gloves when working with adhesives to reduce skin contact and to avoid contamination of the product.

Materials Safety Data Sheets (MSDS) and product labels are available upon request and can be obtained from any Cytec Engineered Materials Office.

### DISPOSAL OF SCRAP MATERIAL

Disposal of scrap material should be in accordance with local, state, and federal regulations.

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