Connecticut
State Building and Fire Codes

Charging Stations and Electric Vehicles

in the State of Connecticut (Part I)

March 15 2011

Presented by
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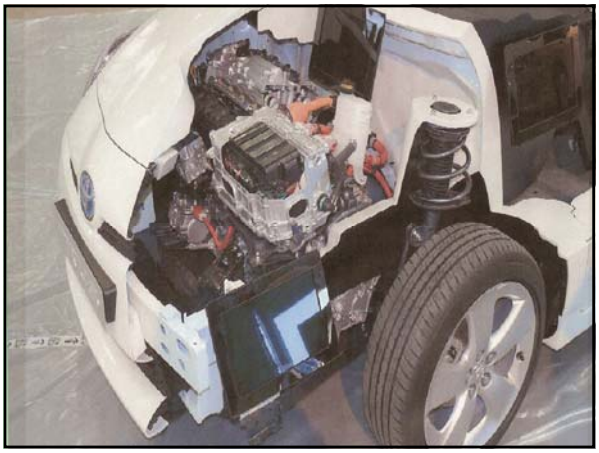
State Electrical Inspector
Office of State Building Inspector

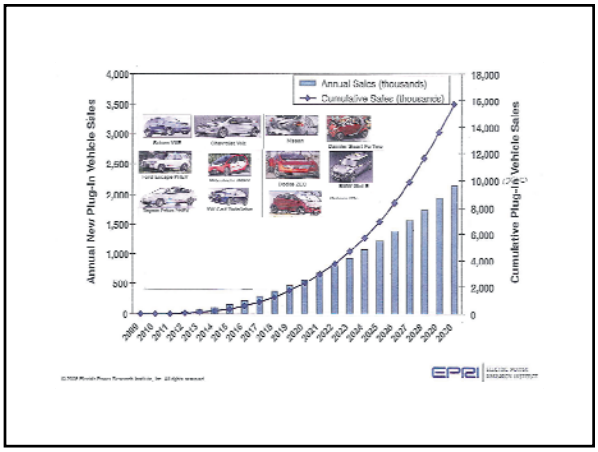
With technical and product support from:
Dan Shanahan,
Director of Sales and Marketing,
Control Modules Industries

Design & Trades Conference

Office of Education and Data Management




WHAT'S NEW AUTOMOTIVE HOW IT WORKS
DEMYSTIFYING THE CHEVY VOLT
Primary electric motor
Planetary gear set
Four-cylinder gasoline engine
Secondary electric motor
A look at the inner workings of GM's plug-in car
In principle, the Chevrolet Volt is simple: It's an electric car with a gas-powered generator for backup. Yet the machinery under the hood is complex. The overarching goal is to wring maximum miles out of the Volt's lithium-ion battery and when gasoline is necessary, to use it frugally. This requires the Volt's drivetrain—composed of two electric motors, a gasoline engine, three clutches and a planetary gear set—to blend power from different sources to find the perfect balance in every driving situation. Here's how it happens. —SETH FLEISHER
1. ONE-MOTOR EV MODE
Driving around town at up to approximately 40 mph, power flows from the 400-pound, 16-kilowatt-hour lithium-ion battery to a large permanent-magnet motor, which moves the car.
2. TWO-MOTOR EV MODE
The harder you push the car, the more stressed the primary motor becomes—until a second, smaller motor joins in, allowing the larger one to spin more slowly. The two motors connect to the planetary gear set, which blends power from the pair into torque that drives the car.
3. ONE-MOTOR EXTENDED-RANGE MODE
Between 25 and 50 miles into your drive, the battery will dip to 35 percent charge, and the gas engine will start. Here, the gas engine drives the small electric motor, using it to generate electricity (an electric motor run backward is a generator) to sustain the battery's charge.
4. TWO-MOTOR EXTENDED-RANGE MODE
With the battery low, at highway speeds, the primary electric motor continues to drive the car. But now the gasoline engine mechanically connects to and powers the secondary electric motor, which in turn helps the primary motor drive the wheels.
Verdict
Critics have argued that, because under some circumstances the gas engine helps power the wheels, the Volt is nothing new—a glorified Prius. But that's not true. Efficient as it is, the Prius is a primarily gas-powered car. The Volt, in contrast, always drives like an electric car, and for up to 50 miles a day you'll never burn a drop of gas.


Annual Sales (thousands)
Cumulative Sales (thousands)
Annual New Plug-In Vehicle Sales
Cumulative Plug-In Vehicle Sales
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
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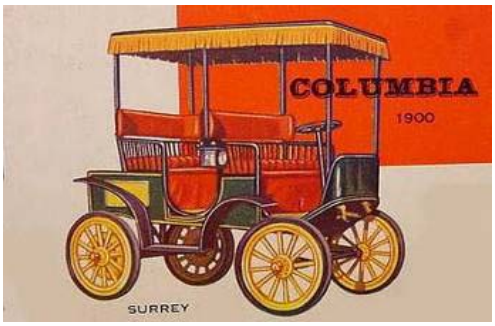
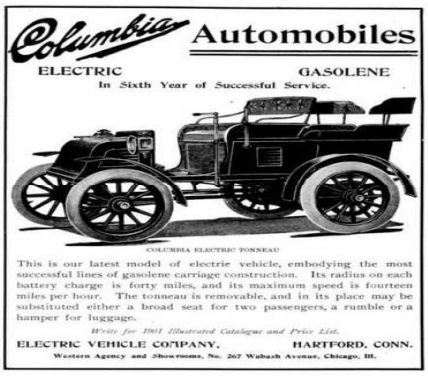
2030
EPRI

