

# Electric Car Charger Installation Considerations

*This document is for informational purposes only. Every installation requires individual investigation and may differ in implementation.*

## What are the types of electric chargers?

There are currently 4 different types of charger categories as shown in the table below showing representative information only. For hotels, the best type to install is a Level 2 with a J1772 plug. Level 2 is defined to be using 220V and up to 60A but is typically between 10A-40A. The J1772 charger is a simple box and cable that costs about \$500 and can be mounted outside on any post or wall. Its configuration is the most compatible across various electric cars including Tesla, Tesla, Kia Soul EV, Nissan LEAF, Ford Focus EV, among others. Furthermore, the power delivered by the J1772 charger is low enough not to be a significant drain on the hotel power supply (10A-40A) and is enough to provide about 100 - 200 miles of range to the guest's car overnight. The delivered power can also be shared among multiple chargers. An example of this charger is the [JuiceBox 40A EV Charger / Home Level 2 Electric Vehicle Charging Station with 24' Cord](#), or the smaller [ClipperCreek LCS-20P – 16 amp EV Charging Station, with 14-50 plug, 25 ft cable](#).

Category	Voltage (V)	Power (kW)	Charge Rate (Miles/hr)	Best Scenario	Chargers Types
Level 4	440	120	350	Coffee shop, restaurant (1-hour)	Tesla Supercharger
Level 3	220	50	150	Retail store (2-hours)	CHAdEMO, SAE Combo (CCS)
Level 2	220	3-7	15	Hotel, house (8 hours)	J1772, Tesla HPWS, NEMA 14-50
Level 1	110/220	1.5	4	Emergency or Sustain Full	Wall Outlet

Another Level 2 charger option is the Tesla HPWS (High Power Wall Socket). Many hotels install Tesla-specific charger stations to cater to Tesla cars, however, this charger is not compatible with any other electric car. The J1772 charger, on the other hand, is considered 'universal' and is compatible with most common electric cars as well as the Tesla with an adaptor. In general, the Tesla HPWS is a great choice if you expect a larger proportion of Tesla cars.

Of the other options, the Level 3 high power charger is not ideal due to the expense and the unnecessarily fast charge time of approximately 1 hour. The Level 1 wall outlet charger type is the least expensive, but the slow charge rate will only provide about 30 miles of range and given a choice, guests will book a hotel with a Level 2 charger. However, the wall outlet is nice to have on the side for long term stays or fully charged cars to use in order to free up the J1772 to make space for another electric car. Also, electric cars owners are generally very grateful for the use of even the wall outlets for a top up especially if they are located conveniently near the parking lot. Drivers will typically provide their own electric cables for wall outlets.

## Which cars would be supported?

The J1772 is the only common plug type that supports most electric cars. Examples include Tesla (with adaptor), Fiat 500e, Chevy Volt, BMW i Series, Nissan Leaf, Kia Soul, and Ford Fusion/Focus among others.

### How many chargers should be installed?

If the expectation is to add about 1%-3% to the hotel's guest room fill rate, then a hotel with 100 rooms could utilize up to 3 chargers. The exact number depends upon the hotel size, demographics in your location, competition, and the amount of available power. The availability of other adjacent chargers and other hotels with electric car chargers plays a specific role in the determination. For example, a hotel built next to a Tesla Supercharger station may simply be a temporary stopping point for a Tesla driver, or the driver may stay at the hotel due to the location and convenience. If the Tesla driver stays, they may prefer the supercharger only if it is close enough to walk to the car several times since Tesla penalizes drivers for staying plugged in to superchargers after the car is fully charged. If the supercharger is not close enough, the Tesla driver would prefer a hotel charger to use overnight. Each hotel scenario should be examined individually. Measures should be taken to ensure the charger installation strategy is scalable with the growing number of guests bringing electric cars.

### Where should the chargers be located?

Most hotels install chargers at a location that is closest to the power supply or costs the least to get to the power supply. Ideally the chargers should be located where the front of the car will end up in the parking spot. Some cars charge from the front nose of the car and others are near the rear, therefore, the cable needs to stretch the distance of the car, 20 - 25ft. It helps to identify the parking stall by posting a sign that is visible to all guests. A pair of chargers can be mounted together on a common post or pedestal so that the cables can then run to two cars parked side by side. In this case locate the charger mounting post in between two parking stalls. Add a simple hook to allow charger cables to be tidied up. A holster can protect the cable plug from the rain.

### Does the hotel have enough power?

It is unlikely that the hotel cannot support the power required for an electric car charger unless the hotel was off-grid, solar-powered. The required power per charger is a minimum of 10 Amps at 220V and increasing up to 40A as desired by the hotel. This represents a range of 2kW - 9kW. A table is included to show an approximate power draw compared to other common hotel appliances. Consult your electrician for details pertaining to your situation.

