

# HIGH PERFORMANCE MATERIALS FOR EV BATTERY PACKS



To request an EMS Design Kit, scan QR Code. The kit includes Free Material Samples, Thermal Runaway Solution Analysis and Battery Pad Product Selection Tool.

# EV BATTERY PACK DESIGN CHALLENGES

EV battery packs present numerous challenges for design engineers looking for ways to extend range while achieving safety targets and minimizing complexity, volume, and weight. Rogers partners with OEMs and Tiers to improve and optimize battery pack performance by rapidly developing custom material solutions unique and critical to each EV program.

## Space Constraints

- Tighter tolerance for thickness and CFD

## Assembly Automation

- Meets tackiness requirement for optimal cell stack assembly automation

## Battery Safety

- Thermal propagation delay is critical to high-powered next gen cells
- While V0 may not be the biggest driver, flammability is still a key consideration

## Packaging/Weight

- Meets BOL and EOL compression force needs with a maximum usable range that minimizes incompressible space

## Long Term Performance

- Low compression set
- Uniformity of CFD curve over battery lifespan
- Optimization of charge/discharge cycles to increase efficiencies and the lifespan of the battery



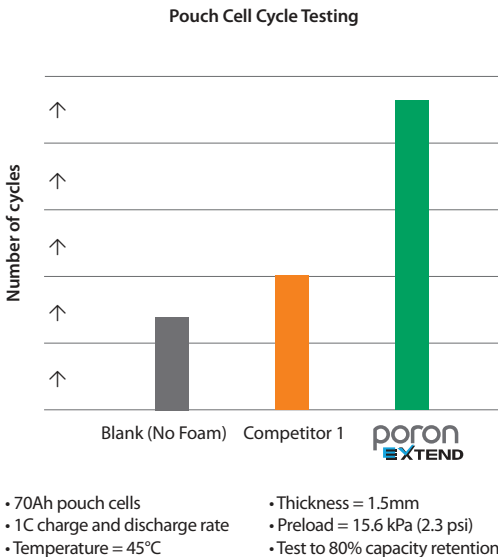
## Rogers EMS Value Propositions



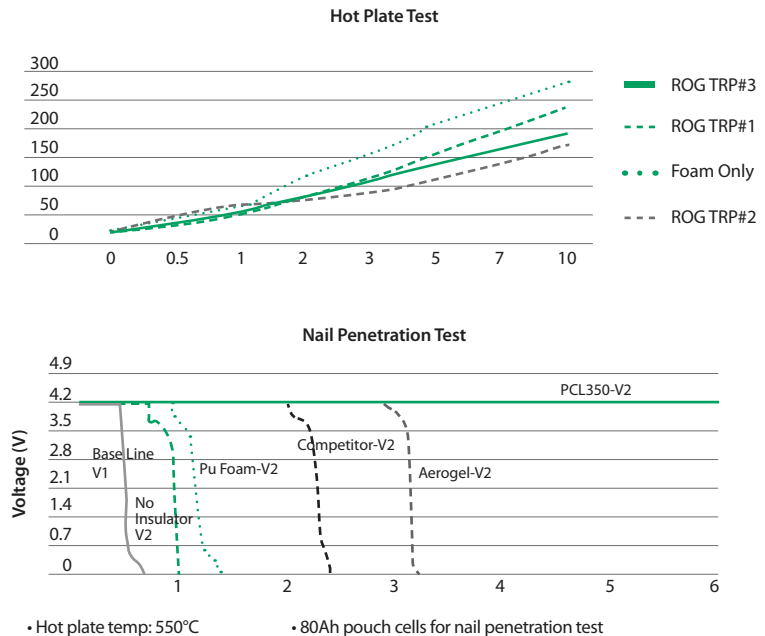
## Rogers Battery Lab & Technical Services

The Rogers Battery Lab and Technical Services teams provide EV design engineers with the expertise and resources required to streamline design cycles, validate proper compression management, and analyze battery stack configuration and material options.

