

Delivering ultra-fast electric vehicle High Power Charging (HPC) with 3M liquid-cooling technology



The Challenge

As greater adoption of electric vehicles accelerates, so does the need for rapid, efficient, safe and easy-to-use charging solutions. The challenge? Help drive electric vehicles further into the mainstream by creating a charging solution fast enough to work in minutes, ergonomic enough for anyone to handle and super-safe for both individuals and the environment.

The Liquid-Cooled Solution

To deliver the high-power charging system that automotive OEMs want and consumers will grow to expect, ITT's engineers determined that liquid cooling is the optimal solution. In the patent-protected ITT Cannon design, the coolant circles continuously from the cooling unit to the cable, to the connector and back again. And since liquid cooling ensures extremely efficient heat dissipation with minimal added weight or bulk, it's easy enough for any driver to handle and has the power to get their vehicle charged quickly.

A Powerful Collaboration

To realize this revolutionary design, ITT Cannon selected 3M™ Novec™ Engineered Fluids for its liquid-cooled DC High Power Charging (HPC) solution, setting a new performance standard in high-power charging. Unlike other liquid coolants on the market, 3M's Novec fluids are dielectric, non-flammable and non-toxic with no compromise on worker safety or environmental sustainability.

Drivers need a charging solution that is safe and easy to handle, while delivering a powerful, ultra-fast charge. In the race to develop more efficient charging solutions in a rapidly advancing market, ITT Cannon selected 3M™ Novec™ Engineered Fluids to support an innovative liquid-cooled charging solution that delivers an ultra-fast charge with a consumer-friendly ergonomic design.

Customer Problem

Electric vehicles continue to rise in popularity, but for the industry to continue to gather pace, charging solutions need to be faster, providing a charge in minutes.

Delivering this level of charging power has safety, performance, and usability implications for traditional EV cable and connector designs which struggle to deal with the heat generated. Cooling is essential, and liquid cooling can help provide the heat dissipation performance required. However, many liquid coolants have issues with flammability, degradation, corrosion, toxicity and pollution.

How We Solved It

We knew that a liquid-cooled solution was the optimal way to meet our markets' current and future performance needs, so we set out to create an ultra-fast CCS1 and CCS2 system that is ergonomic, simple to deploy, easy to maintain in-field, delivers flexibility for our infrastructure partners, has an outstanding safety profile and minimal environmental impact. The liquid-cooled DC High Power Charging solution uses Novec fluid to achieve a groundbreaking design concept, superior to other liquid-cooled charging solutions.

Immediate Impact

ITT Cannon's new liquid-cooled DC High Power Charging solution enables charging up to 500A at 1000V to deliver a 60-mile charge in as little as three to five minutes, eliminating driver range anxiety and dramatically reducing time at the charging station. And it's as flexible and easy to use as a gas pump.

Thanks to the unique properties of Novec fluids, ITT Cannon's DC High Power Charging solution offers unmatched safety and performance for EV charging. So drivers can get back on the road and enjoy the ride.



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Advantages of 3M™ Novec™ Engineered Fluids:

- Novec fluids vs Water Glycol: Issues with water glycol include toxicity and corrosion, and it has the potential to cause short circuiting if it leaks onto an electrical installation. Novec Engineered Fluids are dielectric and safe for contact with electronics.
- Novec fluids vs Mineral Oil: Oils used for heat dissipation in liquid cooling are all flammable at some temperature, and mineral oil is no exception. Mineral oil can cause severe ground water pollution if it leaks, and requires increased maintenance due to higher viscosity as well as thermal degradation with acidity and sediment formation. Novec fluids have a low environmental impact, are non-flammable for greater safety, and leave no residue for easier maintenance.

ITT Cannon and 3M

How can science and engineering change the world? Carrying more power to more people with lighter power lines. Moving people from point A to point B quickly and safely with high-performing interconnect solutions. Both ITT Cannon and 3M are driven to support stronger communities across the globe, by solving the world's toughest engineering problems.

"Our Novec engineered fluids were developed with intention, to cool, coat and protect with high performance and a large margin of safety – while helping minimize the environmental impact on the world we live in. Because of their proven track record of innovative engineering in connector solutions, ITT Cannon's DC High Power Charging solution was the perfect application for Novec fluids. We're excited to be a part of a solution that can make electric vehicles mainstream."

– Marc Hartwig, Business Development Manager, Automotive Electrification Division at 3M

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