

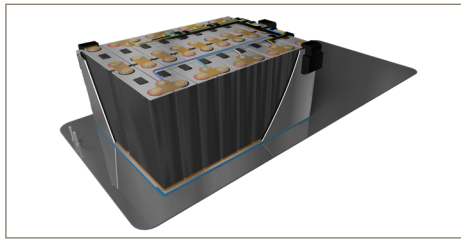
CoolTherm® Materials

for Electric Forklifts



Fueled by clean energy and reliability, electric forklifts and material handling equipment are increasing in popularity. To meet the ramp-up in production, we're here to provide the right thermal management materials solutions for your electric forklift battery or e-motor design.

Thermal management is crucial for electric forklift applications to ensure the battery and motor operate reliably, safely, and at optimal temperatures. CoolTherm® thermal management materials reduce operating temperatures contributing to higher-performing electric transportation. This line of products includes liquid-dispensed thermally conductive gap fillers, potting, encapsulants and structural adhesives along with dielectric coatings.



Battery Packs

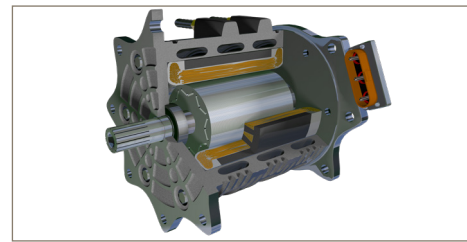
As battery technology evolves towards increased energy density, the ability to manage heat during charge and discharge cycles is crucial for optimizing performance. Our CoolTherm thermal management materials are fully customizable and compatible with cylindrical, pouch and prismatic battery cells.

Contact Information:

Ellsworth Adhesives
W129 N10825 Washington Drive
Germantown, WI 53022

Phone: 877.454.9224

ellsworth.com



Electric Motors

We offer potting and encapsulant materials that are compatible with e-motors. Thermally-conductive epoxy and silicone encapsulants help manage heat, enabling you to increase the power density and life of your electric motor. Our studies have shown a temperature decrease of up to 50°C or an increase in power output up to 30% with CoolTherm.



ENGINEERING YOUR SUCCESS.

Gap Fillers:

Get the best performance out of your batteries by filling in surface imperfections with a thermally conductive gap filler designed with electric forklift applications in mind. They are a stay-in-place solution and cure as a gel, easing the stresses caused by thermal differences and flex. We also offer low ppm siloxane solutions for sensitive electronic applications.

GAP FILLERS	PRODUCT	CHEMISTRY	THERMAL CONDUCTIVITY (W/m-K)	SHORE HARDNESS (OO)	DENSITY (g/cm ³)
	CoolTherm® SC-1200	Silicone	2.0	82	2.9
	CoolTherm SC-1600	Silicone	3.7	89	3.3
	CoolTherm SC-2000 RW	Silicone	2.0	65	2.0
	CoolTherm UR-2000	Urethane	2.0	D55	2.6

- Two-Component
- Low Outgas Options
- Room Temperature and Heat Curing
- Electrically Isolative
- 1:1 Mix Ratio
- Protect Against Shock
- Dampen Vibration

Adhesives:

Formulated for MMD equipment, our thermally conductive adhesives provide rigidity, structural integrity and a thermal connection where heat is a problem. With our adhesives, you are no longer constrained by mechanical fixtures and can bond a variety of substrates, which can simplify your overall battery pack design.

ADHESIVES	PRODUCT	CHEMISTRY	THERMAL CONDUCTIVITY (W/m-K)	LAP SHEAR STRENGTH (MPa)
	LORD® 852/25GB	Acrylic	—	18.1
	LORD 5206/55GB	Acrylic	—	19.3
	LORD 7545 A/B	Urethane	—	7.7
	CoolTherm TC-2002	Acrylic	1.0	15.8

- Variable Cure Speeds
- Electrically Isolative
- Improve Design Flexibility
- Reduce Complexity
- Room Temperature or UV Cure

Coatings:

Depend on strong, cost-effective coatings to provide insulating barriers around electric forklift batteries and motors. Our LORD JMC-700K thermally-conductive, dielectric coating is used to coat magnets, heat sinks, and cooling plates in EVs. Sipiol UV single-component, dielectric coating cures in seconds with UV light and is ideal for battery cells.

COATINGS	PRODUCT	CHEMISTRY	THERMAL CONDUCTIVITY (W/m-K)	DIELECTRIC STRENGTH (kV/mm)	TEMPERATURE RANGE (°C)
	LORD JMC-700K	Epoxy	0.4-0.5	100 @ 50 µm	-40 to +180
	Sipiol® UV	Acrylic	0.2-0.5	>90 @ 100 µm	-40 to +120

- Heat and UV Curing
- Electrically Isolative
- High Adhesion and Flexibility

Potting & Encapsulants:

Our encapsulants facilitate optimum heat transfer because of their high thermal conductivity and low viscosity. Additionally, potting and encapsulants provide protection from dust and moisture and can reduce vibration. Our two-component encapsulants exhibit minimal shrinkage during cure, high dielectric strength, and thermal conductivity.

POTTING	PRODUCT	CHEMISTRY	THERMAL CONDUCTIVITY (W/m-K)	VISCOSITY (cP @ 25°C)	DENSITY (g/cm ³)
	CoolTherm SC-309	Silicone	1.0	3,600	1.7
	CoolTherm SC-320	Silicone	3.2	22,000	3.1
	CoolTherm SC-324	Silicone	4.0	30,000	3.2
	CoolTherm EP-6035	Epoxy	1.0	12,000	1.6
	CoolTherm UR-389	Urethane	0.7	14,000	1.5

- Room Temperature and Heat Curing
- Electrically Isolative
- 1:1 Mix Ratio
- Improve Performance
- Protect Electronics
- Reduce Component Stress