



CUSTOM SOLUTIONS

for the dynamic advancement of the

ELECTRIC VEHICLE MARKET



CUSTOM SOLUTION PROVIDERS

As the electric vehicle market continues to make significant progress, Epoxies, Etc. and Epoxy Technology, Inc. have partnered under the Electronics Division of Meridian Adhesives Group to provide advanced technology and intuitive products to the industry. The Electronics Division of Meridian Adhesives Group provides high technology capabilities with experienced technical support. Epoxy, urethane, silicone and UV materials that are manufactured by Epoxy Technology and Epoxies, Etc. have been used in some of the most demanding applications.

Epoxy Technology and Epoxies, Etc. are trusted partners of organizations throughout the world and work together to provide enhanced solutions to the market. The two companies are capable of providing custom solutions for even the most challenging applications, and the companies' expert engineers and chemists can formulate unique products for electric vehicle and battery manufacturing. Many of these solutions are part of an extensive quality program, including ISO 9001:2015, MIL-STD 883/5011 certifications, as well as Sony Green Partnerships, RoHS and REACH Compliance.

ABOUT



Epoxies, Etc. is a leading formulator of specialty epoxies, urethanes, silicones, and UV curable systems. Since opening our doors in 1987, we have taken great pride in our commitment to the research, innovative development and consistent manufacturing of materials for today's demanding applications.

Our adhesives, potting and encapsulating compounds, and coatings are widely used in the electronic, electrical, construction and decorative industries. While we have thousands of existing epoxy, urethane and silicone formulations, we specialize in creating custom formulations for the specific needs of our clients. Our hands-on approach and creative, experienced technical staff are paramount to ensuring client satisfaction, as we work directly with customers to determine the perfect product to meet application demands.



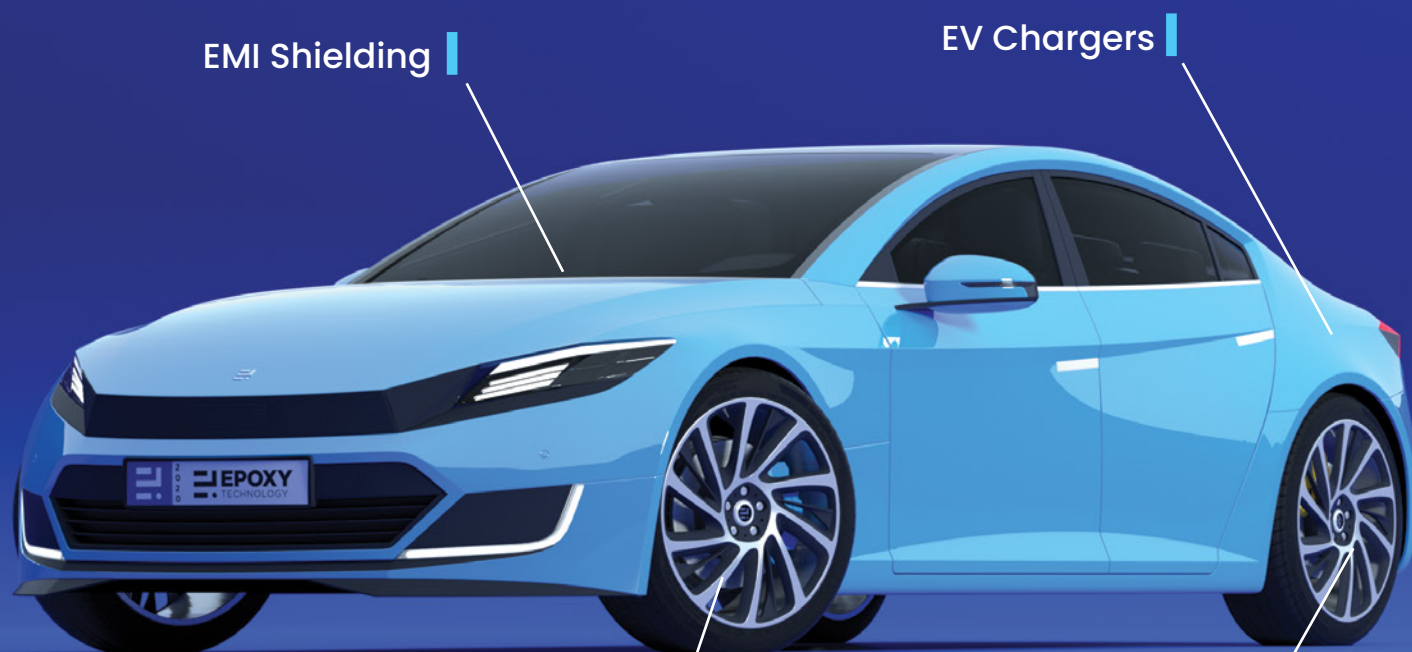
Epoxy Technology, Inc., founded in 1966, is a pioneer in the development and manufacture of Specialty Epoxy, UV & UV Hybrid adhesives to meet key performance standards needed in high-tech applications.

