

City of Sacramento Guide to Electrical Vehicle Supply Equipment (EVSE) Permits for Residential Installations

Residential Electrical Vehicle Supply Equipment (EVSE) Permits

Do you own an Electric Vehicle, or are you considering buying one? Depending on your charging needs, building permits may be required if work needs to be performed in your home to upgrade or replace your electrical panel or outlets. Please contact SMUD for possible additional requirements.

Definitions:

- A **hybrid** is a vehicle what has in internal combustion engine as well as an electric motor and battery to increase gas mileage and decrease tail pipe emissions.
- A **Plug-in Hybrid Electric Vehicle (PHEV)** is a hybrid with a larger battery pack that produces superior gas mileage and reduced emissions comparable to a hybrid and has the capability to be plugged in to charge the battery for increased efficiency.
- An **Electric Vehicle (EV)** or **Battery Electric Vehicle (BEV)** is 100% electric and has zero tail pipe emissions with no internal combustion engine.
- A **Plug-in Electric Vehicle (PEV)** refers to all vehicles that have a battery on board that can be charged/plugged-in to an electrical outlet, such as PHEVs, Extended-Range Electric Vehicles (EREVs), BEVs and EVs.
- **Electric Vehicle Supply Equipment (EVSE)**, or charging stations, is your connection to the grid or charge connector for your Plug-in Electric Vehicle (PEV)

Is my home ready?

Depending on the charging requirements that your vehicle needs, your home electrical panel may need to be upgraded or replaced to accommodate the Electrical Vehicle Supply Equipment (EVSE) recommended for your vehicle.

There are two levels of electric vehicle (EV) charging systems for single family residence (one- and two- family dwellings) installations:

Level 1 charging: (120 VAC, 15/20 A), this is the standard electrical outlet found in most homes. This charging level can take 8-15 hours to fully charge a vehicle, depending on how drained the battery is and the size of the battery.

Level 2 charging: (240 VAC, 40A or larger), many newer homes use this type of an outlet for a clothes dryer. This level of charging can take 4-6 hours to fully charge a vehicle, depending on how drained the battery is and the size of the battery.

To find where public and existing electric vehicle charging stations are currently located, view the City's Interactive Map here: <http://www.cityofsacramento.org/Public-Works/Electric-Vehicle-Initiatives/EV-Charging-Locations>

Or the U.S. Department of Energy Alternative Fuels and Advance Vehicle Data Center:
<http://www.afdc.energy.gov/afdc/locator/stations/>

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SMUD Rates and Incentives

When you use electricity is just as important as the amount of electricity you use. For plug-in electric vehicle owners, there is a 1.5¢ per kWh credit for charging your EV between midnight and 6 a.m. every day, all year long.

Up-to-date information on current SMUD incentives and rates for EV owners is available at www.smud.org/DriveElectric or by contacting SMUD at pev@smud.org or 1-888-742-7683.

Do I need a building permit?

Depending on the current configuration of your home electrical service, and if a new electrical panel, sub-meter or outlet are needed to accommodate your vehicles charging needs, a building permit may be required. If your home already has the appropriate outlet (either 120VAC or 240VAC) a building permit is not required.

A building permit is required for all new installations and modifications of electrical panels, and electrical outlets. Before a permit can be issued, an electrical plan review, and sometimes a mechanical plan review (depending if a manufacturer's installation guidelines require mechanical ventilation), must be approved. Permits may be obtained over-the-counter for EV charging system installations.

Permit fees

Fees are based on a valuation of construction materials and labor. For example a Level 2 EVSE installation, can range from \$153–\$358 in building permit fees based on an estimated construction valuation of \$1,000–\$4,000.

