Electrical insulation for electric/hybrid electric vehicles
In the exciting new field of alternatively fueled vehicles, only DuPont has the necessary combination of design expertise, evaluation technology and superior electrical insulation material—DuPont™ Nomex®—to help meet original equipment manufacturers’ (OEMs’) needs.

Exceptional thermal stability
DuPont™ Nomex® has an Underwriters Laboratories (UL) thermal rating of 220°C and a long history of proven endurance under high thermal stress. This high-temperature durability helps to allow miniaturization and/or higher power density of electrical drive motors and enables long-term electrical dependability.

This also helps OEMs to reduce the size and weight of components such as traction motors, which in turn can increase fuel efficiency.

The effects of long-term exposure to high temperature on important electrical and mechanical properties of DuPont™ Nomex® are shown in Figures 1 and 2.

Superior mechanical strength
The superior mechanical strength and resilience of DuPont™ Nomex® insulation (refer to Table I) help extend the service life of rotating equipment, such as traction motors, which are subjected to harsh operating conditions that include severe shock and vibration, as well as abrasion caused by thermal expansion and centrifugal forces.

An added benefit of the superior mechanical strength of DuPont™ Nomex® is the manufacturing efficiencies that can be gained from automatic insertion of slot liners.

Figure 1. Effect of prolonged exposure to high temperature on the dielectric strength of DuPont™ Nomex®. (ASTM D-1830, curved electrodes)

Figure 2. Effect of prolonged exposure to high temperature on the initial strength of DuPont™ Nomex®. (Tested per UL-746)
Excellent dielectric strength
DuPont® Nomex® features excellent electrical properties and endures electrical stresses that are commonly encountered in (H)EVs due to the use of inverters. As shown in Table II, DuPont® Nomex® has excellent dielectric strength. It is important to note that these values differ from long-term strength potential. DuPont recommends that continuous stresses in transformers not exceed 1.6 kV/mm (40 V/mil) in order to minimize the risk of partial discharges (corona). DuPont has materials designed for applications where corona is present, should this be necessary.

Excellent chemical stability
Decades of experience in similar types of automotive motors and generators have proven that DuPont® Nomex® is compatible with a wide range of chemicals, including virtually all classes of electrical varnishes and adhesives, as well as the oils and automatic transmission fluids often used in (H)EVs.

Design and testing expertise
As a leader in electrical insulation systems for more than 40 years, DuPont has earned a strong reputation for evaluating the performance of insulation used in equipment. Our experts are drawing on this experience to help global OEMs translate their performance needs into measurable criteria, even designing new test protocols and testing equipment when necessary.

DuPont experts in motor design are also working with top OEMs around the world to help them develop specific solutions that will optimize their motor designs and help advance this evolving industry.
Product safety information is available upon request

This information corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own experimentations. It is not intended, however, to substitute for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. This information may be subject to revision as new knowledge and experience become available. Since we cannot anticipate all variations in actual end-use conditions, DUPONT MAKES NO WARRANTIES AND ASSUMES NO LIABILITY IN CONNECTION WITH ANY USE OF THIS INFORMATION. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any trademark or patent right.

Please note: The properties in this sell sheet are typical or average values and should not be used as specification limits. Unless otherwise noted, all properties were measured in air under “standard” conditions (in equilibrium at 23°C, 50% relative humidity). Note that, like other products of papermaking technology, DuPont® Nomex® papers have somewhat different properties in the papermaking machine direction (MD) compared to the cross direction (XD). In some applications (for example, motor slot liners), it is necessary to orient the paper in the optimum direction to obtain its maximum potential performance.

To learn more about how DuPont® Nomex® electrical insulation can help you improve the performance and reliability of motors and generators for (H)EVs, call 1.800.931.3456 or visit www.nomex.dupont.com