1903 Pope Hartford

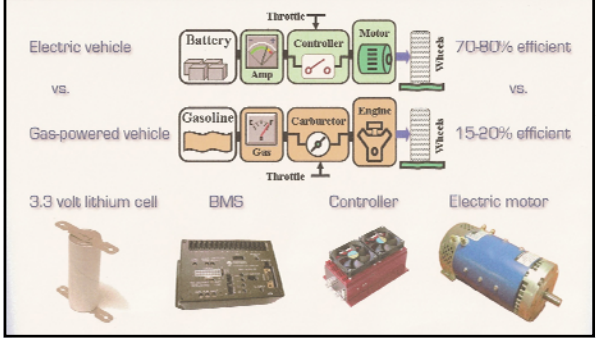
1900 Columbia Surrey

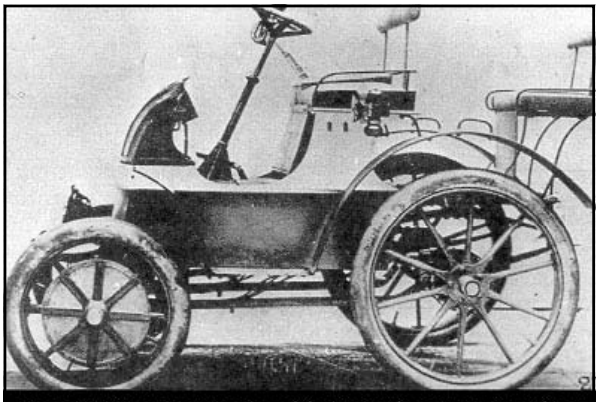




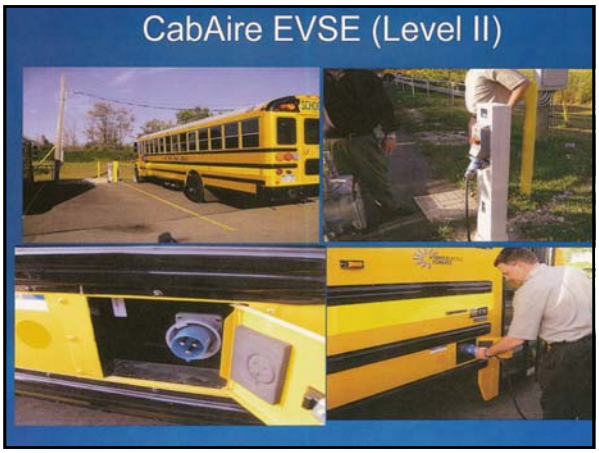
2010 Tesla Roadster
Top Speed 125 MPH
Cost $128,000

Electric Vehicle conversions





The early 1900's Lohner-Porsche, originally electric-powered, then with an internal combustion engine powering hub-mounted electric motors.



Hybrid Myths

Question: Will I be electrocuted if I touch a hybrid vehicle in a crash?
Answer: Other than if an external power source such as a down power line, no and this is no different than safety provided for a conventional vehicle rescue. The hybrid high voltage system is isolated from the body chassis.

Question: Will I be electrocuted if I touch a hybrid vehicle submersed in water?
Answer: No, while there maybe some leakage, it will not be detectable simply by touching the body or frame of the vehicle.

Question: Is it necessary to call for a HAZMAT response if the high voltage battery pack is ruptured during a crash?
Answer: No, there is not enough electrolyte in the individual modules or in the entire battery pack. Leakage will be very minimal if at all, and usually will be contained with in the modules even if the casing was breached during a catastrophic crash. The electrolyte is considered a gel, having the consistency of a machine oil and is absorbed within a fiber material between the metal plates. Spills can be cleaned up with a suitable absorbent for a strong base, diluted with water and neutralized with vinegar.

Question: At a recent Toyota hybrid crash we saw a clear fluid leak and grayish vapor coming from the trunk, was this from the high voltage NiMH battery pack?
Answer: No, there are 12V conventional automotive batteries, in a severe rear end or offset crash the 12V battery maybe subject to impact. The reaction you saw is similar to that of a conventional vehicle when the 12V automotive battery is ruptured during a crash.

Question: At a crash, is there a chance that the high voltage system will electrify the vehicle's body chassis?
Answer: No, there are several automatic sensory devices that will stop the high voltage flow. The SRS ECU upon activation of the airbags, will also send a signal to the hybrid system computer, the computer will then open the high voltage relays to the HV high voltage battery pack; preventing the high voltage flow from the battery pack. In essence, there are checks and balances to prevent this situation.

What Can I do?
Start educating yourself to hybrid technology, now is the time not at 0300 in the morning. Fuel cell vehicles are knocking at the door and will be available to the consumer within the next decade.

The best method is to turn the ignition switch off. This simple action:

- Turns off the engine and the electric motor, which prevents electric current from flowing into the cables from either the motor or the high-voltage battery, and,
- Turns off power to the airbags and the seat belt tensioners.

The second-best method is to remove the main fuse and disconnect the 12V battery. The advantages of this method are:

- Removing the main fuse turns off the engine and electric motor, which prevents electric current from flowing into the cables from the motor.
- Removing the fuse also cuts power to the airbags and the seat belt tensioners.
- Disconnecting the battery cable disables the high-voltage battery controller, which prevents electric current from flowing into the cables from the high-voltage battery.

DC/AC Voltage Classifications

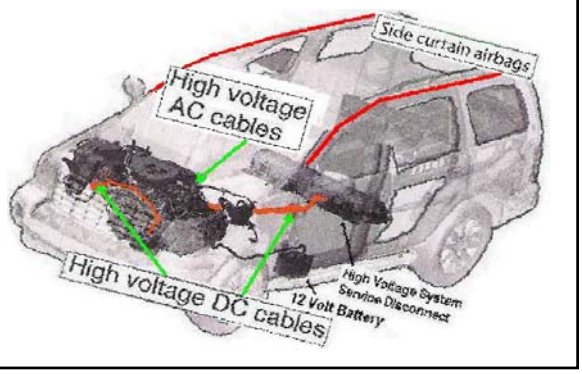
Electricity is categorized as either low, intermediate, or high voltage.

