Electrical Vehicle Supply and charging Equipments

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Outline

- General
- CEC/NEC
- END product Standards
- Related Component standards
- Harmonization
- Overview of Product Standards
General

Electric Vehicle Charger Levels (Industry Terms)

- **Level-I**: AC in AC out, Rated 120Vac 16A max, can be portable, stationary or movable. Full charge takes many hours. Typically a portable cord set is kept or provided in the electric car.

- **Level-II**: AC in AC out, Above the power levels of I, can be stationary, movable or permanent. Full charge takes few hours. Typical stationary equipment in your home garage or a pedestals/boxes installed in a city/region.

- **DC fast Charger**: AC in DC out, mostly permanent connected, similar to a service station. Full charge approx. in less than an hour.
Level 1 – Cord Set
Level 1 Charge points
Level 2
DC Fast Charger
CEC/NEC

Section 86 of CEC Part-I and Article 625 of NEC

- When installed in Commercial Garages or Hazardous location (premises with flammable liquid, gas dispensing and similar facilities), additional requirements (HAZLOC) apply.
- Installation can be Indoor or Outdoor.
- Shall be located not less than 450 mm and not more than 1.2 m above the floor level (NEC)
End Product Standards

Canada:
- *General Use Power supplies: CSA C22.2 No. 107.1-01

US:
- Electric Vehicle Supply Equipment UL 2594

* Not Harmonized
Related Component standards

- **Canada:**
  - Electric vehicle supply equipment - First Edition CSA C22.2 No 280-13
  - Plugs, receptacles, and couplers for electric vehicles - First Edition CSA C22.2 No 282-13
  - Etc
Related Component standards

- **US:**
  - Standard for Safety Electric Vehicle Supply Equipment - First Edition UL 2594
  - Etc

All corresponding standards are Harmonized (including Mexico):
North American Harmonization – EVSE

1. NMX-J-677-ANCE-2013/CSA C22.2 NO. 280-13/UL 2594
   Electric Vehicle Supply Equipment

2. NMX-J-668/1-ANCE/CSA C22.2 NO. 281.1-12/UL 2231–1
   Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements

3. NMX-J-668/2-ANCE/CSA C22.2 NO. 281.2–12/UL 2231–2
   Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protective Devices for Use in Charging Systems

4. NMX-J-678-ANCE/CSA C22.2 NO. 282-13/UL 2251
   Safety of Plugs, Receptacles and Couplers for Electric Vehicles
End Product Standards: UL 2594 and CSA C22.2 No 280

Products covered are:

- Supply equipments providing AC power to On-Board Chargers.
- Conductive Charging supply equipments.
- Portable, Stationary, Movable and Permanent connected
- Indoor and Outdoor equipments.

Annex A provides reference to all applicable normative standards.
Annex B provides details of applicable test based on cord set type, intended use
Annex C provides marking/similar language translation.
End Product Standards: UL 2594 and CSA C22.2 No 280 Contd

- Similar construction requirements like, fire enclosure, mechanical enclosure, spacings, accessible part limits, etc.
- Additional construction requirements like EV bonding or Personal Protective System (Interruptive device).
- Similar test requirements like, leakage current, input test, Temp test, Cap Discharge, Dielectric test, Abnormals, Transformer test (Flanged Bobbin), Strain relief, Cable secureness, Grounding, Impact, Drop, NEMA tests,
- Additional tests like: Vibration test (portable cord set) Vehicle drive over test, harmonic distortion test, Electronic Protection circuits, Cord Reels, etc.
End Product Standard: CSA C22.2 No 107.1

- Clause 2 to 6 are general requirements (old 107 standard).
- TIL I-44 was issued to cover off-board charger, later was added as Clause 17 to the standard
End Product Standard: UL 2202

Applies to:

- Charging system with AC in and DC out, requires a special connector and provided DC to batteries/system.
- Conductive and inductive charging systems.
- On-board (Supplement SA1-SA84) and Off-Board (Section 2-84) chargers.
- Indoor (Section 2-80) and outdoor (Section 2-84) equipments.
End Product Standard: UL 2202 Contd

- Similar construction requirements like, fire enclosure, mechanical enclosure, spacings, accessible part limits, etc.
- Additional construction requirements like EV bonding, Output power circuits to be RI/DI for inductive chargers.
- Similar test requirements like, leakage current, input test, Temp test, Dielectric test, Abnormals, Transformer test (Flanged Bobbin), Strain relief, Stability, Flexing, Bus Bar, Static Load, Handles, Grounding, Cord Tag, Impact, Drop, outdoor test, Etc
- Additional tests like: Vibration test, Heat Sink Temp Cycling, harmonic distortion test, etc.
Similarities

- A majority of the requirements in UL 2202 and 2594 are identical.
- These common requirements are also very similar to those of UL 1012 Power units other than Class 2.
THANK YOU!!!

QUESTIONS?