**ECVFLO FAQ Document**

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| **Question** | **Answer** | **Source** | **Contributor** |
| How do EV charging stations work? | 1. **Identify yourself to the charging station** – this may be through a mobile app, an RFID tag or card, or even using a contactless credit or debit card. 2. **Plug the charging cable into the vehicle and the station**. Some stations come with built-in cables, in which case you can plug that directly into your car. 3. **Charge**. You should see confirmation through your vehicle’s display as well as the charger’s indicator lights. 4. Once charged, you can **end the charging session** via the station or mobile app, depending on how you started it. | https://blog.evbox.com/7-faqs-ev-charging | Barry |
| What is an EV charging cable and charging cable types? | While some charging stations come with cables attached and others require you to bring your own, charging cables are an essential part of charging an electric vehicle. Charging cables come in four forms or “modes” and each is used for a certain type of charging. Mode 1 charging cables With a Mode 1 cable, you simply connect an EV to a standard AC socket-outlet using an extension cord and standard plug. As a result, there is no communication between the vehicle and the charging point, meaning that there are no special safety systems or shock protection. This type of charging is useful for light electric vehicles like e-bikes and scooters, but it’s not considered safe for electric cars and is prohibited in many parts of the world. Mode 2 charging cables When you purchase an EV, it will typically come with what’s known as a Mode 2 charging cable as standard. These cables plug into your EV on one end, and a standard domestic socket on the other and the cable comes with In-Cable Control and Protection Device (IC-CPD) which is responsible for the control and communication between, and the protection of the standard wall plug and the EV. While this charging method is undoubtedly convenient; as most household outlets only deliver up to 2.3 kW of power, charging using this method can take a long time. It can also be dangerous if done incorrectly. Therefore, we only recommend using this charging cable if it’s an emergency. Mode 3 charging cables Mode 3 cables are currently the most common way to charge an EV across the globe. A Mode 3 charging cable connects your vehicle to a dedicated EV charging station—like those found in **workplaces and offices**, **homes and residential locations**, and **commercial** and public parking lots. These cables are in charge of the control, communication, and protection of the charging process and usually connect to charging plugs like Type 1 or Type 2. Mode 4 charging cables As the first three modes send AC power to the vehicle and that power is converted via an onboard AC/DC converter, they stand separate from Mode 4. Mode 4 charging cables, on the other hand, are specifically used for DC charging, and the power is converted before it's transferred to the vehicle. Often known as fast charging or ultra-fast charging, when you charge an EV with DC, you can significantly reduce charging times. However, as this type of charging transfers much more power directly to the battery of an EV, the cables must be permanently connected to the charging station and are often liquid cooled to handle the heat. | https://blog.evbox.com/charging-cables-and-plugs | Barry |
| What is difference between AC and DC charging? | While EV chargers come in many different shapes and sizes, the main difference is whether they provide alternating current (AC) or direct current (DC). All batteries, including those in EVs, store DC power, so the AC current coming from the grid must be converted. It’s not a question of if, but rather where this conversion happens that highlights the key **difference between AC and DC chargers.**  AC charging   * are the most common (and generally slower) type. In most cases, AC charging can reach up to 22 kWh. * In order to fully charge a **Tesla Model S** (that has a 100 kWh battery) with a 22 kW Level 2 charging station, it would take about 7 hours, while it would take an 11 kW charging station approximately 10 hours to do the same.   DC charging   * the electricity is converted from AC to DC by the charging station before it reaches your car. This allows it to bypass the car’s slower onboard converter and achieve much higher power outputs, up to 350 kWh as it feeds power ‘directly’ to the battery. As a result, charging an EV with a DC charger takes mere minutes rather than hours. * To fast charging a Tesla Model S, this would only take around 30 minutes. However, DC charging infrastructure requires a lot of power and is therefore unsuitable for most residential, commercial, and municipal environments. | https://blog.evbox.com/7-faqs-ev-charging | Barry |
