

Our clients want us to install an EV charger in their garage, but the electricians we typically use are unfamiliar with EV charging and reluctant to take the job. Is this something an electrician can do or do we need to find a specialist?

A Saul Berger, owner of Solar Now, a solar energy consulting firm based in Philadelphia, responds: This is something that any electrician who has wired an outlet for an electric stove or dryer can easily handle. Most electric-vehicle (EV) “chargers” come with plugs that conform to National Electrical Manufacturers Association (NEMA) specifications for three-phase, 220-volt receptacles, as well as adapters that can connect the car to standard 110-volt service. (Note: While charging stations are called “chargers,” the charging is done by the car once it is connected to a proper outlet.) The higher the amperage, the faster the car will charge. So while all battery-electric or plug-in hybrid cars can charge off standard 110-volt service, they do so at a slow rate, adding only 3 to 7 miles to the car’s driving range per hour. Most customers with battery-electric EVs want to plug their car into a 220-volt charging station, so they can add as much driving range as possible while their car is parked at home. These 220-volt “Level 2” mobile and wall-mounted charging stations typically draw 32, 40, or 48 amps (though there are Level 2 units at both lower and higher amps). At 32 amps, the car charges at a charge rate of about 30 mph; at 40 amps, around 36 mph; at 48 amps, about 40 mph; and so forth.

Most of the time, we simply install a NEMA 14-50 or 6-50 receptacle in garages. In my experience, the majority of EV owners are using a mobile connector, like the first-generation, 40-amp Tesla version shown in the photo at left. This has a hard-wired 14-50 plug, for which I wired a 14-50 receptacle about 5 feet above the garage floor using a 6-gauge, 4-wire cable running back to a 50-amp breaker in the service panel.

Wall-mounted, 220-volt stations are typically drawing 32 to 48 amps. We often wire these to a short cable with a 14-50 or 6-50 plug (there are also off-the-shelf molded cable assemblies available at the big box stores) to go into a corresponding receptacle mounted on the garage wall. EV car and charging-station manufacturers usually recommend hard-wiring the wall units to house power, rather than to a cord and plugging them into a receptacle, because you have fewer connections where the ground can be interrupted. But a lot of customers want the flexibility of taking their charging station with them to a second home or when they move. If you are installing a 48-amp unit, a 6-gauge cable will do nicely, but technically it should run to a 60-amp breaker, as the National Electrical Code requires electrical circuits to be rated for 25% greater amperage than the output. And if you’re using a 60-amp breaker in the panel and the home has only 100-amp service, the service should be upgraded, preferably to a 200-amp panel.

Wall charging stations typically have a Wi-Fi-connected software component that allows users to monitor charging from their smartphones. We will bring wall units online for customers, but a lot of electricians don’t want to be involved with the software side and will leave this to the homeowner (most of whom can do this from their smartphone).

At this time, direct current (DC) fast charging is used at some commercial EV charging stations but rarely in homes. These offer very fast charging rates that are often described in miles per minute, but they usually run at a higher voltage (400- to 1,000-volt service) not typically found in homes.



A NEMA 14-50 receptacle wired with a 6-gauge cable running back to a 50-amp breaker in the service panel will work for most mobile connectors.

Photo: Clayton DeKorne