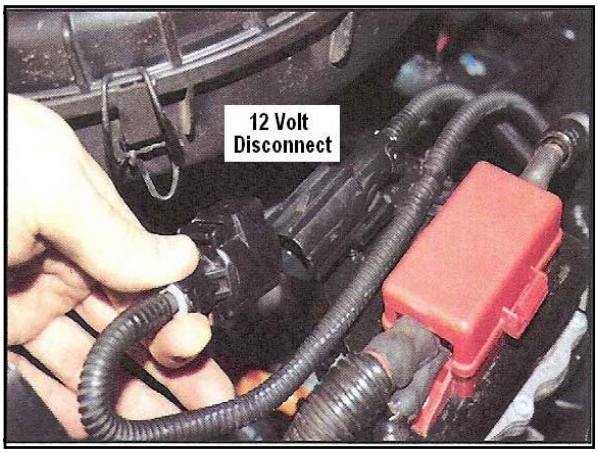
- Low voltage – from 0 to 30 volts DC / 0 to 15 volts AC
- Intermediate voltage – from 30 volts or greater to 60 volts DC / 15 volts or greater to 30 volts AC
- High voltage – any voltage greater than 60 volts DC / 30 volts AC

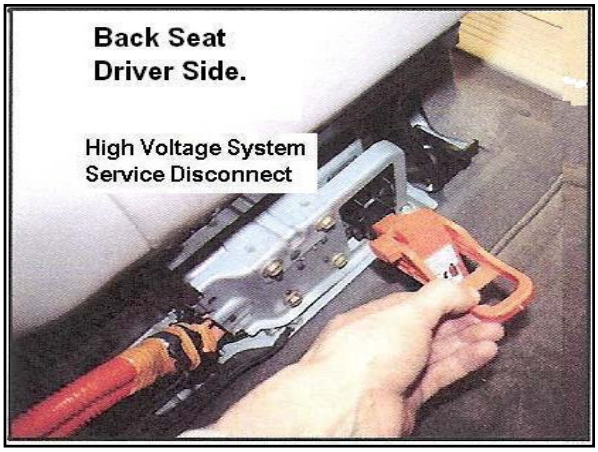
Low voltage

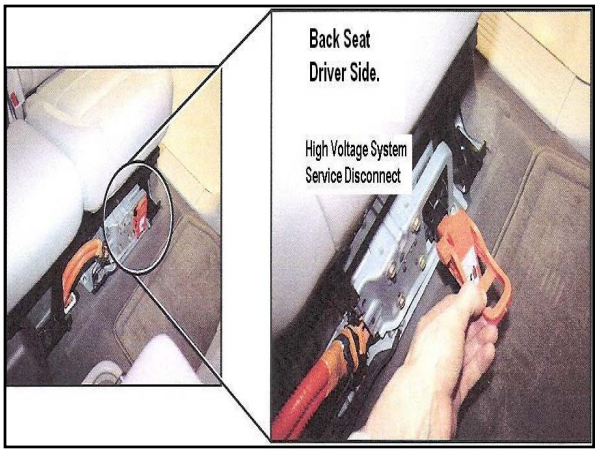
Intermediate voltage

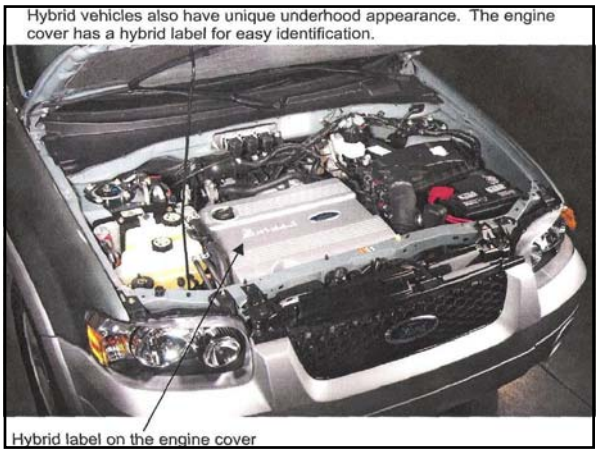
High voltage

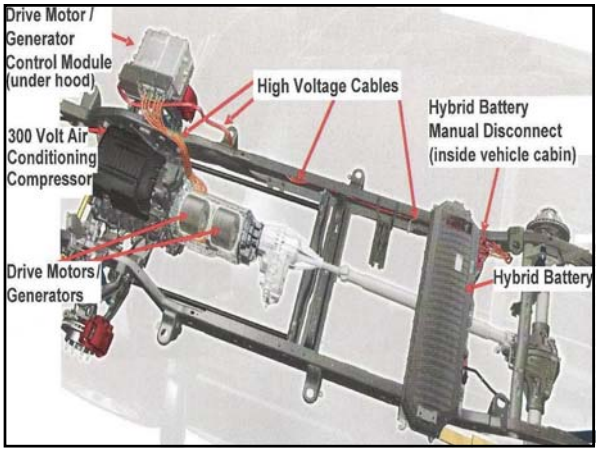



12 Volt
Disconnect


Back Seat
Driver Side.
High Voltage System
Service Disconnect


Back Seat
Driver Side.
High Voltage System
Service Disconnect


Hybrid vehicles also have unique underhood appearance. The engine cover has a hybrid label for easy identification.
Hybrid label on the engine cover


Drive Motor / Generator Control Module (under hood)
High Voltage Cables
Hybrid Battery Manual Disconnect (inside vehicle cabin)
300 Volt Air Conditioning Compressor
Drive Motors / Generators
Hybrid Battery

Codes

- The revised edition to the January 1, 2009 General Statutes of Connecticut
- 2005 Connecticut State Building Code
- 2005 Connecticut Supplements
- 2009 Connecticut Amendments
- 2005 National Electrical Code with the 2008 NEC as a reference for Article 626 Electrified Truck Parking Spaces