Additional information about City of Sacramento building fees can be found here: <http://www.cityofsacramento.org/Community-Development/Resources/Fee-Info>

Steps to Getting an EVSE Permit:

	Once you decide to purchase an Electric Vehicle...
System Selection and Design	<ol style="list-style-type: none"> 1. Confirm with your auto dealership what charging equipment your vehicle needs (Level 1 or 2 charging) and the installation requirements. 2. Have a qualified electrical contractor (QEC) do an electricity panel capacity and load check. This information will need to be submitted to the City to obtain a building permit.
Submit for City Building Permit	Obtaining a Building Permit – City Review <ol style="list-style-type: none"> 3. If the scope of work requires a building permit, submit a complete building application including fees, electrical plans, and mechanical plan if needed, for all new charging equipment to be installed. Applications can be submitted with the City of Sacramento at the public counter at 300 Richards Blvd., 3rd Floor¹. 4. Obtain a city issued permit and complete installation work. 5. Schedule and complete a building inspection.
Connect and Charge	Once you have finished the building permit... <ol style="list-style-type: none"> 6. Connect your vehicle to the charger

(Footnotes)

¹ Please verify hours for over-the-counter plan check online at: <http://www.cityofsacramento.org/Community-Development/Building/Plan-Review/OTC-Review>

Submission Checklist for Electric Vehicle Supply Equipment (EVSE) Installations
Article 625 – 2016 California Electrical Code

Submittal Requirements:

Level 1 Charger:

- 110v dedicated 20 amp circuit
- No electrical plans required

Level 2 Charger:

- 220v dedicated circuit
- Provide:
 1. Cut sheets
 2. Load calculations: complete the Electrical Load Calculation Worksheet (Form CDD-0213) providing the load calculation of the electrical service.
 3. Site plan (show house on lot, service, and EVSE)
 4. One-line diagram: show the service size, E.V. breaker size, E.V. conductor size and number of conductors, and EVSE

Electrical Load Calculation Worksheet
2016 C.E.C 220.82 (100 AMP Minimum)

THIS SHALL BE ON THE JOB SITE AT ALL TIMES

SUBMIT TWO COPIES

Permit # _____ Date: _____

Contractor/Owner: _____ Size of service panel: _____ AMPS

Job Address: _____ Total SF: _____

Phone # _____ Email: _____

ITEM		WATTS	EXAMPLES
_____ Sq.Ft. @ 3 watts per Sq.Ft.			1) - A/C with gas heat
20 amp appliance circuits @ 1,500 watts each			- compressor 20 amps
Range (NPR - nameplate rating)	Gas: Yes <input type="checkbox"/> No <input type="checkbox"/>		- fan(s) 5 amps
Oven (NPR)	Gas: Yes <input type="checkbox"/> No <input type="checkbox"/>		TOTAL 25 amps x 240 volts = 6,000 watts
Cooking Units (NPR)	Gas: Yes <input type="checkbox"/> No <input type="checkbox"/>		2) - A/C with 5 kw electric heater
Water Heater (NPR)	Gas: Yes <input type="checkbox"/> No <input type="checkbox"/>		- compressor 20 amps
Dishwasher (NPR)			- fan(s) 5 amps
Disposal (NPR)			TOTAL 25 amps x 240 volts = 6,000 watts
Washer @ 1,500 watts (min)	Gas: Yes <input type="checkbox"/> No <input type="checkbox"/>		- 5,000 watt heater x 65% = 3,250 watts
Dryer @ 5,000 watts (min)			- Use larger of A/C or heater - i.e. - 6,000 watts
Motors (NPR)			3) - A/C with 10 kw electric heater
Other (NPR) _____			- compressor 20 amps
Other (NPR) _____			- fan(s) 5 amps
Other (NPR) _____			TOTAL 25 amps x 240 volts = 6,000 watts
SUBTOTAL:			- 10,000 watt heater x 65% = 6,500 watts
			- Use larger of A/C or heater - i.e. - 6,500 watts
1st 10,000 watts of SUBTOTAL @ 100%			4) - A/C with heat pump
Remaining _____ watts @40%			- compressor 20 amps
Largest of A/C or electric heater or heat pump*			- fan(s) 5 amps
Electric vehicle supply equipment (EVSE)			
TOTAL WATTS:			SUBTOTAL 25 amps x 240 volts = 6,000 watts
			- 5,000 watt heat strips @ 65% = 3,250 watts
TOTAL WATTS DIVIDED BY 240 VOLTS =		AMPS	TOTAL 9,250 watts

* Use largest of 100% of air conditioner or 65% of the heater or when residence has a heat pump, add 65% of auxiliary heat strips to 100% of air conditioner / heat pump