Electric Vehicle Supply Equipment (EVSE) Certification

EVSE Certification

Electric vehicle charge stations must comply with the US National Electric Code (NEC)

- AHJs – “Authority Having Jurisdiction” (often electrical code inspectors) have final say in the acceptance of equipment and electrical installations
- The NEC tells the AHJ that one way of knowing a piece of equipment is ok is to look for the listing mark of an approved lab
- In the case of EV charging systems, Article 625 indicates that all electrical materials, devices, fittings and associated equipment shall be listed or labeled
  - 625.1 Scope – The provisions of this article cover the electrical conductors and equipment external to an electric vehicle that connect an electric vehicle to a supply of electricity by conductive or inductive means, and the installation of equipment and devices related to electric vehicle charging

EVSE Certification

If you are selling and/or installing EVSE

- You have a responsibility to demonstrate compliance to the NEC
- Product testing and certification – "Listed" – by an independent body recognized for their competency in electrical or mechanical safety is the most commonly accepted method
- Certification assists with market entry, and communicates compliance to AHJ's, buyers and consumers

EVSE Certification

Independent bodies recognized for their competency in electrical testing and certification are generally known in the US as Nationally Recognized Testing Laboratories (NRTL)

Lab, Listed, Mark, Label – Approved by who???

- OSHA (U.S. Department of Labor: Occupational Safety & Health Administration) oversees safety regulations, which are US law and contain requirements for "approval" (i.e., testing and certification) of certain products by a NRTL
- Requirements are found in Title 29 of the Code of Federal Regulations (29 CFR), and the provisions for NRTL certification are generally in Part 1910 (29 CFR Part 1910)

EVSE Certification

An NRTL is an organization that OSHA has "recognized"

- A NRTL is authorized to provide an independent evaluation, testing and certification of electrically operated or gas- and oil-fired products based on standards developed by U.S.-consensus standards organizations such as the American National Standards Institute (ANSI) and Underwriters Laboratories (UL)
- “Recognition” includes demonstrating to OSHA the capability, control programs, independence, reporting and complaint handling procedures to test and certify specific types of products for workplace safety

EVSE Certification

What process does OSHA follow in recognizing an NRTL?

- Appendix A to 29 CFR 1910.7
- OSHA performs an in-depth on-site review of the organization and facilities
- OSHA publishes a notice of finding in the Federal Register for 30 day public comment period
- OSHA publishes a second notice of its final decision
- The recognition remains in effect for a five-year period
- For foreign-based organizations, the Department of Commerce must consider "reciprocity" of the foreign government

EVSE Certification

How does OSHA enforce the requirements for NRTL approval?

- Typically audit each NRTL annually to verify that it sustains the quality of its operation and continues to meet program requirements
- OSHA compliance officers could review specific products during workplace inspections, verifying the certification mark of an NRTL

EVSE Certification

What standards can an NRTL use in certifying products?

- An NRTL must use "appropriate" standards in certifying products for workplace safety (see Test Standard Approval Criteria in the NRTL Program Directive)
- International Electro-technical Commission (IEC), Underwriters Laboratories (UL), the National Fire Protection Association (NFPA), IEEE, and ASTM International, etc.

EVSE Certification

Does OSHA accept the "CE Mark", or equipment certified by foreign testing organizations?

- The CE mark is a generic mark used in the European Union (EU) to indicate that a manufacturer has declared that the product meets EU safety requirements
- CE is unrelated to the requirements in the US
- In the US, the product must have the specific mark of a recognized NRTL
- However, data used to attain NRTL certification, may be applicable to declaration of compliance for CE marking

EVSE Certification

Can an NRTL use other parties to do part of the work necessary in testing and certifying products?

- OSHA permits this, provided the NRTL has met certain criteria
- With appropriate controls in place, a NRTL may accept testing, evaluation data or certain contract services, from outside parties

EVSE Certification

Do NRTLs recognize each other's product testing, certification, or approvals?

- OSHA has no authority to require such acceptance
- This is solely a business decision of each NRTL

EVSE Certification

Does OSHA subsidize or indemnify NRTLs?

- NRTLs are private organizations or companies
- They are not financially or otherwise supported, subsidized, or indemnified by the Government in their capacity as an NRTL
- These organizations maintain the risks and liabilities for their actions

EVSE Certification

Are OSHA recognized NRTLs equal in ability?

