



# How advanced cable design is powering reliable performance in next-generation Electric Vehicles

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Commercial Electric Vehicle (EV) development is accelerating at a rapid pace across the globe. Last year alone, global sales of electric medium and heavy-duty trucks exceeded 90,000 units, growing by nearly 80 per cent year-on-year, highlighting the strong momentum behind the sector.

This growth is driving parallel advancements in battery range and charging infrastructure. However, as these technologies are deployed across increasingly diverse and demanding operating conditions, their real-world performance is being tested more rigorously than ever, particularly in the context of power transmission. Under these conditions, a critical but often overlooked component is coming under greater scrutiny: the cables that connect and power the whole system.

## How do harsh environments impact EV architectures?

Temperatures within EV systems can reach extremely high temperatures under conditions such as rapid charging or thermal runaway of a battery pack, placing significant strain on thermal management systems and limiting effective heat dissipation. This directly impacts the stability and efficiency of power transmission across the vehicle.

At the same time, commercial EVs are subject to continuous vibration and shock under real-world operating conditions. Over time, this induces micro-motion at connector interfaces, degrading contacts, exposing base metals and leading to fretting corrosion. The result is intermittent faults, increased resistance and voltage instability.

Environmental exposure further compounds these challenges. Road salt, coolants, brake fluids and even standing water can all degrade insulation and sealing

systems, penetrating protective layers and accelerating material breakdown. As these barriers weaken, consistent power delivery becomes increasingly difficult to maintain.

While significant attention has been given to protecting connectors, assemblies and joints, one critical element of the architecture requires the same level of attention: the cables. As the primary pathways for power transmission between components, any weakness in cable design can have system-wide consequences.

## Where traditional cables struggle

Traditional cable designs are not built for the combined electrical, mechanical, thermal and chemical stresses of modern commercial EVs. From initial operation, these stresses can already degrade performance, especially in high voltage architectures.

Cables are continuously exposed to sustained high currents, making them critical to maintaining power flow. However, standard, 'run-of-the-mill' cables often exhibit increased electrical resistance under electromagnetic stress, leaving systems vulnerable to signal interference and induced currents.

In extreme cases, this can lead to complete system instability: cables degrade, voltage drops develop under load, power delivery becomes uneven and suddenly the system derates or completely shuts down. What begins as minor transmission losses can quickly spread to widespread failure.

For EV manufacturers, the onus is now on cables that ensure reliable power transmission along with safety and durability throughout their whole life cycle, moving beyond conventional designs to treat cables as engineered system components.

## Meeting EV cable performance demands

To address these challenges, a new generation of cable technologies is being developed to deliver stable electrical performance under demanding conditions. These solutions are engineered to support higher current loads while minimising resistance and energy loss through advanced conductor design and enhanced shielding.

This surge has been driven by automotive standards such as ISO 19642 and ISO 16750, which define environmental requirements and testing conditions for automotive cables and electrical systems, alongside dedicated EMC standards. Together, these frameworks have accelerated the development of cables with improved electromagnetic compatibility, capable of managing high induced current loads without compromising performance.

At the same time, modern cable designs are engineered for increased environmental resilience. Materials and construction techniques now enable resistance to UV exposure, weathering, and extreme temperatures, withstanding conditions of up to 250°C without melting, cracking, or degradation. Features such as optimised tin-plated copper braiding provide effective electromagnetic shielding while maintaining mechanical durability.

Companies such as HUBER+SUHNER have been at the forefront of these developments, with solutions like the RADOX portfolio demonstrating high resistance to heat, pressure and abrasion, even in reduced cable diameters.

Ultimately, these advancements in cable design play a critical role in enabling consistent and reliable power transmission across EV architectures.