



# One and Two Family Residential Electric Vehicle Charging Station

## Level 1 Chargers:

For 120 volt level 1 chargers that can be plugged into an ordinary electrical receptacle outlet, there are no special requirements, if adequate outlets already exist. If a new outlet is to be installed, an electrical permit is required for the new outlet. No load calculations will be required, and the permit can be issued at the Development Services Counter.

## Level 2 Chargers:

Level 2 chargers that operate at 240 or 208 volts will usually require electrical permits. For 240 volt plugin EV chargers, and there is an existing matching 240 volt receptacle, no permit is required. However, if a new 240 volt receptacle is required, or an existing 240 volt receptacle needs to be changed to accommodate the charger unit plug, electrical permits are required. For permit submittals for level 2 chargers, the following are required:

1. Provide a key plan of the residence showing the amperage and location of the electrical service, and the proposed location of the electric vehicle charger.
2. Electric vehicle chargers shall be labeled by UL or approved testing agency.
3. Note on the plans: "Electric vehicle charger installation instructions shall be available at the job site at building department inspections."
4. Show the disconnecting means for hardwired chargers, or the NEMA designation and amperage rating for 240 volt outlets.
5. EV chargers with over 60 amps of supply current shall be hardwired, with a locking disconnecting means per CEC 625.42
6. Provide manufacture's cut sheets for the EV charger. Verify electrical demands and voltage.
7. Provide load calculations for the electrical service, per the included "Level 2 Electric Vehicle Chargers Service Load Calculation", or another method specified in NEC 220.
8. If circuits serving the EV charger are on a sub-panel from the main service panel, provide a single line diagram showing the feeders and sub-panel, and their ratings. Include load calculations for the sub-panel and its feeder.
9. Show that branch circuits and breakers are sized for 125% of the electrical vehicle charger demands per CEC 625.40. If 240 volt plugin chargers are used, the 240 volt receptacle needs to be sized for sized for the 125% of the demands.
10. Provide specifications for the conductors. For exterior or underground locations, conductors must be rated for wet locations per CEC 310.10.
11. Provide specifications for wiring methods. Non-metallic sheathed cable (Romex, or NMC) may be used, if enclosed inside the building construction, or inside the garage, if protected from physical damage.
12. Conductors outside the building construction, must be an approved method for exterior exposure. (EMT, PVC (UV rated if exposed to sunlight) or other approved wiring method.
13. Conductors run underground must use a wiring method approved for burial or underground use.

## Plug-In Electric Vehicle Load Calculator for Level 2 Charging

**INSTRUCTIONS:** Review the list of electrical loads in the table below and check all that exist in your home (don't forget to include the proposed Level 2 charger). For each item checked, fill in the corresponding "Watts Used" (refer to the "Typical Usage" column for wattage information). Add up all of the numbers that are written in the "Watts Used" column and write that number in the "TOTAL WATTS USED" box at the bottom of the table, then go to the next page to determine if your existing electric service will accommodate the new loads.

*(Loads shown are rough estimates; actual loads may vary. For a more precise analysis, use the nameplate ratings for appliances and other loads and consult with a trained electrical professional.)*

Check all Applicable Loads <input checked="" type="checkbox"/>	Description of Load	Typical Usage	Watts Used
<b>GENERAL LIGHTING AND RECEPTACLE OUTLET CIRCUITS</b>			
<input type="checkbox"/>	Multiply the square footage of house x 3	3 watts/sq. ft.	
<b>KITCHEN CIRCUITS</b>			
<input type="checkbox"/>	Kitchen circuits	3,000 watts	
<input type="checkbox"/>	Electric oven	2,000 watts	
<input type="checkbox"/>	Electric stove top	5,000 watts	
<input type="checkbox"/>	Microwave	1,500 watts	
<input type="checkbox"/>	Garbage disposal under kitchen sink	1,000 watts	
<input type="checkbox"/>	Automatic dish washer	3,500 watts	
<input type="checkbox"/>	Garbage compactor	1,000 watts	
<input type="checkbox"/>	Instantaneous hot water at sink	1,500 watts	
<b>LAUNDRY CIRCUIT</b>			
<input type="checkbox"/>	Laundry circuit	1,500 watts	
<input type="checkbox"/>	Electric clothes dryer	4,500 watts	
<b>HEATING AND AIR CONDITIONING CIRCUITS</b>			
<input type="checkbox"/>	Central heating and air conditioning	6,000 watts	
<input type="checkbox"/>	Window mounted air conditioning	1,000 watts	
<input type="checkbox"/>	Whole-house or attic fan	500 watts	
<input type="checkbox"/>	Central electric furnace	8,000 watts	
<input type="checkbox"/>	Evaporative cooler	500 watts	
<b>OTHER ELECTRICAL LOADS</b>			
<input type="checkbox"/>	Electric water heater (storage type)	4,000 watts	
<input type="checkbox"/>	Electric tankless water heater	15,000 watts	
<input type="checkbox"/>	Swimming pool or spa	3,500 watts	
<input type="checkbox"/>			
<input type="checkbox"/>			
<b>ELECTRIC VEHICLE CHARGER CIRCUIT</b>			
	Level 2 electric vehicle charger wattage rating		
<b>TOTAL WATTS USED</b>			

**INSTRUCTIONS:** Using the “TOTAL WATTS USED” number from the previous page, check the appropriate line in column 1 and follow that line across to determine the minimum required size of the electrical service panel shown in column 3. In column 4, write in the size of your existing service panel (main breaker size). If your existing service panel (column 4) is smaller than the minimum required size of the existing service (column 3), then you will need to install a new upgraded electrical service panel to handle the added electrical load from the proposed Level 2 charger.

The table below is based on CEC 220.83(A), 230.42 and Annex D.

1	2	3	4
Check the appropriate line (✓)	Total Watts Used (from previous page)	Minimum Required Size of Existing 240-Volt Electrical Service Panel (Main Service Breaker Size)	Identify the Size of Your Existing Main Service Breaker (Amps)**
<input type="checkbox"/>	up to 48,000	100 amps	
<input type="checkbox"/>	48,001 to 63,000	125 amps	
<input type="checkbox"/>	63,001 to 78,000	150 amps	
<input type="checkbox"/>	78,001 to 108,000	200 amps	
<input type="checkbox"/>	108,001 to 123,000	225 amps	

*\*\*Note that the size of your existing service (column 4) MUST be equal to or larger than the Minimum Required Size (column 3) or a new larger electrical service panel will need to be installed in order to satisfy the electrical load demand of the EV charger.*

**STATEMENT OF COMPLIANCE**

**By my signature, I attest that the information provided is true and accurate.**

**Job Address:**

---

(Print job address)

**Signature:** \_\_\_\_\_

---

(Signature of applicant)

(Date)

In addition to this document, you will also need to provide a copy of the manufacturer’s installation literature and specifications for the Level 2 charger you are installing.

*Note: This is a voluntary compliance alternative and you may wish to hire a qualified individual or company to perform a thorough evaluation of your electrical service capacity in lieu of this alternative methodology. Use of this electrical load calculation estimate methodology is at the user’s risk and carries no implied guarantee of accuracy. Users of this methodology and these forms are advised to seek professional assistance in determining the electrical capacity of a service panel.*