



CIELO
EV CHARGING SYSTEMS

ELECTRIC VEHICLE CHARGING GUIDE

CONTACT US TODAY

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Electric vehicle charging can seem difficult but we're here to make it easier. Whether you're looking for charging solutions in your home or condo building, we're here to help. This guide will provide a basic overview to electric vehicle charging and the different types of charging technology.

THE BASICS

Electric vehicles (EVs) come in many shapes and sizes but always have one thing in common; they are propelled by an electric motor. Most EVs will pull the electricity from the large high voltage battery that is refueled by plugging the vehicle in to a charger or EVSE.

EV CHARGERS OR EVSE?

While we refer to the devices we plug into our EVs as chargers their technical name is electric vehicle supply equipment (EVSE) and manufacturers will sometimes refer to the equipment this way. The vehicles have an on-board charger which is the system that will communicate with the EVSE to determine the power the vehicle can accept making the EVSE more of an extension cord to get electricity from the grid to the vehicle. The on-board charger is used for all level 1 and level 2 charging.

KNOW YOUR PLUGS

SAE J-1772

SAE J-1772 standard. This is the North American standard for electric vehicle charging, so most vehicles purchased in Canada will be able to access vehicle chargers through their J-1772 ("J-Plug") port.

Using standardized equipment ensures proper communications with the vehicle's onboard charger and computer which can prevent fires and other electrical malfunctions.

Combined Charging System (CCS)

The CCS port enables DC Fast Charging (DCFC) and makes use of the J-1772 port with additional contacts that are typically covered with a black or orange plastic flap.

CHAdeMO

CHAdeMO is another DCFC plug popular with Japanese automakers and is typically found next to the J-1772 port in North America. Currently CHAdeMO ports are being phased out but can be found on Nissan EVs and older Mitsubishi and Kia models.

Tesla Charging

Tesla vehicles use their own proprietary connector which is able to facilitate all levels of charging through one port. As a certified Tesla Installer, we install Tesla Wall Connector products or ensure that our customers are setup with the hardware to charge efficiently.



LEVELS OF CHARGING

Level 1

Level 1 charging is sometimes also referred to as “trickle charging” due to it being the slowest method of refueling. All vehicles come with a cordset that is able to be plugged into a standard three-prong 120 Volt outlet. Canadian Electrical Code and cordset specifications require a dedicated 120 Volt 20 Amp circuit for level 1 charging. Vehicles using level 1 charging will gain 8-10 km of driving range per hour of charging which is sufficient for most daily drivers.

Level 2

Level 2 chargers can come in the form of a portable cordset or a permanent mounted charging station, which may be hardwired or plug into an outlet. Level 2 chargers have significantly more power output and can add 20-40km of driving range per hour of charging depending on station output and the power the vehicle's on-board charger will accept. These stations require a 208 - 240 Volt supply and a 40-100 Amp circuit, similar to large household appliances, to get the greatest benefit.

Level 3

Level 3 charging is better known as Direct Current Fast Charging (DCFC) or simply ‘fast charging’. These charging stations enable most EVs to charge to 80% in under an hour, making road trips easier and quicker. Fast chargers in BC have both CCS and CHAdeMO plugs to service all vehicles sold in North America (Tesla can access these with a CHAdeMO adapter).

Superchargers

Superchargers are charging stations Tesla installs for use by their vehicles. Teslas can gain from 10-20km of range per minute at Superchargers. Due to their unique charging plug Tesla Superchargers aren't compatible with EVs from other manufacturers.

ELECTRIC VEHICLE CHARGING FOR SINGLE FAMILY HOMES

Charging your electric vehicle at home will always be the cheapest and most convenient way to keep your vehicle charged and on the road.

Level 1

Charging your EV at home can be as simple as plugging it into an 120 volt outlet with the included cord set. For safety, the Canadian Electrical code recommends that you install a dedicated 120 Volt 20Amp circuit that is used exclusively for charging your electric vehicle.

Level 2

Most electric vehicle owners install a Level 2 charger in their home garage or carport using a 240 Volt connection. A basic Level 2 charger offers a fast and reliable solution to charging your electric vehicle.



Level 1



Level 2



Level 3



Smart Chargers

Smart level 2 charging equipment can add additional features via a wifi connection and apps which display information on energy usage, charging times and allow you to control the station when away from your home. These additional features will come with a greater upfront cost on the equipment but don't generally require ongoing payments.

ELECTRIC VEHICLE CHARGING FOR MULTI UNIT AND COMMERCIAL BUILDINGS

Charging Levels for Multi Unit Buildings

Level 1

Level 1 charging is often a cost effective and convenient method of charging vehicles in multi-unit buildings. The existing 120 Volt outlets in building parkades are typically installed for normal domestic use and are not intended to charge an electric vehicle. For safety and to comply with requirements from the cordset manufacturer, we recommend that you install a dedicated 120 Volt 20 Amp circuit that is used exclusively for charging your electric vehicle. This is a Canadian Electrical Code requirement.

Level 2

For shared spaces two options exist for level 2 charging: Non-Networked

Non-networked level 2 charging equipment is identical to what is typically installed in single family homes. This equipment requires third party devices to access additional services and controls such as restricting access and load management. Non-networked equipment typically makes up for the lack of features with their reduced cost ranging from \$600 - \$1200 with no additional recurring fees.

