

ANAHEIM



BUILDING DIVISION

## RESIDENTIAL GUIDELINE FOR ELECTRICAL VEHICLE (EV) CHARGER INSTALLATION

*The purpose of this guideline is to assist homeowners and contractors in streamlining the permitting and installation process for home EV Charging Stations*

**Thank you for considering the use of electricity as an alternative fuel source for your next vehicle.** There are 2 basic types of EV Chargers for home use (Level 1 and Level 2). Level 1 Chargers are smaller units that plug directly into a standard 120 volt receptacle outlet. These types of Chargers typically require a longer period of time to recharge the vehicle. As long as the receptacle outlet being used to plug-in the Level 1 Charger is existing, there is no requirement to secure a permit from the Building and Safety Division. On the other hand, if you will be installing a new 120 volt receptacle outlet for the Charger, you will need to obtain a permit – but you will not need to provide any plans or electrical load calculations as would be required for the more powerful Level 2 type Charging systems.

A Level 2 EV Charging system requires 240 volts and charges the vehicle much faster than a Level 1 Charger. Level 2 Charger installations require a permit from the City. In order to obtain the permit you will need to provide the City with some basic information to show that your existing electrical service can handle the added load. If a service upgrade is necessary, please contact the Utilities Department for the required “meter spot” report.

### **What information do I need to provide the City in order to obtain the permit?**

The City of Anaheim has developed this “EV Charger Installation Guideline” in order to streamline the permit and installation process. In most cases, you or your contractor merely need to fill-in the blanks on this document, attach the manufacturer’s installation instructions and Charger specifications, and submit it to the Building Division for an over-the-counter review and permit issuance. If all of the information is provided and the proposal complies with the applicable codes, the review and approval process will only take a few minutes. Once the permit is issued the installation may begin. Upon completion of the installation, an inspection will need to be scheduled to inspect the work performed. The inspection request will need to be scheduled through the Anaheim Building Division and is requested and scheduled by the customer. Inspections are typically performed on the work day following your request for inspection. Please keep in mind that someone will need to be present during the inspection so that the Building Inspector can access the location of the EV Charger, which is typically located in the garage. Approval must also be granted by the Utilities Department for the EV Charger installation.

**Installing a Level 2 EV Charging System** often requires changes to building wiring and Utility electric services. Before installing charging equipment and associated infrastructure, talk to your EV manufacturer for information about what you need to charge your vehicle. If separate Contractors are used for the infrastructure wiring and the EV installation, separate permits will be required for each portion.

**When installing your EV Charger**, be sure to use a licensed Electrical Contractor whose license is current for electrical work. The Contractor shall follow the guidelines of the manufacturer and all necessary Code requirements. When mechanical ventilation is **required** for the EV Charger, an additional mechanical permit will be required.

**Why is the Electric Utility concerned about your EV Charger installation?**

Although an individual Level 2 EV Charger may have a negligible impact on the Public Utilities electric system, the combined effect of several EV Chargers in the same area could result in overloads on Utility secondary wires and transformers. It is crucial that the City of Anaheim be notified of any Level 2 Charger installations to ensure the Utility electrical system components are adequately sized to maintain high levels of service reliability. For more information, please contact Mary Rapport of the City of Anaheim’s Public Utilities Department at 714-765-4265. This information can also be accessed on the web at [www.anaheim.net](http://www.anaheim.net) in the Public Utilities’ webpage or you can visit Public Utilities at 201 South Anaheim Blvd., Anaheim, CA. 92805.

**LEVEL 2 ELECTRIC VEHICLE CHARGER – SERVICE LOAD CALULATION**

**INSTRUCTIONS:** Review the list of electrical loads in the table below and check all that exist in the 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), then add up all the numbers written in the “Watts Used” column. Write this number in the “Total Watts Used” box at the bottom of the table and proceed to the next page.