EPO-TEK® products are routinely specified for critical design requirements in advanced technology industries world-wide. As leaders in the industry, our commitment to superior product quality, exceptional customer service and outstanding technical assistance continues to be the basis of our success.



Meridian Adhesives Group is a leading manufacturer and custom formulator of high-value adhesives technologies. With a portfolio of trusted names in the electronics, flooring, infrastructure and packaging sectors, the Meridian platform partners with clients to provide dynamic solutions. Through state-of-the-art technology, operational excellence and superior customer support, Meridian is focused on expansion.

OUR PRODUCTS FOR YOUR DEMANDING EV APPLICATIONS

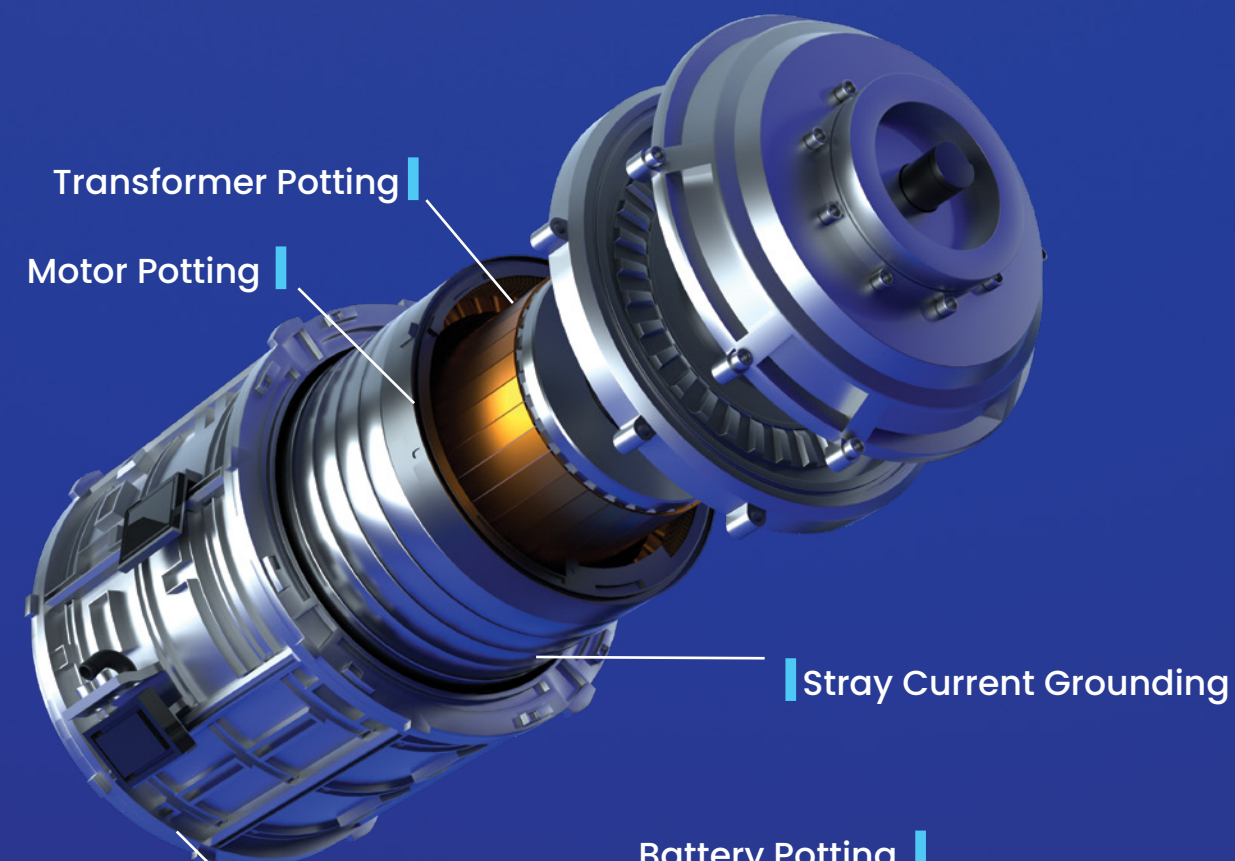


EMI Shielding

EV Chargers

Sensors & Controls

On-Board Chargers
Capacitor Potting
Motor Inverters

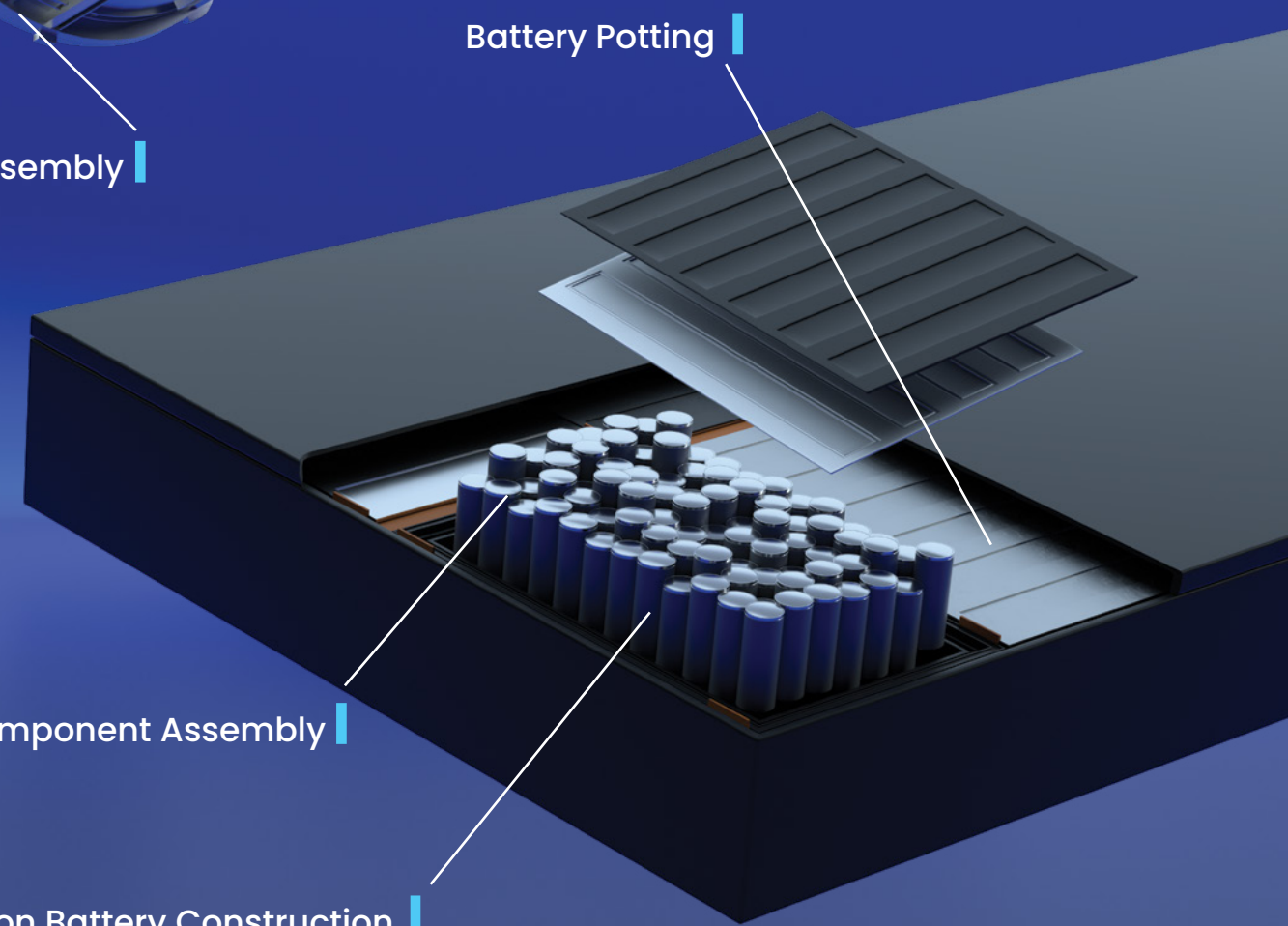


Transformer Potting

Motor Potting

Motor Assembly

Stray Current Grounding



Battery Potting

Battery & Component Assembly

Li-ion Battery Construction

PRODUCTS

01

Thermally Conductive Potting Compounds & Adhesives

Managing heat is an important challenge for EV OEMs and their component suppliers. Our teams manufacture thermally conductive adhesives and potting compounds that offer outstanding electrical insulation and excellent heat transfer to protect the electronics in demanding applications, and many of the compounds are flame retardant. These products are commonly needed in batteries, transformers, electric motors, coils, sensors or anywhere an application needs to dissipate heat away from the electronics. We offer epoxy, urethane and silicone solutions to meet any requirement our customers may have.