Networked

Networked charging equipment can provide a suite of desirable features for shared parking areas by facilitating payment for use, controlling station access and managing use of available electrical supply. Using networked options can provide useful data on station up-time and usage as well as online portals to monitor and adjust station settings. These features require ongoing network fees which can range between \$15-\$25 per charger per month.

WHAT IS AN OPEN NETWORK (OCPP)

Charging networks and equipment can be considered proprietary or open but can exist along a spectrum depending on their use.

Proprietary equipment and networks will only function within their own environment meaning that equipment from another manufacturer can not be added to the proprietary network and another network can not operate the proprietary equipment.



Proprietary equipment requires third party devices to be integrated with infrastructure from another manufacturer.

Open equipment and networks can be used interchangeably across networks and equipment manufacturers.

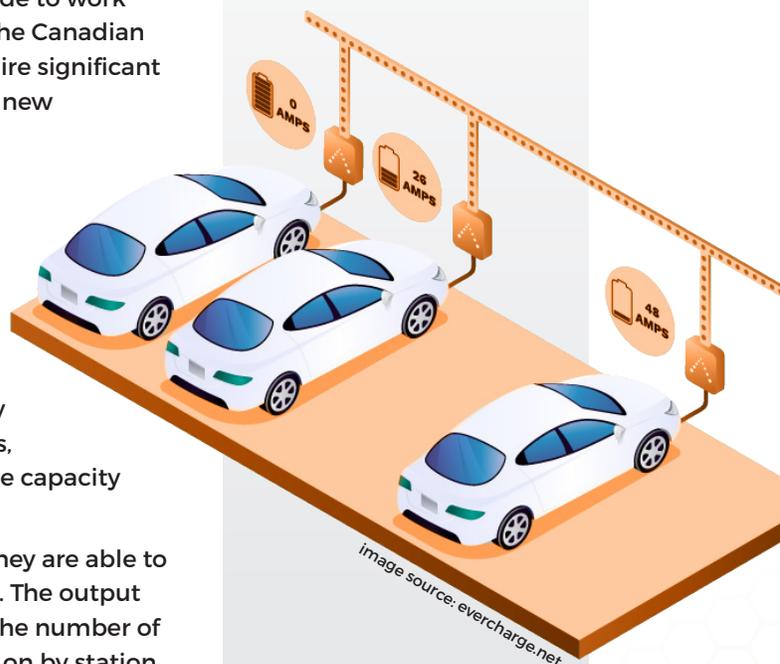
OCPP or Open Charge Point Protocol, is the most common designation for open charging equipment and networks. OCPP provides a common communication protocol for any network to be able to operate OCPP compliant charging equipment. Using OCPP compliant equipment can allow for more flexibility in the future to switch networks or incorporate equipment from other manufacturers.

Choosing between a proprietary or open product will depend on the circumstances as many proprietary systems are made to work seamlessly and the networks have a large presence in the Canadian market. OCPP compliant products will sometimes require significant alterations to the charging equipment to function on a new network if the owner elects to switch service providers.

Load Management

One of the benefits of networked level 2 charging equipment is the native capability for load management across multiple stations. Many multi unit buildings find they do not have the available electrical capacity for each parking stall to have a dedicated 40A circuit, instead of undertaking the costly process of a service upgrade load management services, provided by charging networks, can spread the available capacity over numerous stations.

These smart systems can help with future proofing as they are able to adapt to additional stations being added to the system. The output of charging stations on shared circuits will depend on the number of stations currently in use as well as the settings decided on by station owners and the network operator.



TRACKING AND BILLING FOR EV CHARGING

There are several ways to track the use and billing for electric vehicle charging in Multi Unit and Commercial Buildings.

- Fixed User Fee
- Network Facilitated Payment
- Sub-Metering

Fixed User Fee

Many stratas and EV drivers find the most convenient way to pay for electricity used is to be charged a flat monthly fee. This type of payment structure will work for both level 1 and level 2 charging and is often the simplest to facilitate. This method may require a change to existing by-laws to allow for the collection of a fee for charging as well as a user agreement should the charging methods be shared among residents.

Network Facilitated Payment

Networked stations are able to collect payment, on behalf of the station owner, based on time the vehicle is plugged in or the amount of electricity consumed during the charging session. Frequently the annual network fee can be recouped by charging slightly more than cost of electricity during each use. Networked level 2 stations can also allow for access control if the strata board has elected to have a user agreement as part of the installation of the charger.

Sub-Metering

In the case a strata board wishes to ensure that the entire cost of EV charging is covered by drivers or simply track energy usage, the charging infrastructure can be tied to a new sub-meter. Meters can be simple digital devices which display electricity used on their interface or more complicated systems. If drivers are charging in assigned stalls smart meters can fill many of the roles of a charging network by providing revenue grade meters as well as direct billing to users which may come with additional recurring fees. Metering can be used with both level 1 and level 2 charging as well as EVSE from any manufacturer.

Every home and building will present a unique situation for the installation of electric vehicle charging systems and we encourage you to contact our team for more information.



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