

Testing and Inspection Services for Electrical Relays in Electric Vehicles and Charging Stations

The electrical relay plays a crucial role in the efficient and safe operation of electric vehicles (EVs), EV supply equipment (EVSE) and charging infrastructure. In an EV, the relay installed between the battery and the inverter cuts off and discharges the battery's direct current (DC) power. In EV charging stations, relays start and stop the flow of electricity from the charging stations to the vehicle, cut off the circuit if current and voltage exceed safe levels and if ground faults or short circuits are detected, optimize energy efficiency by regulating the power supply in both charging and standby modes, and enable various systems in a connected charging station — including payments, user authentication, remote monitoring and smart grid systems — to integrate and work together.

Today manufacturers are developing relays that can handle higher currents, more demanding conditions, and more advanced communication capabilities. As relays' role in EVs and charging stations expands and evolves, it becomes increasingly important that they are tested and certified to standards for safety, cybersecurity, reliability, performance and interoperability.

Relays designed for EV and charging infrastructure applications also require special ratings and must be able to withstand extreme temperatures, vibration, mechanical shock and salt spray. However, because no existing standard has dedicated existing ratings for EV and charging stations relays, all testing formerly had to be done in the end product.

An extension of UL 61810-1, the Standard for Electromechanical Elementary Relays, helps manufacturers overcome this obstacle. UL 61810-20, the Outline of Investigation for Electric Vehicle Electromechanical Elementary Relays, applies to relays intended for use as switching devices in an electric vehicle power circuit, including onboard relays (rated EV1) and supply equipment such as charging stations and car chargers (rated EV2-EV7) with the following characteristics:

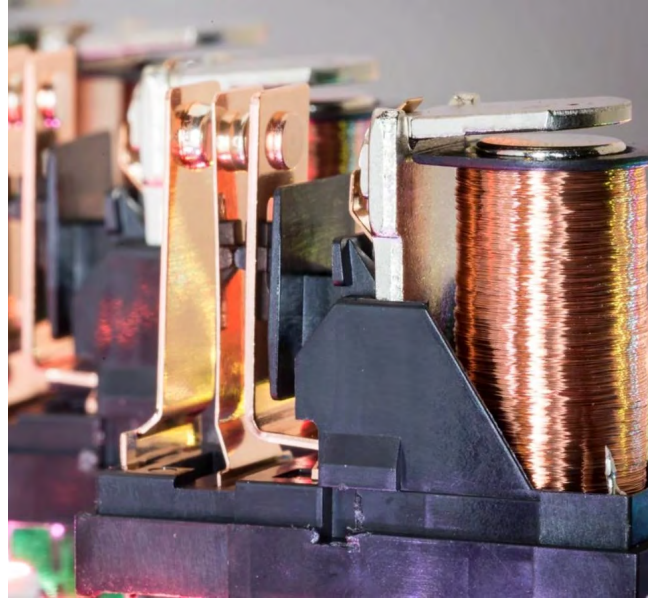
- Not intended for outdoor use
- Not exposed to chemicals, such as gasoline or diesel fuel
- Not intended for use in hazardous locations
- Limited exposure to salt mist conditions due to vehicle use near marine environments or salt deicing used on roads
- Coil voltage rating 6-50 VAC/1.5-500 VDC
- No limited current rating
- Voltage rating: Maximum of 1000 VAC/1500 VDC, or as otherwise specified by manufacturer
- Frequency rating: 50 Hz, 60 Hz or 400 Hz
- Short-circuit capacity rating as specified by manufacturers
- Operating ambient air temperature: -10°C to 55°C, unless extended to +70 to 200°C and -25 to -65°C

Streamline component acceptance and end-product certification

UL Solutions offers EV and EV charging station relay certification at the component level to help end-product manufacturers:

- Optimize certification turnaround time
- Avoid additional costs for component acceptance in charging devices
- Prevent design changes due to choosing new or different relays

After a relay has undergone evaluation, we provide a test report detailing our findings. Relays that meet criteria for certification receive the widely recognized and trusted UL Mark, communicating the relay meets the standards specified in UL 61810-20. Relays that meet certification requirements are also listed in Product iQ®, our online searchable database that helps end-product manufacturers and consumers find and verify components' certification information.



Why choose UL Solutions

Streamline certification — Component-level certification helps support speed of end-product certification and mitigate complications of component acceptance.

Longstanding expertise — With more than a century of experience in electrical safety testing, more than two decades of experience testing EV technologies and our active involvement in standards panels, we are uniquely positioned to support emerging EV and charging infrastructure innovation.

Industry-leading testing equipment and methodologies — We offer robust testing and certification services leveraging industry-leading testing equipment and methodologies at our state-of-the-art testing laboratories in Fremont, Calif., and Northbrook, Ill.

Global presence, local service — Our highly equipped testing laboratories and network of experts provide high-quality, efficient, local service to our global customers.

Seamless customer experience and project management — Our customers enjoy consistent service and clear communication from the same dedicated team throughout the entire project.

End-to-end services — We offer comprehensive testing, inspection and certification services for EV and EV charging infrastructure products and components to support manufacturers throughout the entire product life cycle.



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Safety. Science. Transformation.™