2008 National Electrical Code

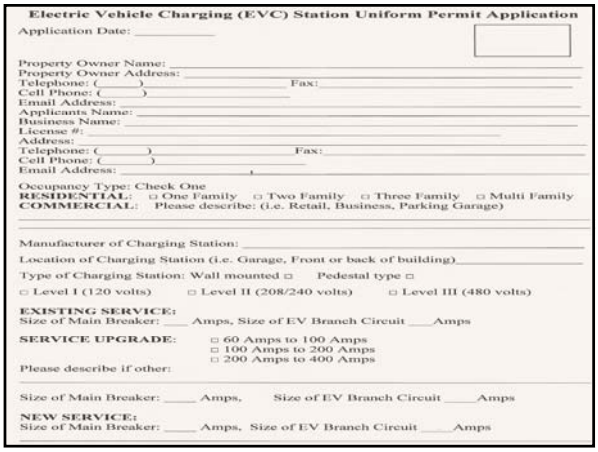
Should be used as reference only until adopted by the State Of Connecticut

Request for Modification can be used if applicable

Permit Process

When finalized by the Governor and the State Legislators of the State Of Connecticut the Electric Vehicle Charging (EVC) Station Uniform Permit Application **shall be used** in all municipalities.

Electric Vehicle Charging (EVC) Station Uniform Permit Application



Electric Vehicle Charging (EVC) Station Uniform Permit Application

Application Date: _____

Property Owner Name: _____
Property Owner Address: _____
Telephone: (_____)_____ Fax: _____
Cell Phone: (_____)_____
Email Address: _____
Applicants Name: _____
Business Name: _____
License #: _____
Address: _____
Telephone: (_____)_____ Fax: _____
Cell Phone: (_____)_____
Email Address: _____

Occupancy Type: Check One
RESIDENTIAL: ☐ One Family ☐ Two Family ☐ Three Family ☐ Multi Family
COMMERCIAL: Please describe: (i.e. Retail, Business, Parking Garage)

Manufacturer of Charging Station: _____
Location of Charging Station (i.e. Garage, Front or back of building)_____
Type of Charging Station: Wall mounted ☐ Pedestal type ☐
☐ Level I (120 volts) ☐ Level II (208/240 volts) ☐ Level III (480 volts)

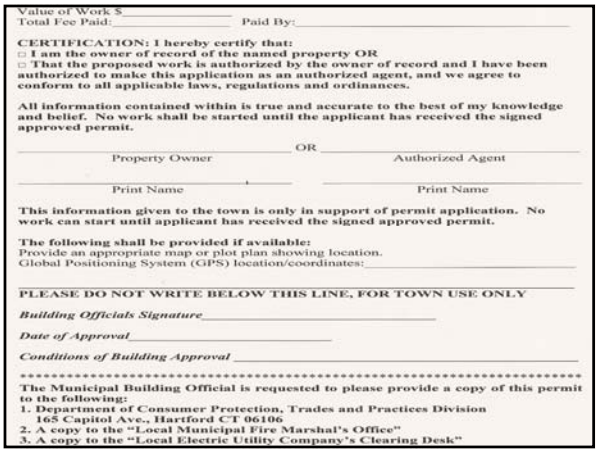
EXISTING SERVICE:
Size of Main Breaker: ____ Amps, Size of EV Branch Circuit ____Amps

SERVICE UPGRADE:
☐ 60 Amps to 100 Amps
☐ 100 Amps to 200 Amps
☐ 200 Amps to 400 Amps

Please describe if other:

Size of Main Breaker: _____ Amps, Size of EV Branch Circuit _____Amps

NEW SERVICE:
Size of Main Breaker: _____ Amps, Size of EV Branch Circuit _____Amps



Value of Work $_____
Total Fee Paid:_____ Paid By:_____

CERTIFICATION: I hereby certify that:
☐ I am the owner of record of the named property OR
☐ That the proposed work is authorized by the owner of record and I have been authorized to make this application as an authorized agent, and we agree to conform to all applicable laws, regulations and ordinances.

All information contained within is true and accurate to the best of my knowledge and belief. No work shall be started until the applicant has received the signed approved permit.

_____ OR _____
Property Owner Authorized Agent

_____ _____
Print Name Print Name

This information given to the town is only in support of permit application. No work can start until applicant has received the signed approved permit.

The following shall be provided if available:
Provide an appropriate map or plot plan showing location.
Global Positioning System (GPS) location/coordinates:_____

PLEASE DO NOT WRITE BELOW THIS LINE, FOR TOWN USE ONLY

Building Officials Signature_____

Date of Approval_____

Conditions of Building Approval _____

****

The Municipal Building Official is requested to please provide a copy of this permit to the following:
1. Department of Consumer Protection, Trades and Practices Division
165 Capitol Ave., Hartford CT 06106
2. A copy to the "Local Municipal Fire Marshal's Office"
3. A copy to the "Local Electric Utility Company's Clearing Desk"

CGS SEC 29-263 Permit to Construct or Alter states in part:

"No building or structure shall be constructed or altered until an application has been filed with the building official and a permit issued. Such permit shall be issued or refused, in whole or in part, within thirty days after the date of an application. No permit shall be issued except upon application of the owner of the premises affected or the owner's authorized agent"

New IRC Code Requirement

- **NEW: E3408 ELECTRIC VEHICLES**
- **NEW: E3408.1 Required Installation.** Provisions for electric vehicle charging stations shall be installed at grade level at or within newly constructed dwelling units. The installation shall comply with the applicable provisions of NFPA 70. The electric provisions for electric vehicles shall be charging stations containing receptacles for Level I- 120 volts; Level II – 240/208 volts.

