Composites® International

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Driving Composites

In Electric, Hybrid and New Energy Vehicles

FLAMEVEX™

Flame Resistant Lightweight Composites

Composite Solutions For Electric, Hybrid, and New Energy Vehicles

FLAMEVEX™
Flame Resistant Lightweight Composites

The number of electric vehicles on the road is increasing due to the cost of ownership coming down, emission standards becoming more severe, and driving range always increasing. Electric and new energy vehicles, however, come with unique challenges for designers. Take for example an EV's battery enclosure. Due to the level of power required for the electrical powertrain, the size of the pack can be over 2 square meters with up to 30 centimeters of depth. Due to its size, proximity to the source of energy, need for a perfect seal, and complex shape, designers must find a material solution which can perform to the highest fire resistance standards, offer high mechanical performance, and simultaneously reduce weight.

In 2020, IDI Composites International launched Flamevex™: a series of highly flame-resistant SMCs with high mechanical properties and a low level of shrinkage, offering the ability to mold complex parts with dimensional stability from a lightweight material. Today, the next generation of Flamevex™ materials add increased strength and stiffness making these materials ideal when combatting thermal runaway events.

Flamevex™ SMCs provide the ideal solution for:

1. **Flame Performance**
2. **Structural Strength & Stiffness**
3. **Light Weighting**
4. **Dimensional Stability**

While steel or aluminum are often used for their high structural performance and high temperature resistance, they remain an expensive solution due to the complex shape and the need for anti-corrosion treatment, electrical insulation, and heat barriers. Plus, steel and even aluminum add significant weight which can be a serious limitation for electric and new energy vehicles.

More and more OEMs are replacing steel and aluminum battery enclosures with IDI's Flamevex™ composites. By doing so, they can eliminate up to 35% of the housing weight and realize cost reductions of up to 65% by reducing secondary operations.

EV Battery Cover

Flame Performance

Flamevex™ materials are not traditional thermoset composites. Other solutions claim high levels of fire resistance by increasing the thickness of the part, but this adds unnecessary weight. With Flamevex™, IDI is advancing SMCs to previously unknown fire performance levels without compromising thickness, strength, or moldability.

Working with our OEM and Tier 1 partners, IDI's Flamevex™ materials have been used on battery packs which have passed the stringent Chinese Standard GB/T 31467.3 (aka China Bonfire test) tests at thicknesses as low as 2.5 mm (with lower thicknesses in development).

IDI's Flamevex™ materials offer a range of flame performance levels that can be tailored to an OEM's requirements. From UL 94 V0 and 5VA to the Bonfire testing levels, we work with customers to identify the flame performance level best suited for their application.

Structural Strength & Stiffness

As the design and requirements for electric vehicles continue to evolve, battery enclosures are increasingly integrated into the primary structure of the vehicle. This means designs must be capable of handling crash energy and other primary loads.

Furthermore, thermal runaway testing performed by IDI Composites International indicates tensile strength and stiffness are critical to containing these challenging events. Because thermal runaway events involve short-term, but extreme spikes in pressure, these mechanical properties of the material have become just as important as flame resistance.

Fire Resistance + Strength: Filling the Void

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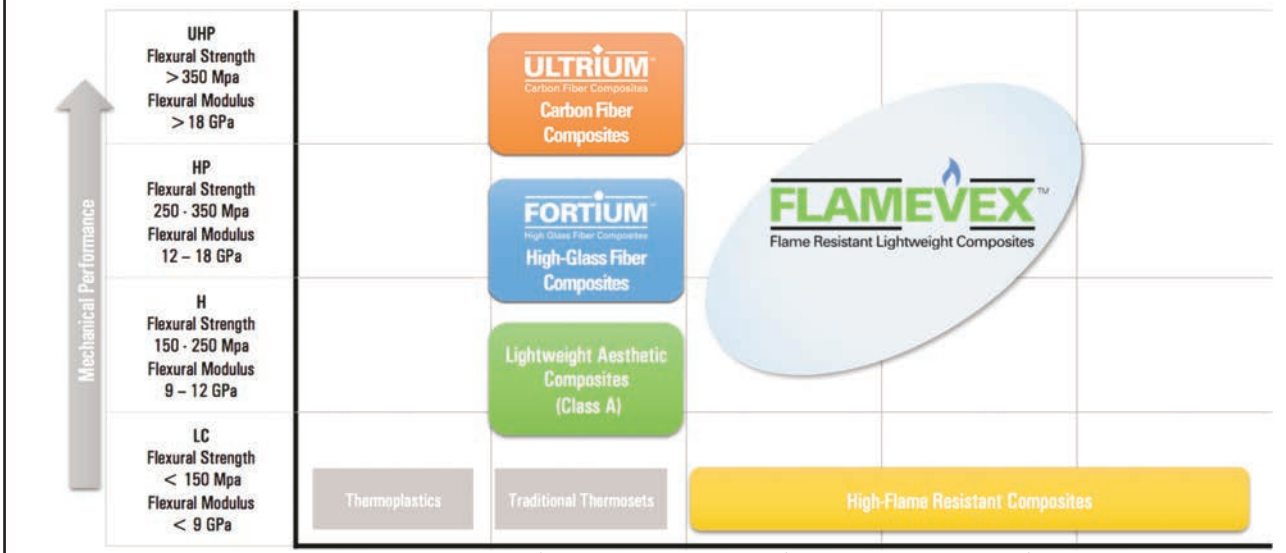