| What are EV charging plug types? | A charging plug is the connector that you insert into the charging socket of an electric vehicle. Just like how the plugs of appliances differ depending on the country you're in, EV charging plugs and sockets also vary depending on the vehicle brand, **charging level**, and country they are manufactured in **AC charging plugs****Type 1 charging plug** SAE J1772—are most commonly used with vehicle models found in Japan and North America. They are single-phase and can deliver a power output of up to 7.4 kW. **Type 2 charging plug** Type 2 plugs—also referred to as “Mennekes” in reference to the German company that originally designed them—are the official plug standard for the European Union. These three-phase plugs have a higher power transfer capacity than Type 1 plugs, delivering up to 22 kW for private charging, and up to 43 kW for public charging. **GB/T charging plug** China developed its own charging system referred to by its Guobiao national standards as GB/T. There are two variations of GB/T plugs: one for AC charging and one for DC fast charging. The GB/T AC charging plug is single-phase, delivering up to 7.4 kW. While it looks the same as the Type 2 plug, don’t be fooled—its pins and receptors are reversed. **DC charging plugs** The Combined Charging System or CCS for short is the fast charging plug standard in North America (CCS1) and Europe (CCS2). It’s called a combined charging system because it supports both AC and DC charging. **CCS1** an enhanced version of the Type 1 AC plug with an additional two power contacts to enable DC fast charging. CCS1 is the most common fast charging plug across North America besides Tesla's Supercharger technology which has its own plug and can charge at speeds of up to 350 kW. **CCS2** is an enhanced version of the Type 2 AC plug with an additional two power contacts to enable DC fast charging. CCS plugs can deliver between 50 kW and 350 kW of DC power. AC charging is also supported by plugging a standard Type 1 (for CCS1) or Type 2 (for CCS2) plug into the upper half of the plug while leaving the lower DC power contacts empty. **CHAdeMO charging plug** Developed in Japan, most CHAdeMO charging plug enables fast charging of up to 200 kW as well as bidirectional charging. **GB/T charging plug** The current GB/T DC charging plug can deliver up to 237.5 kW. **China’s Electricity Council is also currently developing a new version**, in partnership with the CHAdeMO Association, that could deliver up to a whopping 900 kW. This latest version—called ChaoJi—enables DC charging with over 500 kW while ensuring the connector to be light and compact with a smaller diameter cable, thanks to the liquid-cooling technology as well as to the removal of the locking mechanism from the connector to the vehicle side. **Tesla charging plug** With 30,000+ Superchargers, Tesla owns and operates the largest global, fast charging network in the world. Until recently, this network was exclusively for Tesla drivers. The Supercharger has its own proprietary plug, which looks like a regular AC Type 2 socket but does not allow other non-Teslas to charge. While Tesla's Supercharger network dominates the North American charging market, they have, however, made concessions in Europe and begun building their vehicles with CCS2. At the same time, Tesla announced that their CCS to Tesla proprietary plug adapter is finally coming—allowing Tesla drivers outside of Europe to charge at non-Tesla DC charging stations. | https://blog.evbox.com/charging-cables-and-plugs | Barry |
| How far can EV travel without recharging? | Many EV models sold in Australia can travel over 400km before they need to be recharged.  Please note the battery range figures on the label and Green Vehicle Guide are based on a test performed in controlled conditions. Your battery range will be affected by how you use your vehicle, including:   * how much weight your vehicle is carrying * if you are using accessories such as heating or air-conditioning * how you accelerate and brake (many electric cars have regenerative braking to help charge your vehicle when you are slowing down). | https://www.greenvehicleguide.gov.au/pages/LowAndZeroEmissionVehicles/ElectricVehicleInformation | Barry |
| What are EV benefits? | Australian drivers travel on average around 33km a day. Given that charging stations are becoming more available, EVs are an increasingly viable and convenient solution in cities, towns and major holiday destinations. There are a range of benefits to driving electric, including:   * Reduced fuel costs and higher efficiency * Less maintenance * Fuel security * Reduced traffic noise * Air quality improvements * Good for the environment | https://www.greenvehicleguide.gov.au/pages/LowAndZeroEmissionVehicles/ElectricVehicleInformation | Barry |
