Are All EV Charging Plugs The Same

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Are all EV charging plugs the same? There are three types of EV plugs available at the moment. There is the standard J1772 plug which comes as standard with most new vehicles, the Chathamo and the dedicated Tesla charging cable, but which one should you use for your EV?

EV charging can seem really complicated, but in reality, it's not that bad. To get started there are three levels of EV charging. Level one typically refers to 2120 volt AC charging, this would be what you find in your typical household wall outlet.

Level 2 typically refers to 240-volt charging, this would be most of your public charging stations or if you have a 240-volt outlet installed in your garage for faster charging at home. And level 3 refers to DC fast charging which is typically something that you use when you're taking a long trip.

Within each of those levels of EV charging, we do have competing standards. With level 1 and level 2 AC charging, at least in the US, we have the standard J1772 plug, or J-plug as it's known which most EV is utilized.

And then there's Tesla with their proprietary charging plug, thankfully these standards are compatible with each other and every Tesla does include a J1772 standard Tesla plug adapter.

You should be able to adapt the standard to the other way as well, but at present, there isn't a commercially available solution to do so.

Similar to the AC charging we also have competing standards for DC fast charging, there are three of them. Chademo CCS and Tesla supercharger.

I'll talk about those in a minute but first, let's talk about AC charging.

When charging via level 1 or level 2 AC you are actually utilizing your car's onboard charger. How quickly your battery replenishes it is dependent upon a few things like how much power your car's onboard charger can handle, how much current the EV's or the charge cord you're using can deliver and what the power delivery capabilities are of the electrical breakers that you are connected to.

Your typical electric vehicle will include a level 1 120 volt charge cable or EVS and these are usually good for three to four miles of range per hour charged, given that you can't pull more than about one-and-a-half kilowatts continuous from your standard 120 volts 15 amp residential breaker.

I know that sounds slow and that's because it is, but if you don't have a very long commute you don't do a lot of driving in a day you can get by just using that standard EVSE that came with your car and charging overnight.

However, if you do a lot of driving in a day you're probably going to want to look into some sort of 240-volt charging solution for your car so that you'll be able to charge it overnight while you sleep and it'll be ready to go in the morning.

For most EV's, this will involve an additional expense in purchasing a 240-volt charging station or upgrading your standard charging cord to handle 240-volt charging.

There are some services available that will come apart and upgrade them for you. And then there's the cost of installing a 240-volt breaker and outlet or other 240 volt hookup for the said charging station.

Cost for a 240-volt charging solution can easily range from four hundred to eight, nine hundred dollars plus and that's assuming you don't need any major panel upgrades which can be an issue in older homes.

The costs are highly dependent upon where you live, what electrician's cost in your area, weather permitting is required for the installation of a charging station and a few other factors.

240-volt charging is a little more convenient and less expensive with a Tesla. and that's because the EVs charge cable that they include with all of their vehicles can function both as a 120 volt and a 240-volt charging cable. They also provide a variety of adapters that allow it to plug into a whole bunch of different types of outlets.

240-volt level 2 charging is what you're going to encounter most frequently out in the wild, with public charging stations and charging stations operated by private companies and the cost to utilize them will vary depending upon each network.

That said, home charging is still going to be your least expensive option and I strongly encourage you to check with your local utility company to find out what sorts of time of use rate schedules they have available.

Most of them do offer special super off-peak rates for EV charging and these are very important because it'll save you a lot of money. In addition to being cheaper, another advantage to home charging is that if you charge a car every night at home, it's like waking up every morning to a full tank of gas.

You don't need all of the infrastructures that you do for gasoline vehicles for around-town use if you're charging at home, because the infrastructure is in your home.

I understand that not everyone rents or owns their own home or has access to something like a garage to function as a dedicated charging space for their EV at night, and this is a particular concern to people who live in the apartments. This access to charging is really only going to be solved with time.

There are some municipalities that started working on regulations requiring all new construction, particularly of apartments and higher density housing, to include facilities for EV charging and it'll take some time for the rest of the housing market to catch up.

In the meantime EV owners who do find themselves in this situation can look for alternatives like, charging at work if you can work something out with your employer or utilizing public Chargers or DC fast chargers that are available within city areas.

