



Residential Electric Vehicle Charger Guidelines

INTRODUCTION

This guide is designed to assist applicants with a streamlined permitting, installation and inspection process for Residential Electric Vehicle (EV) Chargers.

BACKGROUND

There are two types of EV chargers.

Level 1 chargers are small units that plug directly into a standard home outlet (120-volt receptacle outlet). Level 1 chargers take a longer period of time to recharge a vehicle. If there is an existing (and permitted) 120 outlet for a Level 1 charger, no addition permits are required.

Level 2 chargers are larger units that plug into a 240-volt circuit (not as typical in a home or garage). Level 2 chargers are able to charge vehicles faster than a Level 1 charger. Level 2 chargers typically require an electrical permit, and inspections. In order to obtain a permit, some basic information will be needed to ensure safety and capacity for your electrical system.

PERMITTING EV CHARGERS

1. Read through this document and understand all of the requirements. This document is typically completed by a contractor. **Pro Tips:** Always use licensed/insured contractors. Obtain a minimum of three estimates. Verify license information and understand contractor obligations at cslb.ca.gov. The contractor must follow the installation instructions of the EV charger manufacturer and the requirements of California Electrical Code.
2. Applicants should ensure that all required documentation is complete. This includes any EV charger manufacturer's specifications or installation sheets.
3. If you have a homeowner's association, you should check to see if there are any special requirements.
4. Bring this completed packet to the one-stop shop permit center located at 41000 Main Street, Temecula, CA 92592. Ask to speak with one of our Community Development Technicians. Be sure to bring a form of payment.
5. Once a complete application is submitted, it may be reviewed over-the-counter or within 5-10 business days, depending on workloads and staffing levels. If all permit requirements have been met, and all fees are paid, staff will issue a permit.
6. After a permit is issued, installation may begin. Once complete, a City of Temecula Building Inspector will need to physically inspect the installation. Remember, someone will need to be present for the inspection so that Building Inspector can access the electric meter and EV charger (usually located within a garage).

OTHER IMPORTANT INFORMATION

Installing a Level 2 EV Charging system often requires changes to building's electrical wiring. Before installing the EV charging equipment and the associated wiring, talk to your EV manufacturer about the electrical requirements for the charger unit to be installed at your home.

Southern California Edison (SCE) provides electricity throughout Temecula. Please visit <https://www.sce.com/residential/electric-vehicles> to learn more about SCE rebate programs and requirements. It is very important to reach-out to SCE before you make any purchases and understand all of SCE's requirements.



LEVEL 2 ELECTRIC VEHICLE CHARGER – SERVICE LOAD CALCULATIONS

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 EV 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	DESCRIPTION OF LOAD	TYPICAL USAGE	WATTS USED
GENERAL LIGHTING AND RECEPTACLE OUTLET CIRCUITS			
	Multiple the square footage of the home x 3	3 watts/square ft.	
KITCHEN CIRCUITS			
	Dishwasher	3,500 watts	
	Electric Oven	2,000 watts	
	Garage Compactor	1,000 watts	
	Garage Disposal Under Kitchen Sink	1,000 watts	
	Instantaneous Hot Water at Sink	1,500 watts	
	Kitchen Circuits	3,000 watts	
	Microwave	1,500 watts	
LAUNDRY CIRCUIT			
	Laundry Circuit	1,500 watts	
	Electric Clothes Dryer	4,500 watts	
HEATING AND AIR CONDITIONS CIRCUITS			
	Central Electric Furnace	8,000 watts	
	Central Heating (gas) and Air Conditioning	6,000 watts	
	Evaporative Cooler	500 watts	
	Whole-house or Attic Fan	500 watts	
	Window Mounted Air Conditioning	1,000 watts	
OTHER ELECTRICAL LOADS			
	Electric Water Heater (Storage type)	4,000 watts	
	Electric Tankless Water Heater	15,000 watts	
	Swimming Pool or Spa	3,500 watts	
	Other: (describe)	watts	
	Other:	watts	
	Other:	watts	
	Other:	watts	
ELECTRIC VEHICLE CHARGER CIRCUIT			
	Level 2 EV Charger Wattage Rating*		
Add-up all of the watts for the loads you have checked ✓			
TOTAL WATTS USED €			

*(use name plate rating in watts or calculate as: (ampere rating of circuit x 240 volts = watts)



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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 EV Charger.

TABLE 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 <u>REQUIRED</u> SIZE OF EXISTING 240 VOLT ELECTRICAL SERVICE PANEL (<i>MAIN SERVICE BREAKER SIZE</i>)	IDENTIFY THE SIZE OF YOUR <u>EXISTING</u> MAIN SERVICE BREAKER (<i>AMPS</i>)**
	Up to 48,000	100 amps	
	48,001 to 63,000	125 amps	
	63,001 to 78,000	150 amps	
	78,001 to 108,000	200 amps	
	108,001 to 123,000	225 amps	

Please 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:			
Signature:		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.



OTHER HELPFUL INFORMATION FOR EV CHARGER INSTALLATIONS

The Table below illustrates the type and size of wire and conduit to be used for various Electric Vehicle Charger circuits.

Size of EV Charger Circuit Breaker	Required minimum size of Conductors (THHN wire)	Conduit Type and Size***		
		Electrical Metallic Tubing (EMT)	Rigid Nonmetallic Conduit – Schedule 40 (RNC)	Flexible Metal Conduit (FMC)
20 amp	#12	1/2"	1/2"	1/2"
30 amp	#10	1/2"	1/2"	1/2"
40 amp	#8	3/4"	3/4"	3/4"
50 amp	#8	3/4"	3/4"	3/4"
60 amp	#6	3/4"	3/4"	3/4"
70 amp	#6	3/4"	3/4"	3/4"

*****Based on 4 wires in the conduit (2-current carrying conductors, 1-grounded conductor, 1-equipment ground).**

As an alternate, Nonmetallic Sheathed Cable (aka: Romex Cable or NMC) may be used if it is protected from physical damage by placing the cable inside a wall cavity or attic space which is separated from the occupied space by drywall or plywood. Must use amperage values from 60 degree column in table 310.15B per CEC 334.