02

Potting & Encapsulating Compounds

Protecting components and assemblies for EV applications is common. Long-term protection from temperature cycling, shock and vibration, water and chemicals is necessary for many devices. Our epoxy, urethane and silicone potting and encapsulating solutions are proven in many demanding applications. This wide variety of chemistry allows us to offer durometers from a soft gel consistency up to a product that is rock hard. We also offer crystal clear and non-yellowing potting compounds when an optical solution is needed.

03

UL Listed 94 V-O Potting Compounds

We offer multiple potting and encapsulating compounds that are certified by Underwriters Laboratory to UL 94 V-0. These products are often requested in EV OEM applications. We offer many flame retardant products that have been certified by UL.

04

UV Curable Coatings & Adhesives

High volume production environments benefit from fast curing adhesives and coatings. There are opportunities for UV curable solutions in many assembly operations. These one-component systems have an unlimited pot life given they aren't exposed to light. These UV solutions offer excellent adhesion and bond to a wide variety of surfaces, including but not limited to metal, plastic and ceramics. Epoxy, acrylate and urethane chemistries are available for our UV products.

05

Circuit & Assembly Adhesives

While the applications are varied, there are many opportunities for companies to design products without mechanical fasteners. Epoxy and urethane assembly adhesives are available in a variety of features and cure speeds, some as fast as 5 minutes. These adhesives