	Electric Car	15,000 BTU Air Conditioning Unit	Mini-Refrigerator
<b>Volts</b>	220	220	110
<b>Power (Watts)</b>	2200	3500	500
<b>Amps</b>	10	15.91	4.55
<b>Run Time (Hours/Day)</b>	6	8	24
<b>Watt-hours</b>	2200	3500	500
<b>Amp-hours</b>	10.00	15.91	4.55
<b>Cost per Day (@ \$0.20/KW-h)</b>	\$2.64	\$5.60	\$2.40

### How much power should be supplied?

This is the most critical question for hotel owners and managers and is a trade-off of supplying enough power to serve the guest but not so much as to overload the power supply, and to minimize installation and running costs. Consider how many driving miles you want to add to your guests electric car and the distance from your main pool of customers. A hotel situated in remote areas would provide more value to their guests by supplying more energy than an urban hotel with more charging amenities. A 10 Amp power level is great for guests to top up a small car in an urban region and 30 Amps will provide 220 miles extra range to a long distance driver. How

empty are guests likely to be when they arrive? Talk to your guests to get a feel for the average range desired.

As an example, if the target range supplied by the hotel is 160 miles, and the car is plugged in for 8 hours, the target current in amps can be calculated:

target charging rate 160 miles / 8 hours = 20 miles/hour

electric car energy usage = 250 Watt-hours / mile driven

target supplied power = 160 miles \* 250 Watt-hours / mile = 40 kWatt-h / 8 hours = 5 kW

target supplied current = 5 kW / 220V = 23A

Another approach that may be adopted is the use of timers. Referring to our [case study](#), a remote switch using a simple timer is set by the hotel manager for a set time, say, 6 hours. The guest then receives 6 hours worth of power at the power level and therefore charging rate set in your charger. This way, the amount of energy is controlled and managed by the hotel.

### **I don't know anything about electricity. What should I do?**

The simplest way to tackle this project is to simply call your electrician. Ask them to read this document and to understand your requirements. Before they arrive, think about where you would like your electric car guests to park and how many stalls you are willing to dedicate to electric cars. Do you want the chargers to be shown prominently in the front or in the rear next to the power supply? The electrician will then be equipped to offer you an accurate quote after reviewing the hotel power supply and your specifications.

### **Is it safe?**

A charger is safe if properly installed and furthermore, electric cars are generally safer than gasoline cars as shown in automobile safety studies. Just as in any other electrical system, a modern power supply with good connections, correctly sized breakers and wiring that has been correctly sized, housed and grounded, is a safe system.

### **Can I install it myself?**

You can install a charger by yourself if your local laws allow and if you have the required skills. Read over the [case study](#) for a detailed installation example.

### **Should an electrician be hired to install it?**

Again, if your local laws require installation by a qualified electrician or if desired by the hotel management. [Find an Electrician who is familiar with J1772 charger installations here](#). Some portion of the construction may be done by the maintenance staff such as digging any trenches or other construction preparation work. Or, the installation and maintenance can be completely outsourced to a third party Electric Charging Network such as Blink or ChargePoint. The disadvantage is that the guests will likely need to be a member of the Network for billing purposes unless there is an agreement that the hotel will accept all the billing responsibilities. We have seen both implementations, but typically, hotels install their own charger without involving a third party.

### **Should the charger management and operation be outsourced?**

The installation and maintenance can be completely outsourced to a third party Electric Charging Network such as Blink or ChargePoint. The advantage is that the only consideration for the hotel is where to place the chargers and when the construction will take place. The disadvantage is that the guests will likely need to be a member of the Network for billing purposes unless there is an agreement that the hotel will accept all the billing responsibilities. We have seen both implementations, but typically, hotels install their own charger without involving a third party.

### **Should guests be allowed to reserve the charger?**

An EV driver that books a room will likely want to use the hotel charger overnight. Many hotels will place a cone in the dedicated parking stall to reserve the spot for the guest.

### **Is it possible to meter the power used by the charger and the cost?**

A simple energy meter to measure the energy supplied to the chargers is straightforward to install as is shown in the [case study](#). Alternatively, an official [metered panel](#) may be installed by the local power company to deliver a separate power supply to the chargers and may be delivered at a different (lower) rate. Call the local power company for details on their ability to provide incentives.

### **Is it possible to control power to the chargers?**

Remote management via a switch at the reception desk allows the hotel management to manually control the power to the chargers at their discretion. This is possible for situations where the chargers are installed in an area requiring monitoring or managing charger reservations. An example of the switch installation is also available in the [case study](#).