The Table below illustrates the required supports for various types of electrical conduit or cable.

Conduit Support	Electrical Metallic Tubing (EMT)	Rigid Nonmetallic Conduit – Schedule 40 (RNC)	Flexible Metal Conduit (FMC)	Nonmetallic Sheathed Cable (NMC)
Conduit Support Intervals	10'	3'	4-1/2'	4-1/2'
Maximum Distance from Box to Conduit Support	3'	3'	1'	1'

In addition to the above noted requirements, the California Electrical Code contains many other provisions that may be applicable to the installation of a new electrical circuit. Installers are cautioned to be aware of all applicable requirements before beginning the installation. For additional information or guidance, consult with the Department of Building and Safety staff or a qualified and experienced Electrical Contractor.

GENERAL INSTALLATION GUIDELINES FOR LEVEL 2 RESIDENTIAL EV CHARGERS

1. GENERAL REQUIREMENTS - All Electrical Vehicle Charging Systems shall comply with the applicable sections of the California Electrical Code, including Article 625.
2. EQUIPMENT HEIGHT - The coupling means of the Electric Vehicle Supply Equipment shall be stored at a minimum height as detailed below (CEC 625.50).

If located inside: 18"
If located outside: 24"
3. LISTED EQUIPMENT - All Electric Vehicle Supply Equipment shall be listed by a nationally recognized testing laboratory.
4. MECHANICAL VENTILATION – Mechanical ventilation is required if required by the manufacturer's specifications. Please see CEC 625.52 for ventilation and supply wiring requirements.
5. PROTECTION FROM PHYSICAL DAMAGE - Electrical Vehicle Supply Equipment shall be protected against vehicle impact damage when located in the path of a vehicle. In order to avoid the installation of a substantial pipe bollard as an equipment guard, locate the Electrical Vehicle Supply Equipment on a garage side wall, out of vehicular path. (see sample drawing below) (CEC Art. 110.27(B))
6. IF MORE THAN 60 AMPS - When EV charging equipment is rated at more than 60 amps or 150 volts, the disconnect means shall be provided and installed in a readily accessible location and shall be capable of being locked on the open position. (CEC Art. 625.43)

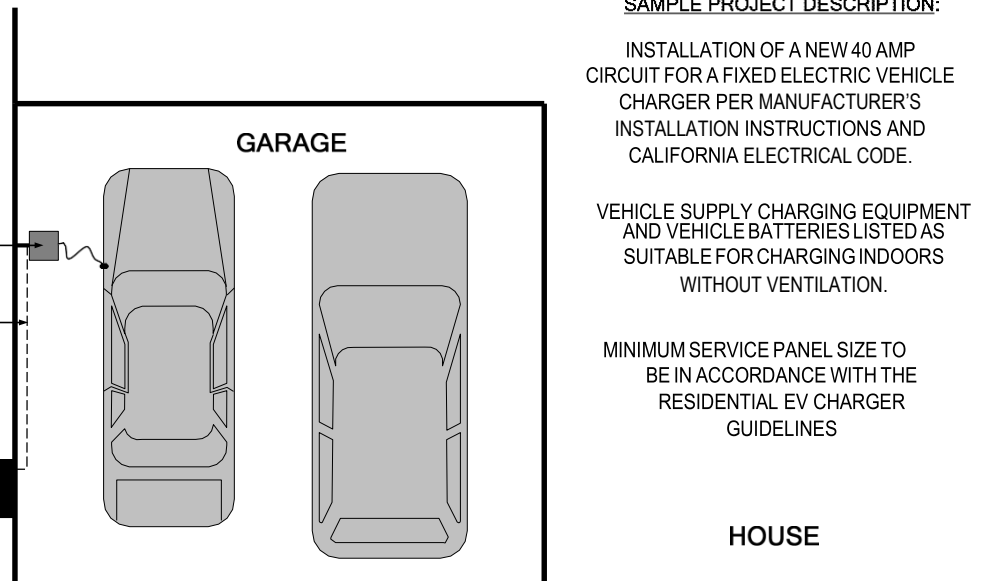
SAMPLE ELECTRICAL PLAN FOR LEVEL 2 ELECTRIC VEHICLE CHARGER CIRCUIT INSTALLATION

FEEDERS AND CIRCUIT
BREAKERS SIZED FOR 125%
CONTINUOUS DUTY PER CEC
625.41

NEW 32 AMP RATED FIXED
ELECTRIC VEHICLE CHARGER
SECURED IN PLACE

NEW 1/2" CONDUIT WITH #8
CONDUCTORS PER CEC

NEW 40 AMP CIRCUIT
BREAKER INSTALLED IN
THE EXISTING ELECTRIC
METER PANEL



SAMPLE PROJECT DESCRIPTION:

INSTALLATION OF A NEW 40 AMP
CIRCUIT FOR A FIXED ELECTRIC VEHICLE
CHARGER PER MANUFACTURER'S
INSTALLATION INSTRUCTIONS AND
CALIFORNIA ELECTRICAL CODE.

VEHICLE SUPPLY CHARGING EQUIPMENT
AND VEHICLE BATTERIES LISTED AS
SUITABLE FOR CHARGING INDOORS
WITHOUT VENTILATION.

MINIMUM SERVICE PANEL SIZE TO
BE IN ACCORDANCE WITH THE
RESIDENTIAL EV CHARGER
GUIDELINES