bond to numerous substrates including a variety of plastics, aluminum and many other different types of metals. Many of these adhesives are available in cartridges for easy mixing and dispensing. Electrically conductive adhesives are also available where conductivity is needed for PCB level electronics.

APPLICATIONS

1

Battery & Component Assembly

Adhesives replace heavy mechanical fasteners in EV battery and component assembly. By providing a lighter bond with the use of epoxies and urethanes, EV ranges are improved. Vibration can also be reduced in many applications with the use of structural adhesives.

2

Battery Potting

Thermally conductive, UL listed potting compounds increase the efficiency and service life of battery packs by dissipating heat effectively and protecting against moisture, chemicals and mechanical shock.

3

Capacitor Potting

Epoxy and polyurethane potting compounds improve reliability, performance and life cycle of capacitors by providing an electrically insulating, environmentally protective barrier.

4

EMI Shielding

Electrically conductive epoxy adhesives are used for electromagnetic interference (EMI) shielding applications in electric vehicles. EMI shielding is required in many applications within an electric vehicle, including data transmission systems and shielding between components and functions.

5

EV Chargers

Power electronics require thermally conductive materials to operate, and electric vehicle chargers are no different. By using thermally conductive epoxies and urethanes as opposed to silicones, clients are able to significantly increase adhesion to important components while offering excellent thermal conductivity and outdoor protection.