As I mentioned earlier there are three primary DC fast charging standards, Chademo CCS and the Tesla supercharger network. Chademo is primarily

used by Nissan in the Leaf but it can all be found in other EVs like the Kia Soul EV and be short-lived Honda Fit EV.

Given the limited range of these cars, most of the Chademo network was built out to service short-range EV's. They're all clustered around city areas and don't really enable much in the way of long-distance travel.

In recent years there have been a few expansions by some of the private network operators that allow for limited distance travel, but it doesn't really give you the kind of coverage that you'd want for true long-range travel.

Another sticking point with Chademo is that a good percentage of the stations are actually located at Nissan dealerships, this was part of Nissan's push to expand the availability of DC fast charging.

Unfortunately by putting those DC fast charging at dealerships it creates a limited access issue to where you can most of the time only use them within 2 business hours of the dealership, and some dealerships aren't very friendly toward Nissan's rolling up to charge.

Chademo stations are largely owned and operated by third-party charging networks like eveygo.com or chargepoint.com All of those have different P-structures and different membership plans and if you're going to make use of the Chademo network you should probably just go out and find out for everyone who operates in your area.

It’s worth pointing out that Tesla also makes a Chademo adapter for their cars so Tesla can make use of this network as well as their supercharger network.

DCS or combine charging system is one of Chademo’s competitors and is being adopted by more auto manufacturers than Chademo. You have the US manufacturers on board with CCS as well as the Germans and some of the other Asian manufacturers are starting to adopt it as well.

Being newer than Chademo it does not have quite the same rollout yet, however, a lot of the newer stations are being put in rare combination CCS and Chademo stations.

Similar to Chademo the existing network is also built out, for the most part, to serve short-range EVs because that’s what exists in the marketplace presently.

I mean let’s say the only long-range EV’s you can get right now is either the Tesla Model S, Tesla Model X and hopefully the Tesla Model 3 by the end of the year and the Chevy Volt

Like Chademo this is starting to change and we are starting to see a little more in the way of long-distance travel infrastructure appear, mostly in California but it is slowly spreading to other areas as well.

Given the number of auto manufacturers that are adopting CCS, I think that’s one to watch out for as it's going to grow very very rapidly as we start seeing more longer-range EV’S produced by the major auto manufacturers.

Hopefully, Tesla will be able to produce a CCS adapter at some point but at present, there isn't one. With the existing CCS and Chademo infrastructure what you're going to find are charging stations capable of delivering between 20 and 50 kilowatts of power.

This is also kind of an artifact of the short-range EV issue, but they are working on increasing the capabilities of those standards.

There have been some hundred kilowatts CCS stations installed in the US but they are very rare at the moment.

The Tesla supercharger network is arguably the most mature of the three standards in the United States. Having been built entirely around Tesla's large battery long-range EV concept the network is meant specifically for long-range travel only.

If you look at a Tesla coverage map that's what really gives Tesla's vehicles an edge as far as being 100% use case cars, you can use this network to travel to a lot of places in the United States.

In addition, each Tesla supercharger station pin on the map typically represents between 2 and 13 charging stalls, whereas with the CCS and Chademo Network most charging stations have only one or two.

Another key difference is that all Tesla supercharger stations are owned and operated by Tesla. It's all done through Tesla which means that there can be a high level of integration between the charging network and the cars.

Beyond simple availability, Tesla superchargers are also capable of delivering up to 145 kilowatts of power, though currently, Tesla's vehicles can only accept up to 120 kilowatts.

There's some room for improvement in the vehicles but it also aids in improving charge times when you have two vehicles sharing paired charging spots.

In case you're wondering why I keep talking about power delivery instead of charge times, it's because the time it takes to charge depends on several factors. Like how large your battery is, what the maximum charge rate your car can accept is, but also how depleted your battery is.

Lithium-ion batteries all have what's referred to as a charge curve, they can accept power much more rapidly when they're at a low state of charge than when they're at a high state of charge.

What you end up doing in instances of long-distance travel is trying to arrive at a charging station with a fairly low state of charge. That way you can take on

power as quickly as possible, only take on exactly what you need to get to the next charging station or your final destination and then move on.

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