### Battery Life Extension Validation with Capacity Fade test

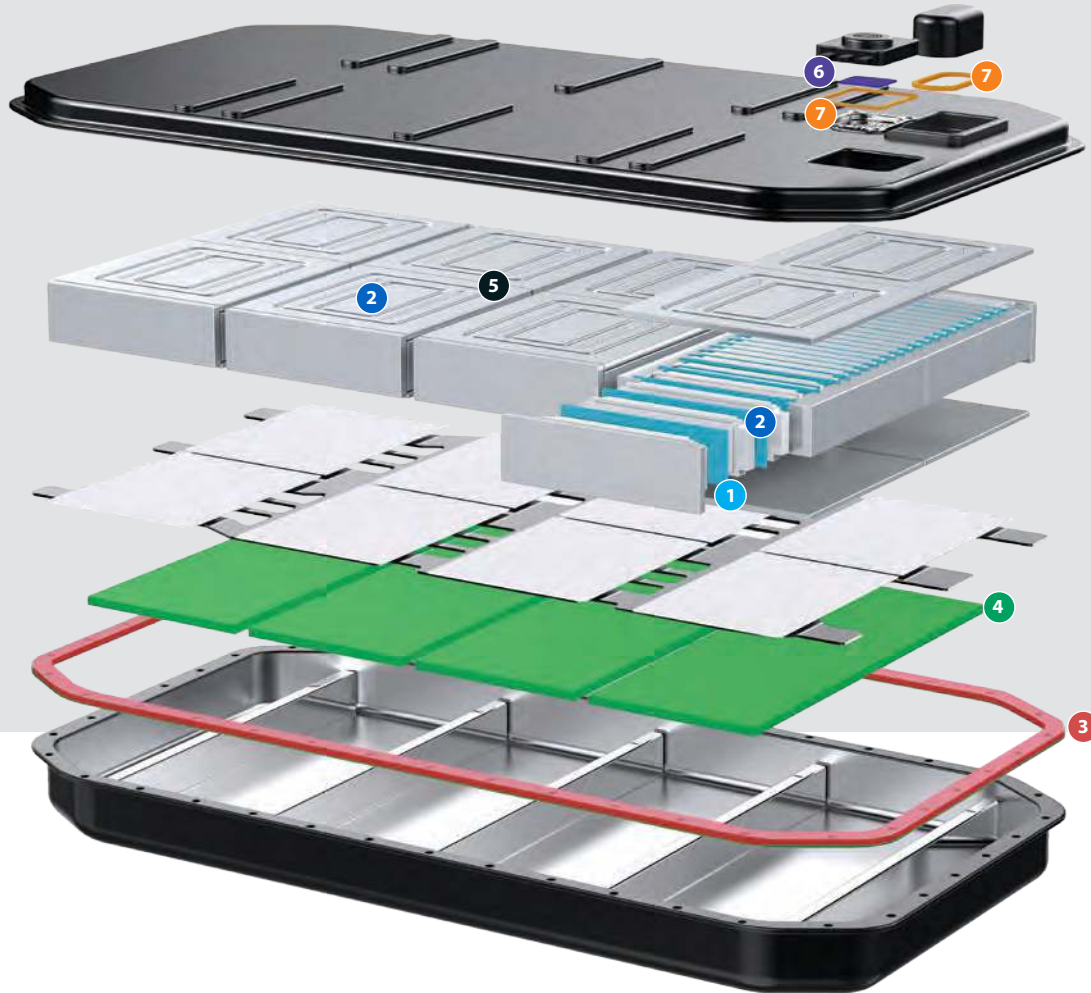


### Thermal Propagation Solution through Hot Plate and Nail Penetration tests



# EV BATTERY PACK SOLUTIONS

Built to withstand the stresses of fluctuating compression and temperature, PORON® polyurethane and BISCO® silicone materials are designed to reliably hold a consistent force, keep battery cells aligned, seal against dust and fluid, and isolate the damaging effects of vibration.