New IBC Code Requirement

- **NEW: 2703 ELECTRIC VEHICLES**
- **NEW: 2703.1 Required Installation.** Provisions for electric vehicle charging stations of various voltage supplies shall be installed at or within a newly constructed building that have a work place of one or more employees and parking facilities that provide parking for a newly constructed building or structure shall provide a minimum of 10% of the parking spaces for electric vehicles. The electric provisions for electric vehicles shall be charging stations containing receptacles for Level I – 120 volts; Level II – 240/208 volts; and where the facilities are provided with 277/480 volts shall provide charging stations for Level III – 480 volt.

Article 625

Electric Vehicle Charging System

Section 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

Section 625.2 Electric Vehicle Definition

An automotive-type vehicle for on-road use (i.e. automobiles, buses and trucks)

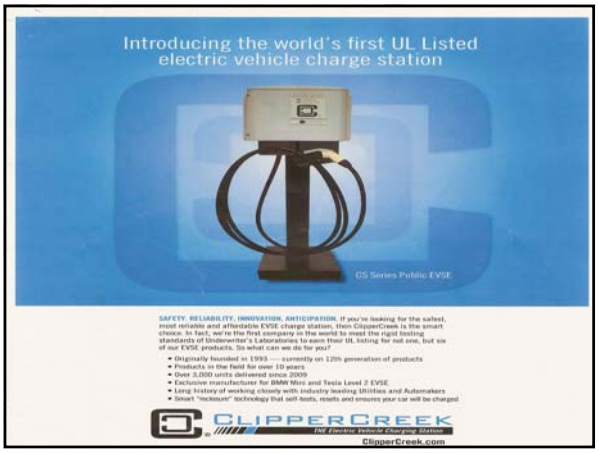
Not included are: electric motor cycles, industrial trucks, golf carts and airline ground support equipment and the like.

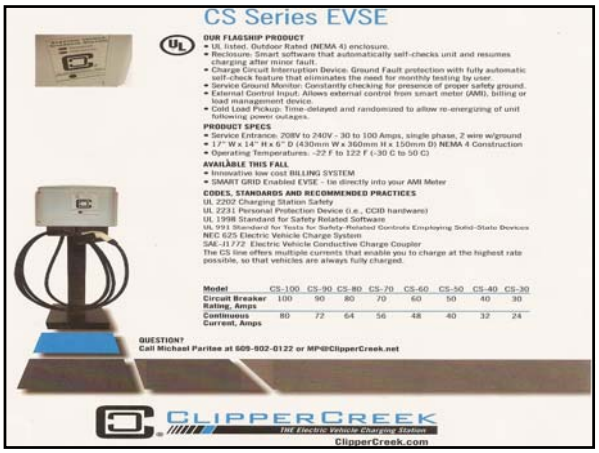
Section 625.4
Voltages

Unless other voltages are specified, the nominal ac system voltages of 120, 120/240, 208Y/120, 240, 480Y/277, 480, 600Y347, and 600 volts shall be used to supply equipment covered by this article.

Section 625.5
Listed or Labeled

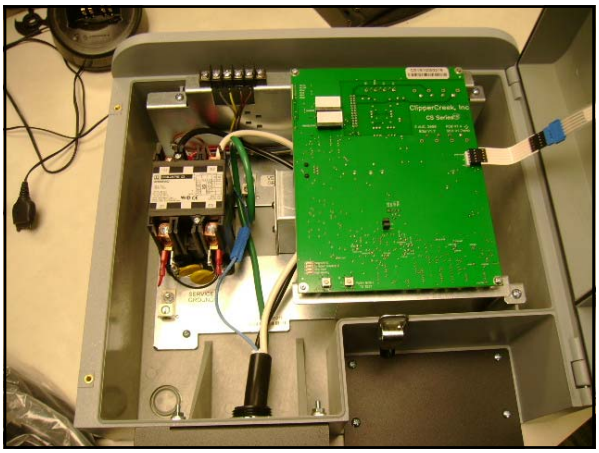
All electrical materials, devices, fittings, and associated equipment shall be listed or labeled.

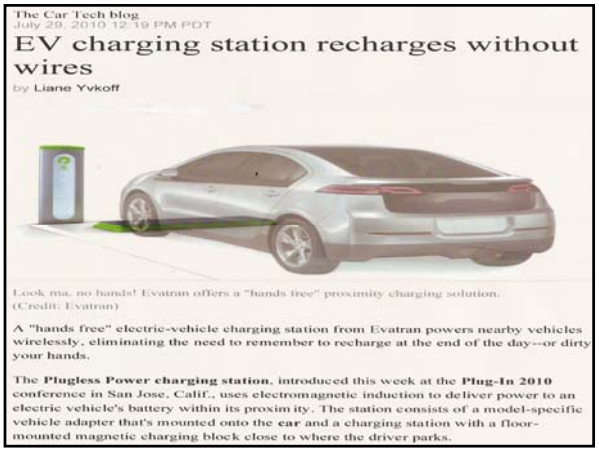



CS Series EVSE
OUR FLAGSHIP PRODUCT
• UL listed, Outdoor Rated (NEMA 4) enclosure.
• Reclosure: Smart software that automatically self-checks unit and resumes charging after minor fault.
• Charge Circuit Interruption Device. Ground Fault protection with fully automatic self-check feature that eliminates the need for monthly testing by user.
• Service Ground Monitor: Constantly checking for presence of proper safety ground.
• External Control Input. Allows external control from smart meter (AMI), billing or load management device.
• Cold Load Pickup: Time-delayed and randomized to allow re-energizing of unit following power outages.
PRODUCT SPECS
• Service Entrance: 208V to 240V - 30 to 100 Amps, single phase, 2 wire w/ground
• 17" W x 14" H x 6" D (430mm W x 360mm H x 150mm D) NEMA 4 Construction
• Operating Temperatures: -22 F to 122 F (-30 C to 50 C)
AVAILABLE THIS FALL
• Innovative low cost BILLING SYSTEM
• SMART GRID Enabled EVSE - tie directly into your AMI Meter
CODES, STANDARDS AND RECOMMENDED PRACTICES
UL 2202 Charging Station Safety
UL 2231 Personal Protection Device (i.e., CCID hardware)
UL 1998 Standard for Safety Related Software
UL 991 Standard for Tests for Safety-Related Controls Employing Solid-State Devices
NEC 625 Electric Vehicle Charge System
SAE-J1772 Electric Vehicle Conductive Charge Coupler
The CS line offers multiple currents that enable you to charge at the highest rate possible, so that vehicles are always fully charged.
Model CS-100 CS-90 CS-80 CS-70 CS-60 CS-50 CS-40 CS-30
Circuit Breaker Rating, Amps 100 90 80 70 60 50 40 30
Continuous Current, Amps 80 72 64 56 48 40 32 24
QUESTION?
Call Michael Paritee at 609-902-0122 or MP@ClipperCreek.net
CLIPPERCREEK
THE Electric Vehicle Charging Station
ClipperCreek.com


