H.B. Fuller

North America TECHNICAL DATA SHEET

EV Protect 4006-A SFR / 4006-B SFR

Flame Retardant Encapsulation Foam

Material Description

EV Protect 4006-A SFR / 4006-B SFR is a two-component flame retardant, low density polyurethane foam.

EV Protect 4006-A SFR / 4006-B SFR material is designed for potting and encapsulation of battery cell in EV battery modules. But it can also be used in other potting applications where low density and flame retardency is desired.

Features & Benefits

- Low odor and non-corrosive
- Low viscosity for fast flow in around intricate parts for encapsulation
- Long cream time to allow for leveling before rising
- Low density for light weight
- Conforms to flammability requirements of UL94 Flammability of Plastic Materials Vertical Burn Test Rating - V0
- Designed for compliance to UL94 Flammability of Plastic Materials Horizontal Burn Foam Material Rating - HBF
- Good impact resistance properties
- No outgassing of Hydrogen gas during curing

Curing Profile

EV Protect 4006-A SFR / 4006-B SFR cures at room temperature or heat accelerated. The curing speed varies with temperature and humidity. Contact HB Fuller technical support for additional recommendations.

Properties

Typical Uncured Properties			
Property	**4006-ASFR**	**4006-BSFR**	**Blend**
Color	Off White	Clear Amber	Lt. Amber
Specific gravity D792/D1475	1.17	1.25	
Viscosity at 25°C (cPs)	500	160	
Mix ratio by weight	100	86	
Mix ratio by volume	100	81	
Working time at 25°C (sec)			120
Cream time at 25°C (sec)			180-240
Tack Free time at 25 °C (min)			~ 60

Cured Properties	
Operating Temperature Range (°C)	-60 - 120
Hardness @ 24 / 48 hours (Shore A)	20 - 30 / 35 - 45
Foam Density – Free Rise (g/cm^3)	0.16 – 0.19
Foam Density – Free Rise (pcf)	10 - 12
Thermal Conductivity (W/m-K)	0.10

Electrical Properties		
Property	**Test Method**	**Value**
Dielectric Strength (kV/mm)	ASTM D149	3.0
Dielectric Constant @1MHz	ASTM D-0150	1.40
Dissipation factor @ 1MHz	ASTM D-0150	0.029
Volume resistivity (ohm-cm)	ASTM D-0257	5.1 x 10^{11}
Surface resistivity (ohm)	ASTM D-0257	7.7 x 10^{12}

Instructions for use

EV Protect 4006-A SFR / 4006-B SFR 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 4006-A-SFR prior to use for 5 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 contaminates.

Hand mixing instruction 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 container's 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.

Storage & Shelf Life

EV Protect 4006-A SFR / 4006-B SFR 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 25ºC.

Clean Up

For cleanup of EV Protect 4006-A SFR / 4006-B SFR, 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 cleaneing solvent options are Isopropanol and Denatured Alcohol.

Health & Safety Precautions

Please see the Safety Data Sheet (SDS) for proper handling and disposal instructions.

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 HB Fuller for assistance.