



Community & Economic
Development Department
Building & Safety Division

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(R-3) RESIDENTIAL EV CHARGER AND EV METER PANEL REQUIREMENTS



The purpose of this guideline is to advise our permit applicants and to assist in streamlining the permitting, installation and inspection process for all single family residential electric vehicle (EV) charging systems and any proposed (EV) meter service panels in accordance with Riverside Public Utilities Regulations and our adopted California Electrical Code. There are 2 basic types of EV charging systems available for home use: Level (1) and Level (2). Level (1) Chargers are smaller units that plug directly into a standard 120 volt receptacle outlet. This guide is exclusive to Level (2) 240 volt EV charging systems.

Permit applicants must submit the following documents to the Building & Safety Division for consideration and approval prior to permit issuance: a scaled site plan, the manufacturer's installation instructions and the charger equipment specifications. If all of the information is provided and the proposal complies with the applicable codes and utility regulations, the review and approval process can usually be performed over-the-counter or within a day or two, depending on staff availability. Once the permit is issued, the installation may begin. When the installation is complete, an inspection of the work must be scheduled. Inspections are typically performed on the work day following your request for inspection. Keep in mind that someone will need to be present during the inspection so that the Building Inspector can access the location of the existing electrical service panel, the EV meter panel (when applicable) and the EV charger, typically in the garage.

- a. Provide EV charger installation guide and specification sheet along with listings
- b. Provide a site plan to scale that includes: project address, property owner information, a detailed scope of work, depicts all property lines and the building footprint of the house and garage, shows the existing electrical service location and all proposed work. **(see example on page 5)**

Note: For most properties, the City of Riverside Building & Safety Division can provide a simple scaled site plan that the applicant may use to depict the required information and proposed work

Installing a Level (2) EV charging system often requires changes to the dwelling's electrical wiring. Before installing the EV charging equipment and the associated wiring, talk to your EV manufacturer about the electrical requirements for the charging unit to be installed in your home. **When installing your EV charger**, be sure to use a licensed electrical contractor whose state contractor's license and insurance are current. The installer must follow the installation instructions of the EV charger manufacturer, our Utility Regulations and the requirements of California Electrical Code.

Why is the Electric Utility concerned about your EV charger installation? Though an individual Level (2) EV charger may have a negligible impact on the utility electric system, the combined effect of several chargers in the same neighborhood could result in overloads on utility secondary wires and transformers. It's important that the Utility provider be notified of a Level (2) charger installation to ensure the utility electrical system components are adequately sized to maintain high levels of service and reliability.

ELECTRICAL WIRING AND SUPPORT INFORMATION FOR EV CHARGER INSTALLATIONS:

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

Size of 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	1/2"	1/2"	1/2"
50 amp	#8	3/4"	3/4"	3/4"
60 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*

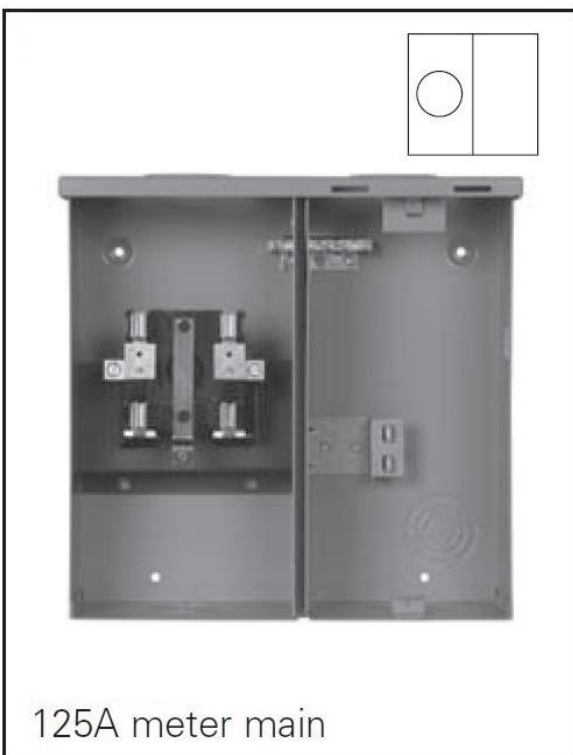
Note: As an alternate, Nonmetallic Sheathed Cable (Romex Cable or NMC) may be used if it is protected from physical damage by placing the cable inside a wall cavity or attic space which is separated from the occupied space by drywall or plywood.

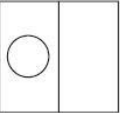
The Table below illustrates the required supports for various types of electrical conduit or cable:

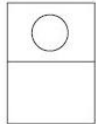
Conduit Support	Electrical Metallic Tubing (EMT)	Rigid Nonmetallic Conduit – Schedule 40 (RNC)	Flexible Metal Conduit (FMC)	Nonmetallic Sheathed Cable (NMC)
Conduit Support Intervals	10'	3'	4-1/2'	4-1/2'
Maximum Distance from Box to Conduit Support	3'	3'	1'	1'

Note: 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 Building and Safety Division staff or a qualified and experienced Electrical Contractor.