6

Li-ion Battery Construction

Epoxies are used to structurally seal the composites and metals that separate the cathode from the anode, with the highest degree of chemical resistance due to the aggressive solvents contained in the Li-ion electrolyte salts. The ideal epoxy must cure <100°C in order to not harm the Li-ion battery, as well as not have any side effects producing trapped HF gases.

7

Motor Inverters

In GaN chip technology, epoxies are used for thermally efficient SMD packaging, handling high voltage (800 – 900V power-bus) and fast switching for most efficient and reliable inverters for EV, which are liquid cooled. Thermal K epoxy is common for drawing more heat away from the cooling tubes. Inverter efficiency impacts the longevity of the battery charge. Inverters power the drive chain by converting direct current (DC) power from the main battery into alternative current (AC) power that drives the motor. Improved inverter circuits extend the driving range of EVs.

8

Motor Assembly

SMD format as well as coil windings need epoxy for impregnating, insulating and protecting the Cu winding. They commonly use thermally conductive epoxy for bonding the two halves of ferrite cores, which forms the basis of the bobbin.

9

On-Board Chargers

On-board chargers use GaN transistor packaging for improved power density. Reduced power losses enables faster charging for EV car owners. EV manufacturers need lighter weight and smaller sized OBC. GaN outperforms Si and SiC chips in power efficiency. High thermal K packaging is required to utilize GaN semiconductors' performance. More efficient OBC can mean reduced car cost due to simpler air cooling methods.

10

Motor Potting

Electric vehicle motors require thermally conductive, UL 94V-0 flame retardant materials in order to dissipate heat and protect and seal these crucial components. Using a thermally conductive material also helps extend the life of the motor by lowering its operating temperature. Large core diameter Cu coils need thermally conductive epoxy, with very fine particles to penetrate the coil winding, for heat sinking the motor. The ideal product needs high dielectric strength at high temperatures and is compatible with vacuum potting processes for void-free encapsulation.

11

Sensors & Controls

Sensors & controls are important components in electric vehicles. Adhesives and potting compounds are often necessary to protect or assemble these critical devices. Position, speed, temperature, pressure and flow are just a few examples of sensors that are common applications for EV/battery manufacturers. MEMS sensors often require electrically conductive, thermally conductive or optical grade materials.

12

Stray Currents/ Grounding

Premature bearing failure caused by induced electrical currents through the motor shaft leads to motor failure. Silver epoxy is used for grounding these unwanted stray currents.

13

Transformer Potting

Thermally conductive epoxies protect, insulate and heat sink the active and passive power devices and components on the board and in the housing. The ideal epoxy has the best balance of viscosity, high content of thermal fillers and delicate curing process.

APPLICATIONS

| PRODUCTS | Battery Potting | Capacitor Potting | EV Chargers | Inductor Potting | Transformer Potting |
|-----------------------------|-----------------|-------------------|-------------|------------------|---------------------|
| 50-3141FR* | | | | | |
| 50-3150FR** | X | X | X | X | X |
| 50-2369FR** | X | X | X | X | X |
| 50-3152FR** | X | X | X | X | X |
| 50-3170 | | | X | X | X |
| 50-1225* | X | X | X | X | X |
| EJ2189-LV | | | | | |
| 10-3216 | | | | | |
| 10-3005 | | | | | |
| T905BN-3 | | | | | X |
| T7110 | | | | X | X |
| 920-FL | | | | | |
| 377H | | | | | |
| 377 | | | | | |
| H77 | | | | | X |
| 70-3812NC | | | | | |
| 431 | | | | | |
| H31 | | | | | |
| 930-4 | | | | | X |
| 301-2 | | | | | |
| H20E | | | | | |
| 353ND | | | | | |
| OG198-54 | | | | | |

* Meets UL94 V-0 flame retardant requirements
** UL94 V-0 Listed

| Motor Potting | EMI Shielding | Battery & Component Assembly | Heat Sink Bonding | Stray Currents/ Grounding | Sensors |
|---------------|---------------|------------------------------|-------------------|---------------------------|---------|
| | | X | X | | X |
| X | | X | X | | |
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This is not an all-inclusive list. For a complete product listing, visit www.epotek.com and www.epoxies.com.

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