IDI Rating	FV1	FV2	FV3	FV4	
Flame Test Sample Thickness	≥ 10.0mm	≥ 3.0mm	≥ 2.0mm	≥ 1.5mm	UL94 V0 Testing
	≥ 15.0mm	≥ 5.0mm	≥ 3.0mm	≥ 2.0mm	UL94 5VA Testing
	Does not pass	≥ 5.0mm	≥ 3.0mm	≥ 2.0mm	Bonfire Testing
UL Thermal Runaway	Does not pass	Does not pass	≥ 250KPa	≥ 500KPa	Li-ion Failure
Thermal Conduction		< .1W/m*K		< .05W/m*K	

Fire Resistance

Flamevex™ Performance Levels

IDI's Flamevex™ materials are available in a range of performance levels. FV3 materials take fire resistance a step above other thermoset composites and are capable of passing UL94 VO at 2.0mm. For even higher performance, FV4 materials pass UL94 VO at 1.5mm.

Material Density

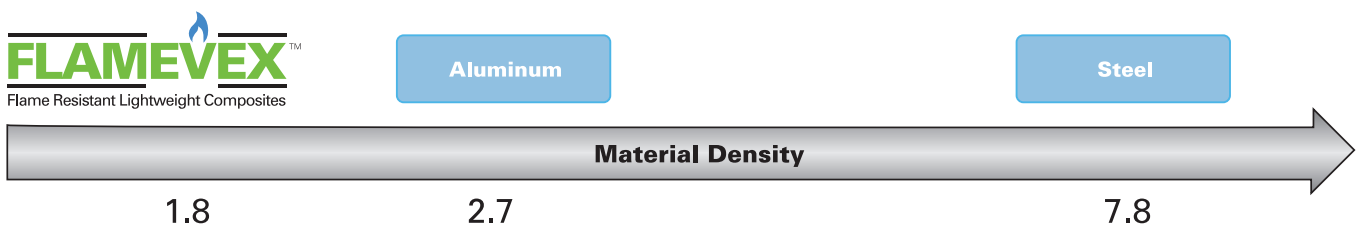
The need to extend the range of electric and new energy vehicles means more and more need for lightweight solutions. At 1.8 density, Flamevex™ materials are far lighter than metal alternatives.

IDI has the Experience & Expertise

With a global portfolio of materials, IDI has collaborated with numerous OEMs and offers the experience and expertise needed in order to optimize the material performance and processability required for EV applications such as battery covers.

With materials in mass production, we have worked with OEMs and Tier 1s to meet evolving flame performance targets. Our materials are in mass production with OEMs and Tier 1s, proving consistent results.

IDI Flamevex™ Material Density



IDI World Headquarters

IDI Composites International (IDI) is the premier global formulator and manufacturer of thermoset molding composites and compounds for OEMs, Tier 1s and molders. IDI provides standardized and customized polyester/vinylester-based sheet molding compounds (SMC), bulk molding compounds (BMC), and new lines of high performance composites, Ultrium™, Fortium™, Flamevex™ and Alluralite™ that are manufactured for the most demanding applications.

3i Composites Technology Center

inquiry • ideas • innovation

The 3i Composites Technology Center is the research and development division of IDI Composites International, with locations in both North America and Europe. Due to increased demand from OEMs, Tier 1s and molders for stronger, lower density and higher performing materials, the 3i Technology Center was founded to meet these industry-wide demands.

7/2024

GLOBAL LOCATIONS GLOBAL SOLUTIONS

idicomposites.com

United States	Europe	United Kingdom	Asia/Pacific	Caribbean	Mexico
Noblesville, Indiana	Vineuil, France	Oldbury, UK	Shanghai, China	Aguirre, Puerto Rico	Mexico City, Mexico