TYPICAL PV METER PANEL DETAILS



 Side-By-Side Construction Meter Mains					
Rated Amps	No. of Spaces	Max. Circuits	Cover Type	Mounting	Service
125	2	1	Ring	Surface	OH

 Over-Under Construction Meter Mains					
Amps Max.	No. of Spaces	Max. Circuits	Cover Type	Mounting	Service
100	2	1	Ring	Surface	OH
125	2	1	Ring	Surface	OH

WARNING SIGNAGE FOR MULTIPLE ELECTRICAL SERVICES

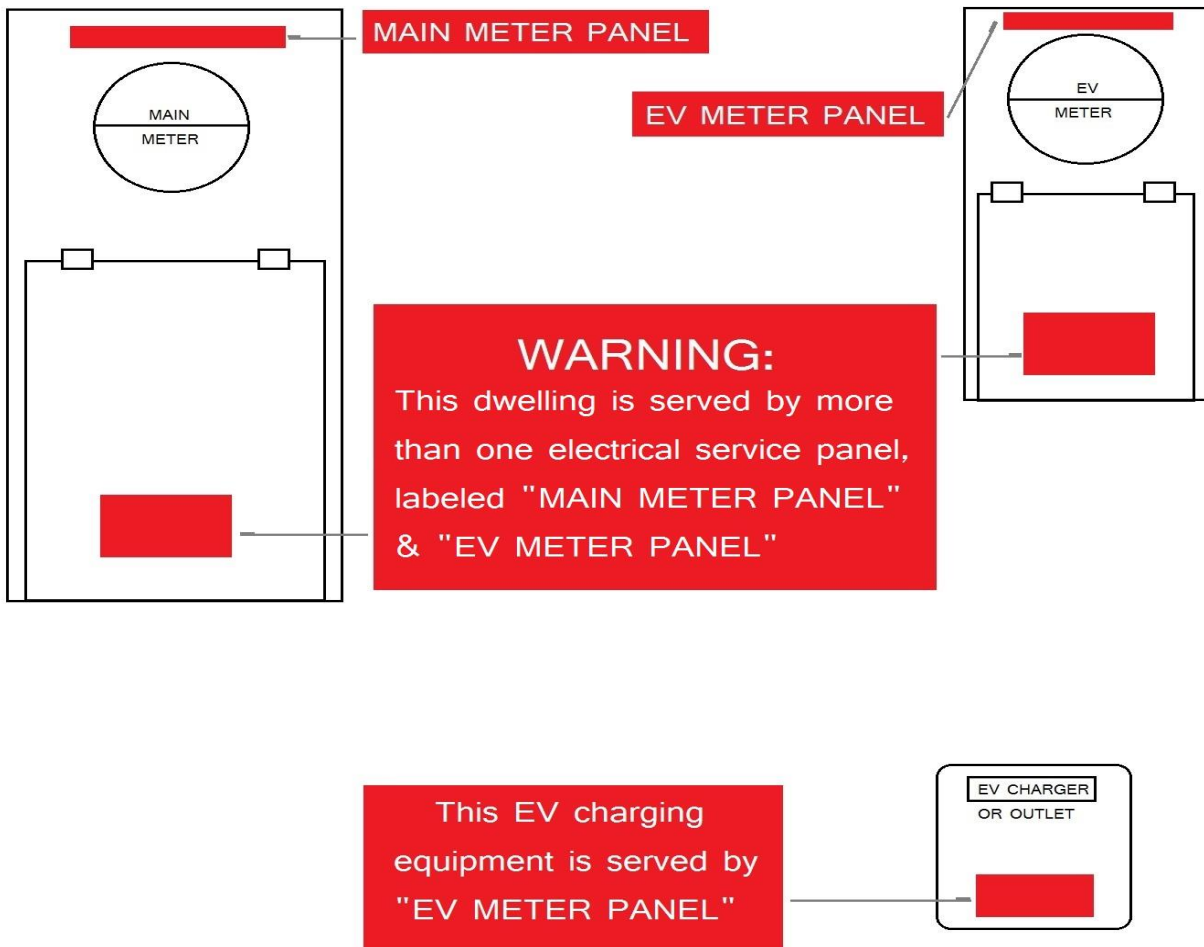
- With the additional EV electrical service meter panel, the dwelling will be equipped with two electrical services. Specific identification signs are required in accordance with **CEC 110.22, 225.37 and 230.2 (E)** to provide warning to personnel who may be servicing or need to shut down the electrical meter panels.
- The service signs need to be 1/8" thick plastic, minimum font 1/4" tall, white font on a red background. The size of the signs should not interfere with the normal operation of the electrical equipment. Signage attachment to the equipment should be with adhesive or approved short fasteners.

a. Sign verbiage at the PV meter panel shall be as follows:

This dwelling is served by more than one electrical service panel, labeled "MAIN METER PANEL" & "EV METER PANEL"

b. Additionally, a sign shall be provided at the EV charger or outlet that states:

This EV charging equipment is served by "EV METER PANEL"



GENERAL INSTALLATION GUIDELINES FOR LEVEL 2 RESIDENTIAL EV CHARGERS

1. **GENERAL REQUIREMENTS** - All Electric 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 height of 18 – 48 inches above the finished floor. (CEC Art 625.29(B)).
3. **LISTED AND LABELED EQUIPMENT** - All Electric Vehicle Supply Equipment shall be listed and labeled by a nationally recognized testing laboratory (UL, etc.).
4. **FASTENED IN PLACE** - Level 2 Electric Vehicle Supply Equipment must be permanently connected and fastened in place in accordance with the manufacturer's installation instructions (CEC Art. 625.13).
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. **NO MORE THAN 60 AMPS** – The residential EV charging meter service is rated for 60 amps maximum.
7. **MAIN DISCONNECT** - shall be in a readily accessible location and shall be capable of being locked on the open position. (CEC Art. 625.23)

SITE PLAN EXAMPLE:

