



EV Protect 5006



Technical Data Sheet



Flame Retardant Encapsulation Foam



PATENT PENDING

The next generation of our ultra-lightweight, fire retardant, protective encapsulant is here. Our EV Protect 5006 offers battery designers the ability to integrate high-level structural performance characteristics into their battery system which is ideal for cell to pack applications. This ultra-lightweight material minimizes weight addition to the battery pack and when exposed to a thermal event, significantly reduces, or delays thermal propagation. With a reduced viscosity and improved curing speed, the EV Protect 5006 is especially advantageous for those unique, complex, or intricate battery design architecture. Works in all types of battery cell form factors (cylindrical, prismatic, or pouch).

Technology/Base:	Polyurethane Foam
Type of Product:	Encapsulant
Components:	Two Component
Curing:	Room Temperature Cure
Appearance / Color:	Grey
Consistency:	Low Viscosity Liquid

General Information

EV Protect 5006 is generally dispensed using a high-speed dynamic mixer head directly into the battery module. The low viscosity liquid is easily able to flow and self-level at the bottom of the enclosure. Once leveled, the material will foam and rise to approximately 5 times volumetric expansion. After rising, the foam will crosslink and cure creating a semi-structural interconnected foam that encapsulates all components within the module. In the event of a thermal event, the foam will absorb, isolate, and insulate the cells to reduce the chances of thermal propagation.



Features and Benefits



- Reduces Thermal Propagation
- Ultra-Lightweight
- Low Viscosity & Self Leveling
- Great Vibration and Impact Resistance
- Outstanding Insulation Properties
- Faster Cure Speed for Improved Cycle Times
- No outgassing of Hydrogen gas during curing
- Meets UL94 V0
- Up to 5 Times Expansion Rate
- Cost Effective - Low Volume Usage
- Ease of Processability



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Technical Data

Typical Uncured Properties

Property	5006-A	5006-B	Blend
Color	Grey	Clear Amber	Grey
Specific gravity D792/D1475	1.15	1.22	1.17
Viscosity at 25°C (cPs)	700	150	450
Mix ratio by weight	100	86	
Mix ratio by volume	100	83	
Working time at 25°C (sec)			120
Cream time at 25°C (sec)			180-240
Tack Free time at 25°C (min)			< 60

Hand Mixing Instructions for Foams

1. Per the stated mix ratio, measure out (either by weight or volume) the appropriate portions of Part A and Part B as into a flat sided container.
2. The mixing container should be larger than the amount of total material being mixed to allow for vigorous mixing. For example, for 75 grams of total material we suggest a minimum size of 150 ml container for mixing. For larger amounts, adjust container size appropriately.
3. Generally, it's recommended to add the higher density part into the flat sided mixing container first and then add the other part gently on top of the first part. This helps limit pre-reaction of the materials to just the interphase. Scrape the side and bottom of the individual parts containers to ensure nearly all the measured materials are added to the mixing container.
4. Start timer and immediately mix vigorously for 20-30 seconds with a spatula or flat sided stir stick. Thoroughly scraping the sides and bottom of cup while mixing. Mixed material should be homogeneous and uniform in appearance.
5. At end of mixing time, immediately pour mixed material into mold.
6. Immediately clean all tools used in preparations that you wish to reuse with solvent.

Cured Properties

Operating Temperature Range (°C)	-60 - 120
Hardness at 24 / 48 hours (Shore A)	40 -50 / 50 - 60
Foam Density – Free Rise (g/cm³)	0.16 – 0.21
Foam Density – Free Rise (pcf)	10 - 13
Thermal Conductivity (W/m-K)	0.06

Electrical Properties

Property	Test Method	Value
Dielectric Strength (kV/mm)	ASTM D149	2.0
Dielectric Constant at 1MHz	ASTM D-0150	1.50
Dissipation factor at 1MHz	ASTM D-0150	0.02
Volume resistivity (ohm-cm)	ASTM D-0257	5.8×10^{11}
Surface resistivity (ohm)	ASTM D-0257	6.7×10^{11}

Note:

The values noted in this data sheet are typical properties only and are not intended to be used as material specifications. For assistance in writing a material specification please contact H.B. Fuller for future details.



General Information

EV Protect 5006-A / 5006-B is a two-component material. Hand mixing may be difficult. It is recommended that an automated dispensing unit be used with dynamic mixer to mix material. Prior to use, stir the individual parts to ensure they are uniform and homogeneous. Mixing the 5006-A prior to use for 5-10 minutes is essential to achieve a consistent foam density and cell structure. Check the container bottom for sediment after mixing to ensure filler is mixed in. If an extended shutdown or break in production has occurred (> 1 hour) re-mix part A side prior to use. Note: Pail or Drum size containers may require longer mixing times. Surface must be clean, dry, and free from grease, oil, wax and other surface contaminants.



Handling and Clean-Up

For cleanup of EV Protect 5006, Methyl Ethyl Ketone, Acetone, Dibasic Ester, Ethyl Acetate, or Mineral Spirits are recommended. Confirm with equipment supplier for compatibility of recommended solvents in dispensing equipment. Mineral oil can be used to flush uncured materials from lines. To clean uncured material from tabletops, tools or spatulas, additional cleaning solvent options are Isopropanol and Denatured Alcohol.



Storage and Shelf Life

EV Protect 5006 should be stored in a cool, dry place above 15°C (60°F). Purge open containers with dry nitrogen. Shelf life is a minimum of one year in unopened containers when stored at 25°C.



Typical Packaging

5 gal Pails
55 gal Drums
300 gal Totes



Safety and Disposal

For safe handling information on this product, consult the Safety Data Sheet (SDS)

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