EXISTING MAIN CIRCUIT BREAKER SIZE: \_\_\_\_\_ AMPS

\*(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
<b>GENERAL LIGHTING AND RECEPTACLE OUTLET CIRCUITS</b>			
✓	Multiply the Square footage of house X 3	3 watts/sq.ft.	
<b>KITCHEN CIRCUITS</b>			
✓	Kitchen circuits	3,000 watts	3,000
	Electric oven	Nameplate rating	
	Electric stove top	5,000 watts	
	Microwave	1,500 watts	
	Garbage disposal under kitchen sink	1,000 watts	
	Automatic dishwasher	1,200 watts	
	Garbage compactor	Nameplate rating	
	Instantaneous hot water at sink	1,500 watts	
<b>LAUNDRY CIRCUIT</b>			
✓	Laundry circuit	1,500 watts	1,500
	Electric clothes dryer	5,000 watts	
<b>HEATING AND AIR CONDITIONING CIRCUITS</b>			
	Central heating (gas) and air conditioning	Nameplate rating	
	Window-mounted A/C	Nameplate rating	
	Whole-house or attic fan	500 watts	
	Central electric furnace	8,000 watts	
	Evaporative Cooler	500 watts	
<b>OTHER ELECTRICAL LOADS</b>			
	Electric water heater (storage type)	Nameplate rating	
	Electric tank less water heater	15,000 watts	
	Swimming pool or spa	3,500 watts	
	Other: (describe)		
	Other:		
	Other:		
<b>ELECTRIC VEHICLE CHARGER CIRCUIT</b>			
	Level 2 Electric Vehicle Charger rating*		
(Add-up all of the watts for the loads you have checked) <b>TOTAL WATTS USED</b>			

\*Use nameplate rating in watts or calculate as: (Ampere rating or circuit X 240 volts = Watts)

**INSTRUCTIONS:** Apply the **Total Watts Used** number from the previous page to the table below to identify if the existing electrical service panel is large enough to handle the added electrical load from the proposed Level 2 EV Charger. If your electrical service is NOT large enough, then you will need to install a new upgraded electrical service panel.

Total Watts Used Before Adjustments	Total Watts Used *After any adjustment factors	✓ Check the appropriate line	Minimum Required Size of Existing 240 Volt Electrical Service Panel (Main Service Breaker size)
	Up to 14,400		60 amps
	14,401 to 24,000		100 amps
	24,001 to 30,000		125 amps
	30,001 to 36,000		150 amps
	36,001 to 48,000		200 amps
	48,001 to 54,000		225 amps
	54,001 to 96,000		400 amps

\* 1<sup>st</sup> 8,000 watts @ 100% balance of wattage @ 40% (220.83)

Please note that the size of your existing service must be equal to or larger than the minimum required size identified in the table above or a new upgraded electrical service panel will need to be installed ( a separate permit is required for new service). Please note that approval from the Utilities Department will be required for the installation of the new electrical service panel.

**CAUTION:** This table is **NOT** to be used to determine the size of a **NEW UPGRADED** electrical service panel if your existing panel is too small or overloaded according to the table above. In order to determine the size of a NEW or UPGRADED service panel, there is a completely different load calculation methodology that applies. Sizing of a NEW or UPGRADED electrical service panel should only be done by a qualified Electrical Contractor or Electrical Engineer.

**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)

Please note that this is a voluntary compliance alternative and you may wish to hire a qualified individual or company to perform a thorough evaluation of you electrical service capacity in lieu of this alternative methodology. Use of this electrical load calculation estimate methodology and forms 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 chargers based on 75 degrees Celsius termination provisions.

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 amps	#12	1/2"	1/2"	1/2"
30 amps	#10	1/2"	1/2"	1/2"
40 amps	#8	3/4"	3/4"	3/4"
50 amps	#8	3/4"	3/4"	3/4"
60 amps	#6	3/4"	3/4"	3/4"
70 amps	#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.*

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 currently adopted version of 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 Building Division staff or a qualified and experienced electrical contractor.