ELECTRIC VEHICLE
CHARGING STATION
CHARGING
PROTECTION
CLIPPERCREEK, INC.
PRESS TO START
OR STOP CHARGING


FOR USE WITH ELECTRIC VEHICLES
DANGER
WARNING
WARNING
ELECTRIC VEHICLE CHARGING SYSTEM
PERSONNEL PROTECTION EQUIPMENT
MODEL DS-100
SERIAL CS1C10093218
CONFIG CS-40-C4-L25-10
LISTED
40A BRANCH CIRCUIT PROTECTOR
INPUT: 208-240 VAC, 50/60Hz, 120V TO GND
30AMPS CONTINUOUS
OUTPUT: 208-240 VAC, 50/60Hz, 120V TO GND
30AMPS CONTINUOUS
SHORT CIRCUIT RATING
5000RMS SYMMETRICAL AMPS at 240VAC
SAE J1772 COMPLIANT - NEMA TYPE 4 ENCLOSURE
This device complies with Part 15 of FCC Rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received,
including interference that may cause undesired operation.
11850 KEMPER ROAD
AUBURN, CA 95603
WWW.CLIPPERCREEK.NET
CLIPPERCREEK, INC.
INNOVATIVE INFRASTRUCTURE FOR
ELECTRIC AND HYBRID VEHICLES
MADE IN
USA





The Car Tech blog
July 29, 2010 12:19 PM PDT

EV charging station recharges without wires

by Liane Yvkoff

Look ma, no hands! Evatran offers a "hands free" proximity charging solution. (Credit: Evatran)

A "hands free" electric-vehicle charging station from Evatran powers nearby vehicles wirelessly, eliminating the need to remember to recharge at the end of the day--or dirty your hands.

The **Plugless Power charging station**, introduced this week at the **Plug-In 2010** conference in San Jose, Calif., uses electromagnetic induction to deliver power to an electric vehicle's battery within its proximity. The station consists of a model-specific vehicle adapter that's mounted onto the **car** and a charging station with a floor-mounted magnetic charging block close to where the driver parks.

Section 625.14
Rating

Electric vehicle supply equipment shall have sufficient rating to supply the load served. For the purposes of this article, electric vehicle charging loads shall be considered to be continuous loads.

Charging Stations

- **Level I**, 120 volts = approximately 8 hours of charging
- **Level II**, 240 volts = approximately 4 hours of charging
- **Level III**, 480 volts = approximately 30 minutes of charging

Levels of Charging

- Considering both near-term and long-term requirements for electric vehicle (EV) charging, three methods have been identified for recommended development. Referred to as Level 1, Level 2, and Level 3 EV charging, they cover the range of power levels anticipated for charging EVs.

Level 1

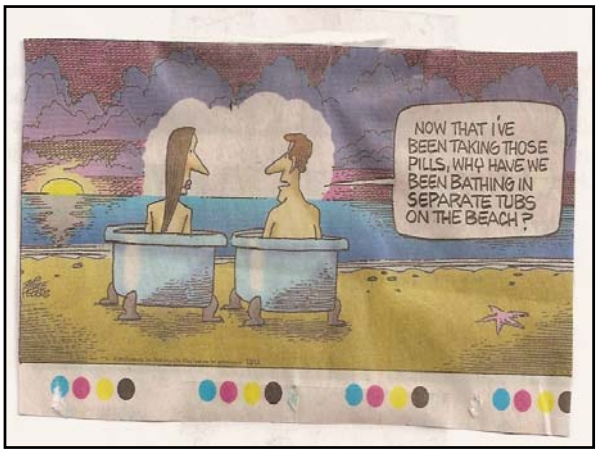
- This method, which allows broad access to charge an EV, permits plugging into a common grounded 120-volt electrical receptacle (NEMA 5-15R or 5-20R). The maximum load on this receptacle is 12 amperes or 1.4 kVA. The minimum circuit and overcurrent rating for this connection is 15 amperes for a 15-ampere receptacle and 20 amperes for a 20-ampere receptacle.

Level 2

- This is the primary and preferred method of EV charging at both private and public facilities. It requires special equipment and connection to an electric power supply dedicated to EV charging. The voltage of this connection is either 240 volts or 208 volts. The maximum load is 32 amperes (7.7 kVA at 240 volts or 6.7 kVA at 208 volts). The minimum circuit and overcurrent rating for this connection is 40 amperes (32 X 1.25 = 40 amperes). Electric vehicles are treated as continuous loads.