**1 Battery Compression Pads**  
PORON® and BISCO® Materials Provide Consistent Push Back Force to Optimize Battery Cell Life and Performance

**2 Thermal Propagation Pads**  
ProCell™ Firewall Materials Offer a 2-in-1 Solution that Provides Cell-Level Thermal Propagation Protection and Compression Management

**3 Battery Pack / Environmental Seal**  
BISCO® Material Delivers Extreme, Long-Term Protection Against Environmental Elements While Allowing the Pack, Module, and/or Electronics Compartments to be Serviced Over the Life of the Battery/Vehicle


















**4 Cooling Plate Cushion Pads**  
PORON® and BISCO® Materials Provide Consistent Push Back Force over the Long-Term, Insuring Cooling Plate Contact with the Battery Elements for Proper Functioning of the Thermal System





















**5 BMS and Sensor Spring Pads**  
PORON® and BISCO® Materials Offer Protection from Vibration and Provide a Consistent Force that Helps to Maintain Proper Functioning of Sensors and Flexible Printed Circuit Boards

**6 Venting Film**  
DeWAL® Venting Membranes are Engineered to Vent and Protect a Wide Range of Critical Enclosure Applications. ePTFE Venting Membranes Allow for Enhanced Heat and Air Ventilation, while Burst Vents Enable Quick Evaluation of Heat and Pressure, Critical to all Thermal Runaway Protection Systems

**7 High-Voltage Sealing Gasket**  
BISCO® Material is a Reliable and Reworkable Solution for Sockets, Manual Service Disconnects as well as Venting Cap Sealing

# ROGERS EV DESIGN SOLUTION PORTFOLIO

Material Features	Rogers Products	Benefits
<ul style="list-style-type: none"> <li>Unique Open-Cell Structure</li> <li>Compression Set Resistance</li> <li>Minimal Stress Relaxation</li> </ul>		<ul style="list-style-type: none"> <li> Compression Management</li> <li> Dimensional Stability</li> <li> Reliability and Performance</li> </ul>
<ul style="list-style-type: none"> <li>Stability in High Temperatures</li> <li>Low Outgassing</li> <li>Chemical Resistance</li> </ul>		<ul style="list-style-type: none"> <li> Thermal and Electrical Insulation</li> <li> Flammability Rated and Safety</li> <li> Environmental Sealing</li> </ul>
<ul style="list-style-type: none"> <li>Energy Absorption</li> </ul>	 	<ul style="list-style-type: none"> <li> Vibration Management</li> </ul>
<ul style="list-style-type: none"> <li>Air Permeability</li> <li>Chemically Inert</li> </ul>		<ul style="list-style-type: none"> <li> Pressure Equalization</li> <li> Burst Capability</li> </ul>
<ul style="list-style-type: none"> <li>Thermal Runaway Barrier with Consistent Mechanical Properties over a Wide Temperature Range</li> </ul>		<ul style="list-style-type: none"> <li> Thermal Propagation Management</li> <li> Compression Management</li> </ul>