| What are the driving range of EV owners? | In a 6-month study by Franke and Krems (2013) among 79 leased EVs in Berlin, it was reported that, on average, users drove 38 km per day. In a 2021 survey, 104 EV owners reported average daily driving distances twice the national average per car per year (Lavieri & Oliviera, 2021). However, the Australian Bureau of Statistics (2021) estimated that, on average, EV passenger vehicles in Australia in 2020 travelled the same distance as other passenger vehicles and 600 km further than petrol passenger vehicles (5.7 percent). Other studies have reported that EV owners in rural areas drive farther compared to their city counterparts. For example, drivers in a suburban territory in Canada were reported to drive 80 percent further than their urban counterparts on average (fleetcarma, 2019). This is not unexpected, with Khoo et al. (2014) reporting that the average driving distances of residents in rural areas or outer suburbs are likely to exceed the driving distances of residents in cities. Weldon et al. (2016) posited that EV owners in Ireland, on average, drove about 30 km between charging events, noting that the studied EVs had a relatively low driving range of 130 km. | https://github.com/Chameleon-company/EVCFLO/blob/main/Research%20Docs/Driving%20and%20charging%20an%20EV%20in%20Australia.pdf | Barry |
| How long does it take to charge an EV | Level 1 chargers are intended for overnight stops, typically 14-16 hours for an 80 percent charge.  Level 2 chargers are for extended stops, typically 3-5 hours.  DC Fact Charging is for quick stops, typically 20-30 minutes for an 80% charge. | [The 4 Most Common Electric Vehicle Charging Questions (motorbiscuit.com)](https://www.motorbiscuit.com/4-most-common-electric-vehicle-charging-questions/) | Mark P |
| What does it  cost to charge  an EV in public? | Depending on the location, charging rate, and other elements, it can cost more or less to charge an EV  in public. The cost per kWh might vary from station  to station when using public charging stations,  which typically charge by the kilowatt-hour (kWh) of  electricity utilized. Although this may vary  depending on the area and electricity costs, public  charging is often more expensive than home  charging. Public charging might be free in some  circumstances, while it might cost money per hour  of use or a set amount per charging session in  others. Before charging, it is advised to review the  cost information for the particular charging station  or network. | <https://www.homechargingstations.com/cost-home-charging-vs-public-charging/> | Arnold M |
| Does EV  battery damage  from DC fast  charging? | If DC rapid charging is performed frequently and  excessively, it may potentially harm an electric  vehicle's (EV) battery. All charging stations limit  power as a battery fills up to prevent overheating  damage to the battery, although DC rapid charging  can still produce higher heat levels that can  eventually degrade the battery. It is typically  advised to use slower charging alternatives for daily  use and DC rapid charging only when essential,  such as on a lengthy road trip.  The majority of EV manufacturers construct their  batteries to survive the high temperatures created  by DC fast charging, although regular use of fast  charging might cause battery degeneration. A  battery's charging rate and temperature are  monitored and controlled by the vehicle's onboard  charger and battery management system to protect  the battery, the Centre adds, adding that rapid  charging normally only makes up a small fraction of  an EV's overall charging. Ultimately, in order to  extend the battery life of an EV, it is crucial to  adhere to the manufacturer’s instructions for  charging and maintenance. | <https://www.lifewire.com/better-to-charge-ev-at-home-or-at-public-charger-5202359>  <https://www.nrdc.org/stories/electric-vehicle-charging-explained> | Arnold M |
| Will my battery go flat if I leave my EV parked for too long? | Yes, it will. Especially if “too long” means months rather than weeks.  But there isn’t a short, simple answer to this question that covers all cases all of the time.  The rate at which an EV’s high-voltage lithium-ion traction battery pack, the one that powers the wheels, loses charge if left idle is usually very slow.  In favourable conditions lithium-ion battery packs will lose around 2 to 3 percent of their charge per month. Two factors will speed up the rate of self-discharge. One is high ambient temperatures. The second is a high state of battery charge (there are also other factors, such as activating the [Sentry mode on a Tesla](https://evcentral.com.au/2021-tesla-model-3-standard-range-plus-review/), which can chew through plenty of electricity).  Very cold weather, too, can use some battery charge because the battery will use some of its own electricity to warm itself. | [Will my battery go flat if I leave my EV parked for too long? - EV Central](https://evcentral.com.au/will-my-battery-go-flat-if-i-leave-my-ev-parked-for-too-long/) | Yesini |