

Global Regulatory Compliance for Battery Chargers

Compliance with global regulation standards enables original equipment manufacturers (OEMs) to sell their non-road mobile machinery (NRMM) in applicable countries. These international and country-specific requirements must be met before entering into new markets.

However, OEMs face two challenges regarding global regulations—the first being their own compliance with so many standards, and the second being their partners' compliance with them. Partners who achieve wide-ranging certifications will significantly ease the burden.

Below, we'll review some of the global regulatory certifications that on-board battery chargers should earn.

Finding the Right Partner to Ease Compliance Burdens

To benefit from the recent surge in electrification efforts, OEMs must collaborate with partners that consistently achieve regulatory compliance—which, per ANSI, impacts [over 90% of trade](#) worldwide. Otherwise, substantial revenue streams may be closed off or dealers and vendors may be unwilling to sell certain NRMM due to operator and consumer safety concerns.

The right partner will also help OEMs navigate what certifications will be needed while products remain in design stages.

Additionally, as investment in electric vehicle (EV) charging infrastructure continues, many of these regulations pertain to EV supply equipment (EVSE). Therefore, compliance requires additional adherence to international EVSE connector standards, such as SAE J1772 in North America and IEC 61851 in Europe.

Regulatory Standard Setting Organizations and Testing

Numerous entities worldwide publish broadly accepted standards and related information as well as perform compliance certification testing. These organizations include:

- **American National Standards Institute (ANSI)** – ANSI provides frameworks for developing standards and standard compliance assessments.
- **Underwriters Laboratories (UL)** – A “global leader in [applied safety science](#),” UL provides testing, inspection, and certification standards.
- **CSA Group (CSA)** – A Nationally Recognized Testing Laboratory (NRTL) that conducts certification for many Canadian and US standards. The main [CSA certification mark](#)

provides proof that the product underwent testing and met the North American certification standards.

- **California Energy Commission (CEC)** – The [CEC](#) requires battery charger manufacturers to adhere to standards testing procedures (e.g., power conversion efficiency, standby draw for idle chargers) specified in [10 CFR § 430](#) as applicable.

Additional Regulatory Certification Nuances for OEMs

OEMs and their partners need to determine which certification they may need. For example, the listings and certifications provided by UL are not the same. UL listings indicate finished products' regulatory compliance, whereas UL certifications only indicate individual components' regulatory compliance.

North American Regulations

Although the US and Canada both have their own regulatory standards for battery charger safety and performance, certification in one country may indicate compliance for both.

For example, the main CSA certification mark indicates compliance with standards established by ANSI, the American Society of Mechanical Engineers (ASME), and other entities. In contrast, a cUL certification mark indicates international compliance, but a UL certification mark only applies to the US.

US

Depending on a given machine's operation and charging system, the US-specific regulatory standards that OEMs may need to comply with to sell battery chargers may include:

- [ANSI/UL 2202](#) – AC to DC EV charging system equipment
- **ANSI/UL 2231-1** – Harmonized North American standard (i.e., for US, Canada, and Mexico) for general requirements for personnel protective systems for EV supply circuits.
- **ANSI/UL 2231-2** – Harmonized North American standard for charging system protective devices for EV supply circuits.
- [UL 2272](#) – Powered bike electrical system standard for New York City
- **ANSI/UL 2594** – Harmonized North American standard for AC to AC EVSE
- **UL 2595** – Battery-powered appliance general requirements

- **UL 2849** – Powered personal e-Mobility device (e.g., mobility scooters) electrical system standard for New York City
- [IEC/UL 60335-2-29](#) – Battery charger requirements for household and similar electrical appliances (e.g., outdoor power equipment (OPE))
- **IEC 61851-1** – General requirements for EV conductive charging systems
- **IEC 61851-21-2** – AC to DC requirements for EV conductive connections
- **IEC 61851-22** – AC to AC connections for EV conductive charging systems
- **IEC 61851-23** – EV conductive charging systems
- **IEC 62133** – Includes specifications for overcharging in the standard for lithium-ion battery safety testing
- **IEC 62196 series** – Conductive charging of EVs, including plugs, sockets, and connectors
- **CEC Title 20** – Appliance efficiency requirements
- [FCC Regulations, Title 47, Part 15](#) – Specifies the Class A (industrial) and Class B (residential) limits on intentional and unintentional electromagnetic interference (EMI) radiation
- **Off-board EV charging system requirements for electromagnetic compatibility (EMC)** – Limiting the occurrence and impact of EMI.

Canada

Similar to the US's, Canada's national standards include:

- [CAN/CSA-C22.2 NO. 107.2](#) – Specifies requirements for industrial, commercial, and household battery chargers with nominal voltages below 600 V
- [CAN/CSA C22.2 No. 281.1](#) – Harmonized North American standard for general requirements for personnel protective systems for EV supply circuits.

- **CAN/CSA C22.2 No. 281.2** – Harmonized North American standard for charging system protective devices for EV supply circuits.
- **CSA C22.2 No. 282** – Harmonized North American standard for EV plugs, receptacles, and couplers
- **CAN/CSA C381.2-17** –Battery charger energy consumption requirements for 115 V AC and DC sources
- [IEC 60335-2-29](#) – 120 V ripple-free DC restriction for household appliance battery chargers
- **CSA C22.2 NO. 60335-2-29:20** – Specifies battery charger safety requirements for household and similar appliances

European Regulations

Battery chargers sold in the EU—as standalone devices or components within finished products—must primarily adhere to two regulations:

- **CE** – A “[declaration of conformity](#),” which means the finished product or component meets all applicable health, safety, and environmental regulations.
- [UN ECE R10](#) – EMC requirements for on-road EV on-board chargers

Additional Global Regulatory Requirements

Aside from the major North American and European standards, other countries may require compliance with their standards. For example, [REDACTED]’ chargers meet universal AC input requirements (i.e., can plug in anywhere globally) and many country-specific safety and EMC requirements (e.g., Japan, South Korea, and Australia).

Partner with [REDACTED] for Regulatory Compliance Reliability.

[REDACTED]’ chargers comply with all applicable North American and European regulatory standards. When OEMs partner with [REDACTED], they maintain the confidence that our chargers won’t become a market entry barrier—either as individual devices or components within a finished product.

Simply your compliance burden by partnering with [REDACTED], whether for NRMM or any other application.

Sources:

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