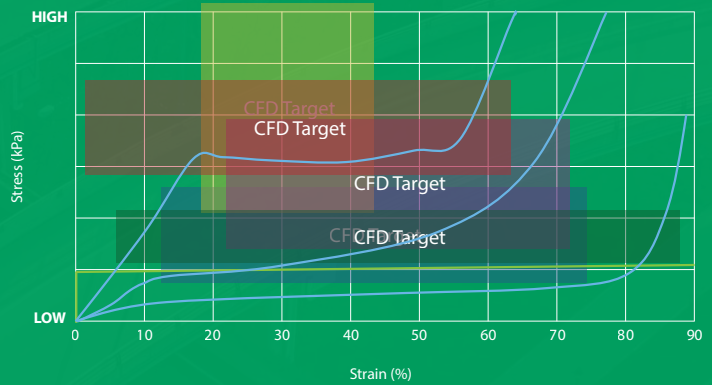
Application	Material	Benefits
<ul style="list-style-type: none"> <li>Cell-to-Cell Compression Pad / Separator Insulation</li> </ul>	<p><b>PORON EVExtend® Material</b> Optimal Pressure with Usable Range 4790-92 (Extra Soft, Slow Rebound) 4701-50 (Firm) V0 (Flame Retardant)</p>	<ul style="list-style-type: none"> <li> Compression Management</li> <li> Dimensional Stability</li> <li> Reliability and Performance</li> <li> Thermal and Electrical Insulation</li> </ul>
<ul style="list-style-type: none"> <li>Thermal Propagation Protection</li> </ul>	<p><b>PORON EVExtend® Material</b> <b>ProCell™ EV Firewall Material 350</b></p>	<ul style="list-style-type: none"> <li> Thermal Propagation Management</li> <li> Compression Management</li> </ul>
<ul style="list-style-type: none"> <li>Battery Pack Seal</li> </ul>	<p><b>BISCO® Silicone Material</b> HT Series Flame Retardant, Gasketing, Water Sealing Medium to Firm Grade</p>	<ul style="list-style-type: none"> <li> Environmental Sealing</li> <li> Reliability and Performance</li> <li> Flammability Rated and Safety</li> </ul>
<ul style="list-style-type: none"> <li>Cooling Plate Cushion Pad</li> </ul>	<p><b>BISCO® Silicone Material</b> HT Series Consistent Push-back Force over Vehicle Life Medium to Firm Grade</p>	<ul style="list-style-type: none"> <li> Compression Management</li> <li> Dimensional Stability</li> <li> Reliability and Performance</li> <li> Thermal and Electrical Insulation</li> </ul>
<ul style="list-style-type: none"> <li>Environmental Sealing, Insulation</li> </ul>	<p><b>BISCO® Silicone Material</b> HT Series Flame Retardant, Gasketing, Water Sealing Medium to Firm Grade</p>	<ul style="list-style-type: none"> <li> Environmental Sealing</li> <li> Reliability and Performance</li> <li> Flammability Rated and Safety</li> </ul>
	<p><b>PORON® AquaPro® 37/41</b> Soft, Enhanced Sealability</p>	<ul style="list-style-type: none"> <li> Environmental Sealing</li> <li> Reliability &amp; Performance</li> </ul>
<ul style="list-style-type: none"> <li>Battery Management System Spring Pad and Gasket for Sensors and Flexible Printed Circuit Boards</li> </ul>	<p><b>PORON EVExtend® Material</b> <b>BISCO® Silicone Material</b> HT-800 (Medium Firm) HT-870 (Medium)</p>	<ul style="list-style-type: none"> <li> Compression Management</li> <li> Dimensional Stability</li> <li> Reliability and Performance</li> <li> Thermal and Electrical Insulation</li> </ul>
<ul style="list-style-type: none"> <li>Burst Vent</li> </ul>	<p><b>DeWAL® Venting Material</b> DW232PA</p>	<ul style="list-style-type: none"> <li> Pressure Equalization</li> <li> Burst Capability</li> </ul>
<ul style="list-style-type: none"> <li>Pressure Equalization &amp; Protection</li> </ul>	<p><b>DeWAL® Venting Material</b> DW930 Series</p>	<ul style="list-style-type: none"> <li> Pressure Equalization</li> <li> Environmental Sealing</li> </ul>

# Technical and Design Support Tools to Optimize Battery Performance

The Application Design Tool assists in identifying the best PORON® or BISCO® material solutions to meet specific compression force and gap filling needs.



<https://tools.rogerscorp.com/ems/products/msg/index.aspx>



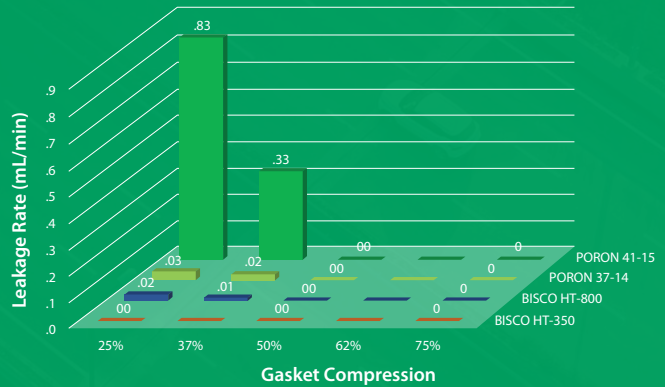
## Gap Filling Tool

The Gap Filling Tool guides users to a selection of the best PORON® or BISCO® materials for water, dust, and environmental sealing applications.