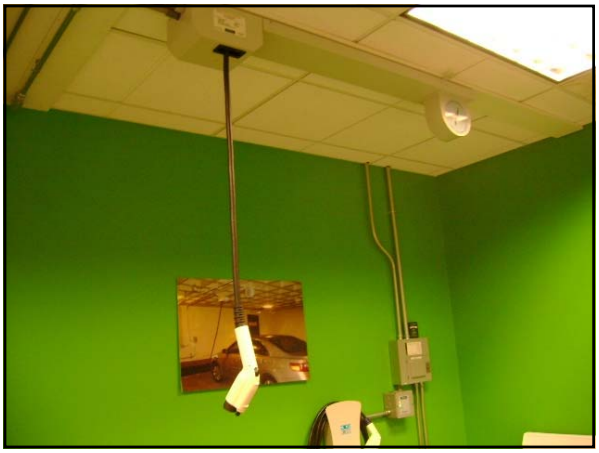
Level 3

- The EV equivalent of a commercial gasoline dispensing station, this high-speed, high-power method charges an EV in about the same time it takes to refuel a conventional vehicle. Because of individual supply requirements and available source voltages, exact voltage and load specifications for Level 3 charging have not been defined as in Level 1 and Level 2. These power requirements are specified by the equipment manufacturer.


NOW THAT I'VE BEEN TAKING THOSE PILLS, WHY HAVE WE BEEN BATHING IN SEPARATE TUBS ON THE BEACH?

Section 625.18 Interlock

- Electric vehicle supply equipment shall be provided with an interlock that de-energizes the electric vehicle connector and its cable whenever the electric connector is uncoupled from the electric vehicle. An interlock shall not be required for portable cord-and-plug-connected electric vehicle supply equipment intended for connection to receptacle outlets rated at 125 volts, single-phase, 15 and 20 amperes.



Section 625.19
Automatic De-Energization of Cable

- The electric vehicle supply equipment or cable-connector combination of equipment shall be provided with an automatic means to de-energize the cable conductors and electric vehicle connector upon exposure to strain that could result in either cable rupture or separation of the cable from the electric connector and exposure of live parts. Automatic means to de-energize the cable conductors and electric vehicle connector **shall not be required for portable cord-and-plug connected electric vehicle supply equipment intended for connection to receptacle outlets rated at 125 volts, single phase, 15 and 20 amperes.**


1 2 3 4 5 6 7 8 9 0 BACK
Q W E R T Y U I O P
A S D F G H J K L ENTER
SPACE Z X C V B N M . CLEAR

Section 625.15 Markings

All electric vehicle supply equipment shall be marked by the manufacturer as follows:

“FOR USE WITH ELECTRIC VEHICLES”

“VENTILATION NOT REQUIRED”

Section 625.23 Disconnecting Means

For electric vehicle supply equipment rated **more than 60 amperes or more than 150 volts to ground**, the disconnecting means shall be provided and installed in a readily accessible location. The disconnecting means shall be capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.

Readily Accessible Definition

Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is a requisite to climb over or remove obstacles or resort to portable ladders, and so forth.

Section 625.28
Hazardous (Classified) Locations

Where electric vehicle supply equipment or wiring is installed in a hazardous (classified) location, the requirements of Articles 500 through 516 shall apply

Section 625.29
Height of Charging Station

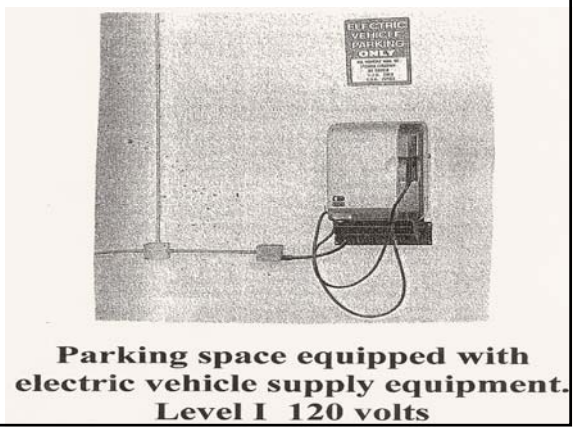
Unless specifically listed for the purpose and location, the coupling means of the electric vehicle supply equipment shall be stored or located at a height of **not less than 18 inches** and **not more than 4 feet** above the floor level.

Location of EVCE in Flood Zones

- 2003 International Residential Code Section R323.1.5 ***Protection of Mechanical and Electrical Systems*** states in part: "Electrical systems and components shall be located at or above the design flood elevation".
- ***Exception*** states in part: "Electrical systems, equipment and components are permitted to be located below the design flood elevation provided that they are designed and installed to prevent water from entering or accumulating within the components. Electrical wiring systems are permitted to be located below the design flood elevation provided they conform to the provisions of the electrical part of the code for wet locations".

ACCESSIBILITY FOR PEOPLE WITH DISABILITIES 2003 ICC/ANSI A117.1

- Unobstructed Forward Reach
- Unobstructed High Reach
- Unobstructed Side Reach
- Clear Floor Space



Parking space equipped with electric vehicle supply equipment. Level I 120 volts

End of Part I

Questions?

CT Department of Public Safety
Division of Fire, Emergency and Building Services

- Office of the State Building Inspector
  (860) 685 - 8310
- Office of the State Fire Marshal
  (860) 685 - 8350
- Office of Education and Data Management
  (860) 685 – 8330

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Thank-you !

Connecticut
State Building and Fire Codes

Charging Stations and Electric Vehicles

in the State of Connecticut (Part II)

March 15 2011

Presented by
Robert Nuzzi
State Electrical Inspector
Office of State Building Inspector

With technical and product support from:
Dan Shanahan,
Director of Sales and Marketing,
Control Modules Industries

Article 626

Electrified Truck Parking Spaces

Section 626.1
Scope

The provisions of this article cover the electrical conductors and equipment external to the truck or transport refrigerated unit that connect trucks or transport refrigerated units to a supply of electricity, and the installation of equipment and devices related to electrical installations within an electrified truck parking space.

Electrified Truck Parking Space
Definition

A truck parking space that has been provided with an electrical system that allows truck operators to connect their vehicles while stopped and to use off-board power sources in order to operate on-board systems such as air conditioning, heating, and appliances, without any engine idling.