- Given that each NRTL has met the same requirements for recognition, OSHA considers NRTLs, recognized for the same product safety test standard, to be equivalent
- **However, each NRTL is an independent business and will operate as such. They may provide different levels of service, costs, ongoing support, etc.**

EVSE Certification

How do I know whether an NRTL has certified a product?

- Each NRTL uses its own unique, registered certification mark(s) to designate conformance
- Each NRTL must register its certification mark(s) w/the US Patent & Trademark Office
- The manufacturer physically places the mark on the products
- An NRTL must ensure that its mark is applied to each unit, or if not feasible, to the smallest package containing each unit

EVSE Certification

What does a safety mark tell me?

- Safety marks such as ETL, UL, and CSA signify that the product has been tested to, and found to comply with, national safety standards by a qualified, independent testing laboratory
- The presence of a safety mark also means the product is ‘listed’ in the NRTL’s “directory” – public record.
- And, is part of an on-going follow-up program that ensures the products continued comply with the applicable standards

EVSE Certification

What's the difference between the UL, CSA, and ETL Marks?

- All of these Marks demonstrate that the product that bears it has met the minimum requirements of widely accepted product safety standards as determined through the independent testing
- The only real differences between the Marks are in the services of the testing laboratory behind them

EVSE Certification

Aren't manufacturers required to use UL for their compliance testing? Isn't this mandated by the standards themselves?

- The simple answer to both questions is "no"
- In fact, this misconception has misled many manufacturers to believe that they don't have a choice in their third-party testing partner
- To satisfy the prerequisite of having your products tested by an independent organization, the true legal requirement is that the laboratory which performs the testing be a Nationally Recognized Testing Laboratory (NRTL) recognized by OSHA

EVSE Certification

Where can I view the current list of NRTLs?

- http://www.osha.gov/dts/otpca/nrtl/index.html

How do I choose which NRTL to use?

- When choosing a testing and certification partner, make a list of your key purchasing drivers and use this as your guide
- Compare what you are looking for with the services that each NRTL provides
- Like any other product or service, competition is best for the “purchaser” and the marketplace

EVSE Certification

Are EVSE even covered under the jurisdiction of OSHA and the NRTL program?

- The NRTL program has a defined list of applicable standards
- Depending on design, in the US EVSE is subject to evaluation against:
  - UL 2231-1, UL2231-2, UL2251, Subject UL2594 & UL2202
  - Today, only UL2202 is on OSHA's list
  - However, it's become generally accepted practice within many markets and jurisdictions to utilize NRTL status as indicator of competency
  - And it is very direct way to demonstrate compliance with the NEC

EVSE - Testing & Certification Standards

Intertek Applies EV UL Safety Standards

Battery Charger (on/off board)

UL 2202

Charging Inlet

UL 2251

Charging Station (EVSE)

UL Subject 2594

Personnel Protection Circuitry

UL 2231-1 and UL 2231-2

Hybrid Battery

UL Subject 2580

Charging Plug

UL 2251

Vehicle pictured is used for illustrative purposes only - no further claims are made or intended

Intertek Applies EV International (IEC) Standards

On Board Battery Charger

IEC 61851

Charging Inlet

IEC 62196

Charging Station (EVSE)

IEC 61851

IEC 60950

Hybrid Battery

IEC 61982

IEC 62133

Charging Plug

IEC 62196

Vehicle pictured is used for illustrative purposes only - no further claims are made or intended

Intertek Applies EV SAE Standards

Hybrid Battery Safety

SAE J2929

Abuse

SAE J2464

On Board Battery Charger

SAE J2894 (Power Quality)

Charging Inlet

SAE J1772

Charging Station (EVSE)

SAE J2293

Charging Plug

SAE J1772

Vehicle pictured is used for illustrative purposes only - no further claims are made or intended

Charge Station Certification

UL Subject 2594

OUTLINE OF INVESTIGATION FOR Electric Vehicle Supply Equipment Issue Number: 1 November 5, 2009

This outline covers electric vehicle (EV) supply equipment, rated a maximum of 250 V ac, with a frequency of 60 Hz, and intended to provide power to an electric vehicle with an on-board charging unit.

Wall Mount Charge Station for homeowners – typically mounted in the homeowners garage and connected to 240VAC 60Hz source for high amperage charging.

Travel Cordset Charge Station for homeowners, device is typically carried in the vehicle for charging while on the road. Typically connects to 120VAC 60Hz source.

