So, you want to determine maximum demand for EV charger installation in a house? Here's what you need to know.

ELECTRIC VEHICLE COUNCIL

Disclaimer:

The EVC is not your local electrical regulator. This guidance should be considered in combination with input from your relevant electrical regulator or licensed electrical inspector. It is not to be interpreted as legal guidance.

What is the maximum demand?

Maximum demand is the expected peak load in an electrical system. It is determined at the time of design or modification to the electrical installation, in order to inform the required capacity of upstream electrical equipment, in accordance with section 2.2.2 of AS/NZS 3000:2018 (Australian/ New Zealand Wiring Rules).

If an incorrect determination of maximum demand is obtained, there will be negative consequences. The installation will be more expensive than necessary if the maximum demand is overestimated. The circuit breakers will trip, or fuses will blow, if the maximum demand is underestimated. Getting it right is important.

The standard presents four methods to determine maximum demand as part of the installation.

The methods most relevant to installing an EV charger in a standalone dwelling are (a) calculation, and (d) limitation. Methods (b) and (c) are relevant to more complex installation types, which will be the subject of future guidance notes.

Method (a): Calculation

This method is the most commonly used for the determination of maximum demand at the time of design in the electrical industry today. In this method, the maximum demand is calculated by summing up the individual loads under consideration.

This approach provides a conservative estimation, intended to allow a lot of coincident usage of equipment. It does not take into account the opportunity to limit the maximum demand by controlling when individual loads (such as EV charging equipment) operates.

In the case of EV charging, for domestic installations of up to 5 dwellings, the calculation method in the standard requires that the EV charger is assumed to contribute 100% of rated load. So, a 32 A EV charger in a house will add 32 A to the maximum demand calculation.

For a standalone domestic dwelling with a 63 A supply, if the intent is to install a 32 A (7 kW) charger, determining maximum demand by calculation will typically result in a determination that an upgrade to the supply to the building from the network is needed, because the addition of 32A to the existing loads in the home (oven, aircon, hot water service, etc.) will cause the total to exceed 63A.

This approach will therefore lead to lengthier installation timeframe and higher installation costs. Depending on the site, it may also lead to the conversion of meters, fuses, and main switch board from single phase to three phase.

This approach will also ensure the higher availability of charging, which may be of sufficient value to the consumer that it's worth the extra cost.

Method (d): Limitation

In this approach, a circuit breaker can be used to define the maximum demand by limiting the maximum current.

This method is particularly suitable for standalone houses. These houses are typically equipped with 63 A main switches and further upstream are backed up with 80 A service fuses.

To apply the limitation method to an electrical installation of this type when installing an EV charger:

1) Replace the 63 A main switch with a 63 A circuit breaker, or install a 63 A circuit breaker in series with the 63 A main switch. Which of these two is more practicable will be governed by the specific site installation, and the local service and installation rules.

2) Inform the consumer that they should use the EV charger when other high-energy equipment (oven, aircon, etc.) are not all in use at the same time. They can do this by setting their preferred charging time in the vehicle, or via an app that communicates with the car, or just by remembering to plug the car in when they go to bed.

3) Show the consumer how to reset the breaker, in case they forget, and try to charge their car while running everything else.

In this scenario, if EV charger, aircon, oven, and electric hot water service all operate at once, the new 63 A breaker may trip, but the fuse (which the consumer cannot replace themselves) will not. If this happens, the consumer can unplug the car, reset the 63 A breaker, and everything will come back on.

This method has the advantage of being low cost, and easy to implement. It requires only a small modification of adding a miniature circuit breaker (MCB) in the already deployed main switch board in series with the main switch. For this method to work efficiently, the key education element is that the consumer needs to be told not to run the EV charger when everything else is running.

This method has the added advantage of limiting the impact of EV charging on network peak demand.

Comparison between the methods

	A – Calculation	D - Limitation
Charging Availability	Charging always available.	Charging available ~90% of the time. For most drivers, a 2-hour top-up per day is sufficient.
Upstream installation implications	Up to several thousand dollars	Typically, less than $200
Use cases	Cases where 100% availability is worth higher cost	90% availability is acceptable, and cost saving is desirable.
Consumer education	Not required	Required
Grid implications	Possible increase to network peak demand	Probable improvement in network utilisation

Next steps

If you'd like to discuss these matters further with the EVC, or enquire about becoming a member, please reach out to us at office@evc.org.au.