Section 626.10
Branch Circuits

Electrified truck parking space single-phase branch circuits shall be derived from a 208Y/120-volt, 3-phase, 4-wire system or a 120/240-volt,single-phase, 3-wire system.

Section 626.11(A) Parking Space Load

The calculated load of a feeder or service shall be not less than the sum of the loads on the branch circuits. Electrical service and feeders shall be calculated on the basis of **not less than 11 kVA per electrified truck parking space.**

Section 626.11(B) Demand Factors

Electrified truck parking space electrical wiring system demand factors shall be based upon the climatic temperature zone in which the equipment is installed. The demand factors set forth in Table 626.11(B) shall be the minimum allowable demand factors that shall be permitted for calculating load for service and feeders. No demand factor shall be allowed for any other load, except as provided in this article.

Table 626.11(B) Demand factors for Services and Feeders

Climatic Temperature Zone (USDA Hardiness Zone) See Note	Demand factor (%)
1	70%
2a	67%
2b	62%
3A	59%
3B	57%
4A	55%
4B	51%
5A	47%
5B	43%
6A	**39%**
6B	34%

NOTE: The climatic temperature zones shown in Table 626.11(B) correlate with those found on the "USDA Plant Hardiness Zone Map" and the climatic temperature zone selected for use with the table shall be determined through the use of this map based on the installation location.

Calculation for Single Phase 120/240 Volts

11kVA X 1000 = 11,000 watts
per
Section 626.11(A)

11,000 ÷ 240 volts = 45.8 amps
Demand Factor 39% x 45.8 = 17.8
17.8 + 45.8 = 63.6 amps

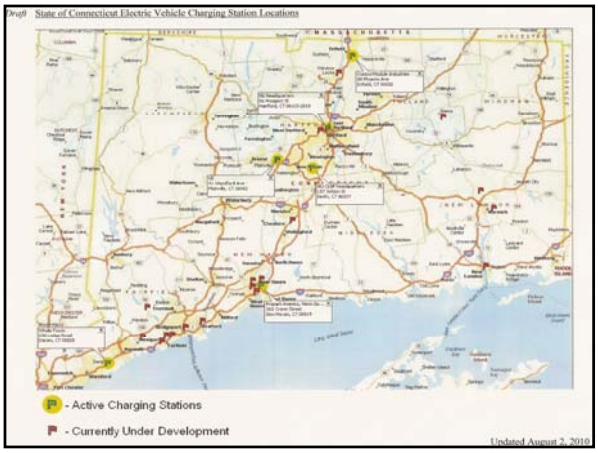
Table 310.16 (75°C)(167°F)
Conductor size = # 6 = 65 amps

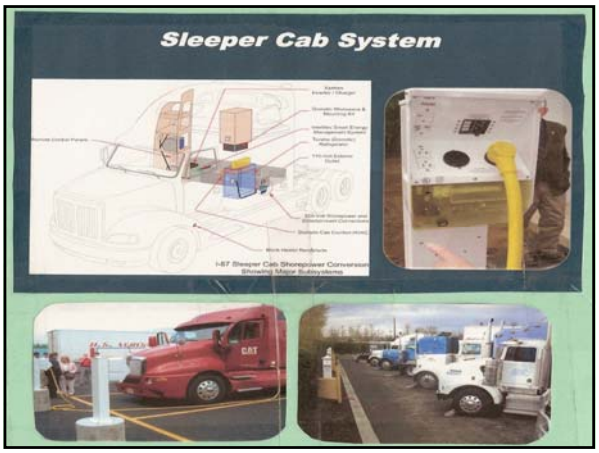
Calculation for Three Phase 120/208 Volts

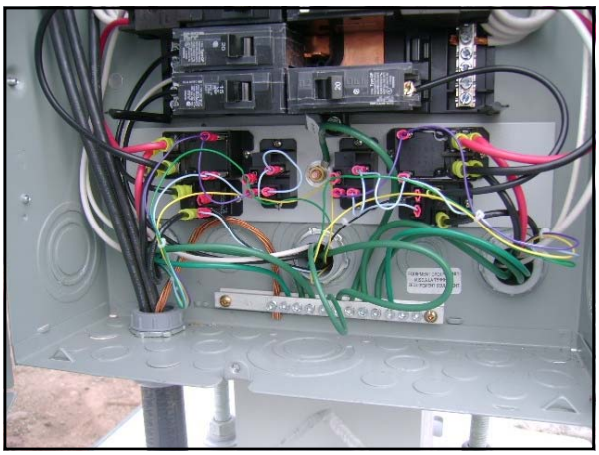
11kVA X 1000 = 11,000 watts
per
Section 626.11(A)

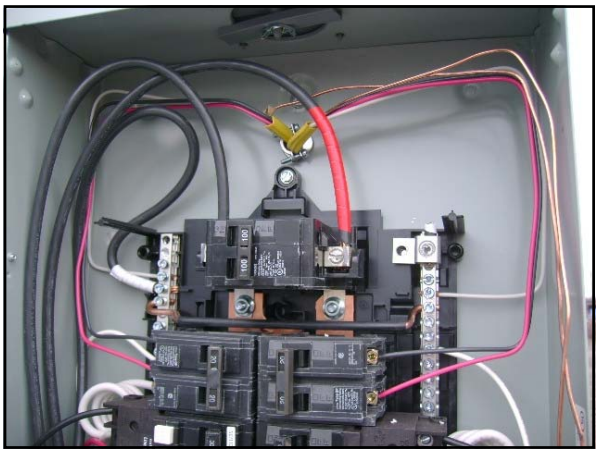
11,000
1.732 x 208 volts = 30.5 amps
Demand Factor 39% x 30.5 = 11.8
11.8 + 30.5 = 42 amps

Table 310.16 (75°C)(167°F)
Conductor size = # 8 = 50 amps




Sleeper Cab System






220 VAC
30 AMP
115 VAC
20 AMP
ON
OFF

Questions??

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