



# 3M™ Battery Enhancement Material 1807S

## Frequently Asked Questions - External

### General Product Information

Q: What is 3M™ Battery Enhancement Material 1807S?

A: 3M Battery Enhancement Material 1807S is a thin, non-flammable and lightweight thermal insulation for the battery pack. It is designed to augment the battery thermal management system by maintaining optimal battery temperatures longer. This flexible, minimally fiber shedding solution enables the following key benefits:

- Reduces battery usage for cooling and heating
- Enables faster battery warm-up
- Increases driving range
- Offers flame resistance (UL 94 V-0)
- Offers high compressibility and recovery properties
- Provides excellent cavity filling
- Demonstrates good performance in high-temperature applications

3M BEM helps the temperature uniformity among battery cells inside the module. EV batteries have a large thermal mass and may develop hot spots. The highest temperatures are in the core of the battery, meaning the gradient would be high to the outside. Adding 3M BEM around the box helps reduce this gradient and allow the outside cells to become warmer and even out the gradient.

Q: Why do EV batteries need the 3M Battery Enhancement Material?

A: Lithium-ion batteries are the preferred battery solution for electrical vehicles. However, Lithium-ion batteries work effectively in a narrow temperature range. 3M BEM reduces parasitic loss in the battery's heating and cooling system by keeping the battery in its effective temperature range longer than batteries without insulation, resulting in a more efficient use of the battery's energy.

Q: How does 3M Battery Enhancement Material 1807S extend the EV battery range in cold environments?

A: 3M BEM helps maintain optimal battery operating temperature longer by retaining heat, so the battery temperature won't decrease as quickly in a cold ambient environment. This enables the battery's cooling system to use less energy, which can translate to more energy used towards driving range.

Q: How does 3M Battery Enhancement Material 1807S extend the EV battery lifetime in hot environments?

A: 3M BEM helps maintain optimal battery operating temperature longer, so the battery temperature won't increase as quickly in a hot ambient environment. 3M BEM aides the effectiveness of the battery's cooling system, while acting as a barrier to the hot outside climate. This reduces the amount of time a battery can be exposed to potentially damaging high temperatures, which helps maintain overall charge capacity.

Q: How does 3M Battery Enhancement Material 1807S help enable battery safety?

A: 3M Battery Enhancement Material 1807S is certified to Flammability Standard UL 94-V0 rating (certified by SGS-CSTC Standards Technical Services).

Q: What type of applications would be good targets for 3M Battery Enhancement Material 1807S?

A: 3M Battery Enhancement Material is intended for applications that require superior thermal insulation and improved flame resistance, including EV battery packs.

Q: How do EV battery customers evaluate thermal insulation?

A: In the EV battery industry, engineers are using the Heat Preservation Time (HPT) to characterize the thermal insulation effectiveness. For a any given battery, the longer the HTP, the better the thermal insulation performance. The following is how a customer would approach measuring HPT:

In the battery thermal management system, each battery cell has at least one sensor to monitor the cell temperature.

The cold environment heat preservation time is measured in following steps:

1. A battery pack obtains stable temperature of 23°C
2. Put the battery pack in a temperature chamber of -30°C
3. The heat preservation time is the hours that it takes for average temperature of all battery cells to lower from 23°C to 0°C

The hot environment heat preservation time is measured in following steps:

1. A battery pack obtains stable temperature of 23°C
2. Put the battery pack in a temperature chamber of 50°C
3. The heat preservation time is the hours that it takes for average temperature of all battery cells to rise from 23°C to 40°C

Q: What thicknesses and configurations are available?

A: Current product is 6 mm in thickness. One differentiation of this is its compressibility and thickness recovery. 3M Battery Enhancement Material 1807S can be easily compressed to less than 2 mm in thickness and recover to gap thickness to achieve cavity filling.

Q: What is the continuous working temperature range?

A: 3M Battery Enhancement Material 1807S demonstrates continuous performance – more than 7 hours – at temperatures between -40°C to 150°C without thermal insulation performance loss.

Q: What materials are used in 3M Battery Enhancement Material?

A: The functional material inside the 3M BEM is a non-flammable ceramic fiber that is covered by a fabric scrim on either side to mitigate fiber shedding. The fabric scrim is treated with a non-flammable coating.

Q: How is thermal conductivity measured?

A: To measure the thermal resistance, use test method: ASTM C518: Standard test method for thermal transmittance of textile materials.

Thermal resistance ( $m^2-K/W$ ) is defined as the article thickness divided by the thermal conductivity coefficient. Thinsulate™ thermal insulation is a good thermal insulator due to its cavity filling properties. After compression, Thinsulate™ thermal insulation can recover its thickness and function to provide high thermal resistance value.

## Processing

Q: Can this product be die-cut and edge-sealed in one step?

A: Yes, this product can be die-cut and edge-sealed using a hot-press converting method. Hot press edge seal conditions will be provided by 3M.

## Product Performance

Q: Can 3M Battery Enhancement Material 1807S be taped to the edge of the battery wall?

A: Yes. 3M BEM can be attached to an aluminum surface using 3M™ Adhesive Transfer Tapes. However, the adhesive layer of 3M Battery Enhancement Material 1807S may not pass the UL 94 V-0 rating. Work with your 3M Application Engineer to determine adhesive feasibility.

- Q: How can I obtain data related to 3M Battery Enhancement Material 1807S performance for improving EV battery efficiency and range extension?
- A: 3M and the EV Battery Engineers at the OEMs have conducted EV battery efficiency and range extension performance testing. Please contact your 3M Application Engineer to obtain the data package.

### **Delivery/Supply**

- Q. What is the minimum order quantity (MOQ)?
- A. Contact your local 3M customer service representative.
- Q. What is the lead time for the product?
- A. Contact your local 3M customer service representative.

### **Pricing**

- Q. How much will this product cost?
- A. Contact your local 3M customer service representative

### **Source of Supply**

- Q. Where is the product produced?
- A. The product is produced in 3M authorized manufacturing facilities.
- Q. When may we audit the plant?
- A. The quality system may be audited, but due to the confidential nature of the process we are unable to offer tours of operations.
- Q. Where are the raw materials sourced?
- A. The formulation is confidential. The raw materials are sourced from 3M certified source of suppliers around the world.

### **Quality**

- Q. How do you ensure the continuity of product quality (performance and dimensions)?
- A. 3M uses IATF16949 standards to ensure a robust quality system is in place and utilizes regular quality control to measure the product's quality.
- Q. Is 3M able to provide a statement of quality assurance?
- A. Your 3M quality engineer or sales representative can provide you with a statement of quality assurance.

### **Samples**

- Q: What is the process for ordering prototypes?
- A: Contact your local 3M representative.

### **Contact Information**

The information provided in this technical document is intended as a guide for these products. For more information or help in selecting a 3M product for an application, please contact your 3M application engineer or call 3M product application support at 1-800-328-1684.

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Automotive Aerospace Solutions Division  
3M Center, Building 224-6NE-45  
St. Paul, MN 55144-1000  
Phone: 1-800-328-1684  
Web: [www.3M.com/autoelec](http://www.3M.com/autoelec)

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