<https://tools.rogerscorp.com/ems/gapfilling/index.aspx>

### Water Sealing ASTM F37@ 1m H<sub>2</sub>O Pressure

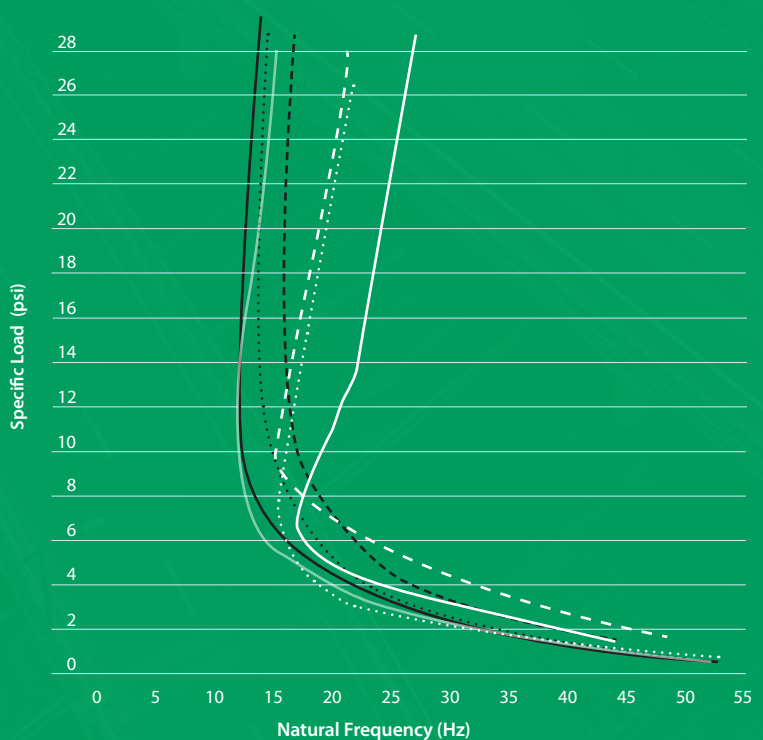


## Vibration Isolation Tool

The Vibration Isolation Tool recommends the proper BISCO silicone and PORON polyurethane materials for vibration mitigation applications.

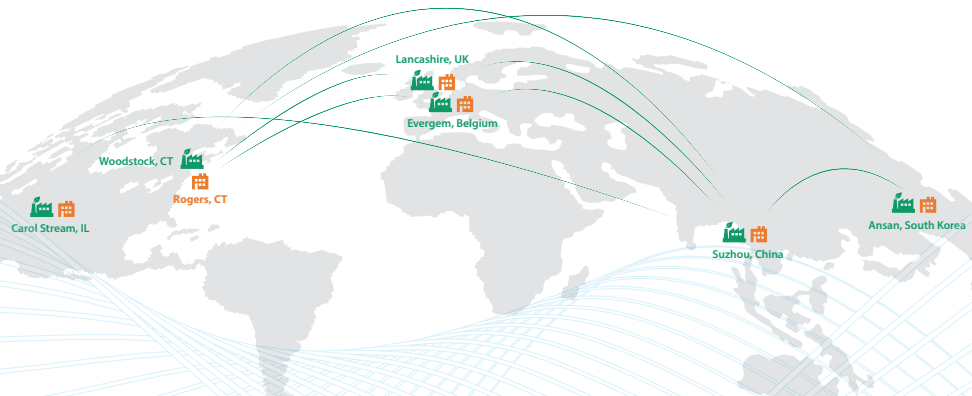


<http://tools.rogerscorp.com/ems/vibration/index.aspx>



## Rogers and its global converter network provide supply chain and logistics support for serial production programs.

A network of global manufacturing sites and converter networks provide resiliency in the event of supply chain shocks.



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