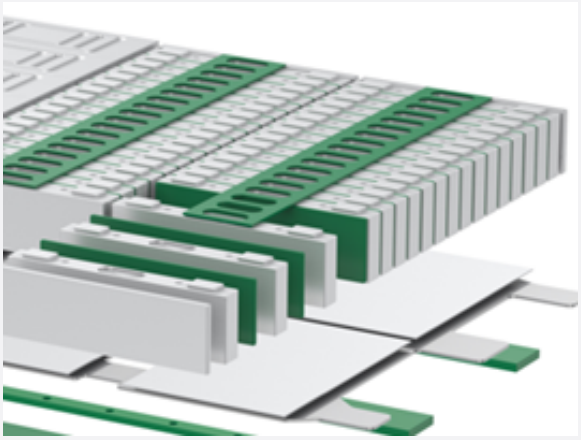
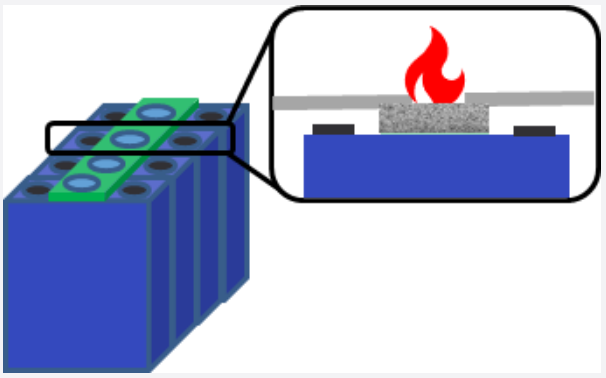
Technical Bulletin

Venting in EV Battery Packs

Thermal runaway prevention and delay is one of the main elements battery pack manufacturers must consider when designing their packs. If one of the lithium-ion battery cells within the pack is damaged by puncturing, overcharging, or a manufacturing defect, it will release gas and heat, damaging other cells and potentially causing a chain reaction of thermal events. Once that thermal runaway event occurs there is a steep increase in pressure inside the battery pack as well as a forceful stream of hot gasses that will exit the pack. Including venting in the pack configuration can ensure that there is a pressure release to prevent the battery from exploding. In the case of a catastrophic failure, designing an established vent path for the hot gasses ensures that the ejecta is directed away from other cells and, most importantly, the passenger cabin.



Some battery pack manufacturers have designed air ducts to direct the hot gasses out and away from the other lithium-ion cells into the designed vent path. To ensure the hot air is dispersed through the ducts they need a gasket seal between the duct and the battery racks. BISCO® materials are compressible and capable of withstanding extreme heat for short durations to ensure the hot gasses proceed down the design path for maximum safety of the pack and passengers.



At the cell level, vent channel gaskets are often used with prismatic form factor because they have a factory vent. A foam gasket can be used around the cell vent to divert hot gas and ejecta away from neighboring cells. Vent channels can be used at the pack or module level of any form factor to direct hot gas and ejecta away from critical components or direct gas towards sensors for earlier detection of a thermal event.

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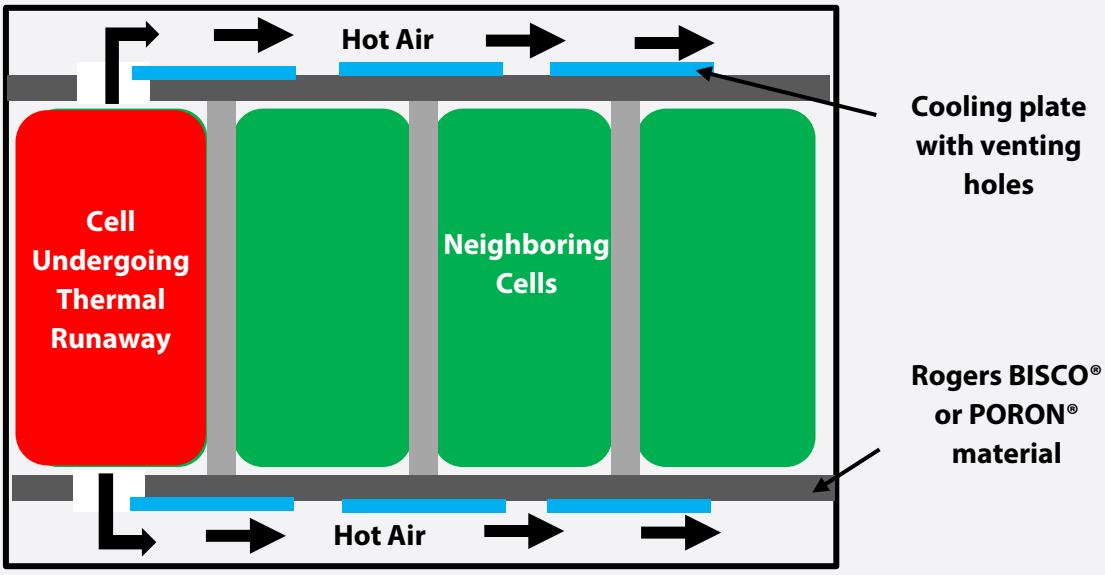
VENT PATH SOLUTIONS

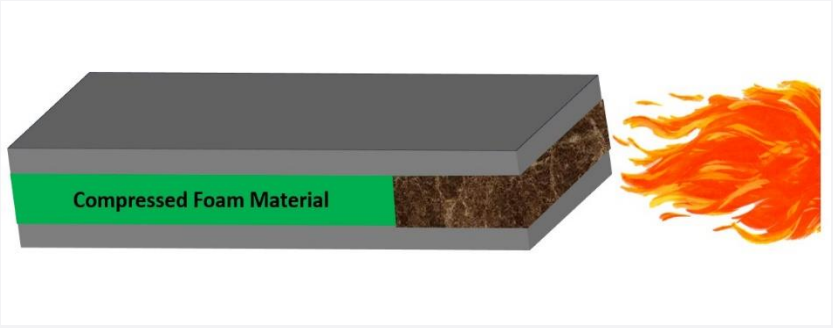


Vent paths are created in battery packs to direct the hot air from a cell undergoing thermal runaway away from the neighboring cells and out of the cell pack. A Rogers material can help guide hot air through a vent when it bursts at high temperatures, allowing heat to escape while keeping the area between the cooling plate and cell spacer sealed to prevent a full thermal runaway.

BISCO® SILICONE FOAMS and PORON® POLYURETHANE VENT SEAL TESTING

Cross-Section Flame Testing

The Rogers team uses a cross-section flame test to validate performance of materials in this application. A foam, or other sealing material, is compressed to a specified thickness or strain % using metal plates. The cross section of the material is then exposed to a 1100°C (2012° F) flame for a period. The ingress of the char is analyzed to determine how far the heat from the flame was able to propagate through the cross section of the material. That information is then used to evaluate the potential for neighboring cells to be exposed to the heat of the released gases.



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