Lower amperage charging.

Municipal Charge Station – can be provided with both 120VAC 60Hz and 240VAC 60 Hz sources. Can be mounted anywhere, parking lots, hotels etc.

May be provided with a variety of options for things such as credit card readers, I/O ports for recording data etc.

Charge Stations – Personal Protection System Certification

Devices covered by UL 2231-1 and UL 2231-2 are typically control circuits that are not complete products but are circuit boards to be fitted into a charging station

UL 2231-1

Standard for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements First Edition

These requirements cover devices and systems intended for use in accordance with the National Electrical Code (NEC), ANSI/NFPA 70, Article 625, to reduce the risk of electric shock to the user from accessible parts, in grounded or isolated circuits for charging electric vehicles. These circuits are external to or on-board the vehicle.

UL 2231-2

UL Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems, First Edition

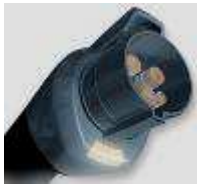
This standard is intended to be read together with the Standard for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements, UL 2231-1. The requirements of UL 2231-1 apply unless modified by this standard. This Part contains the construction and performance requirements that are applied to a device that is intended to become an integral part of an overall device or charging system.

EV Receptacle Certification

UL 2251

UL Standard for Safety for Plugs, Receptacles and Couplers for Electric Vehicles, First Edition

These requirements cover plugs, receptacles, vehicle inlets, and connectors, rated up to 800 amperes and up to 600 volts ac or dc, intended for conductive connection systems, for use with electric vehicles in accordance with National Electrical Code (NEC), ANSI/NFPA-70 for either indoor or outdoor nonhazardous locations.



Vehicle Coupler – Standard configuration coupler for providing power to the on-board charger. Specified by SAE 1772

Vehicle Inlet – Standard power inlet for coupling to Standard SAE 1772 Coupler

EV Level 3 Charger Certification

UL 2202

UL Standard for Safety for Electric Vehicle (EV) Charging System Equipment, Second Edition

Supplied by circuit of 600Volt or Less

For recharging batteries in over the road EV's

On-board or Off-board the vehicle.

"LEVEL 3" Chargers fall under this standard

About Intertek

2009: FTSE 100

2002: Intertek, becomes a public company traded on London Stock Exchange

1996: Intertek Testing Services purchases Inchcape Testing

1988: Inchcape acquires ETL

1942: Edison required to divest company--ETL registered as a separate company

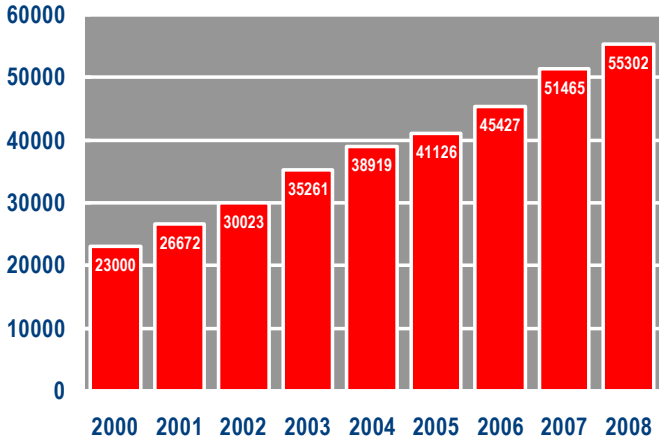
1904: Edison renames his Lamp Testing Bureau “Electrical Testing Laboratories”

1896: Edison separates Lamp Testing Bureau from manufacturing

Thomas Edison

About Intertek

- Billions of products around the globe feature Intertek certification marks
- 62,000+ Listed product types across North America, from more than 10,000 clients
- We conduct more than 2,000,000 annual tests, inspections, certifications
- Testing to more than 1,000 ANSI, ASTM, CSA, NFPA, IEC, SAE, UL and other standards around the world
- **Fully Accredited Services – OSHA/NRTL**
- Intertek Certified
  - Chevy Volt “Voltec” EV Charging Technologies
  - Eaton’s “Pow-R-Station” EV Charging Station



EVSE Contacts

Tim Hubbard

- Director of Operations, MI
- 616 617 2767
- tim.hubbard@intertek.com

Rich Byczek

- Site Manager, Livonia, MI
- 248 219 1099
- rich.byczek@intertek.com