

Electric Vehicle Charging Stations – Installation and Permit Requirements

The growing need to offer drivers relief from the increasingly high cost of gasoline has produced various models of vehicles powered by alternate sources, i.e. natural gas, hybrid and electric, to name just a few. The purpose of this article is to provide you with technical and administrative guidance on the installation of electric vehicle (EV) charging stations.

An EV charging station supplies electricity to recharge electric or plug-in hybrid vehicles at voltages and currents that minimize the charging time. Even though most electric cars can be recharged from a typical 120 volt/15 amp wall receptacle (NEMA 5-15R), the charging time for a fully depleted battery can take longer than the typical eight-hour overnight charge. This makes EV charging stations a practical means of faster charging.

The Society of Automotive Engineers (SAE) classify EV charging stations in three categories: Level 1 - 120 volt alternating current (AC) charging; Level 2 - 240 volt AC charging; and Level 3 - 500 volt direct current (DC) high-current charging. To speed up the charging process electric vehicle owners will probably opt to install a level 2 charging station at home, while businesses and local government may provide level 2 and level 3 public charging stations. It is important to note that SAE standards have been developed for Levels 1 and 2, but DC Level 3 Fast Charge standards are still under development.

Just like any other electrical installation, the charging systems for electric vehicles are required to comply with the subcodes adopted by the State of New Jersey in the Uniform Construction Code (UCC). In fact, the installation of the electric vehicle charging systems are addressed in Article 625 of in the 2008 National Electrical Code (NEC) as adopted in the UCC.

The most common question about electric vehicle charging stations is about listing and labeling requirements. Most electrical equipment is listed and labeled per Section 625.5; this makes the approval of the equipment for the installation and use a “no brainer”. However, what does one do when there is no clear listing or labeling? N.J.A.C. 5:23-3.7, Municipal approvals of alternative materials, equipment, or methods of construction, provides regulations to assist in the approval of equipment that does not have the standard listing and labeling. A testing agency may verify the installation and the intended use, which means that the equipment complies with Section 625.5. Note that, per Sections 625.29(C) and (D), indoor charging stations may require special ventilation per their listing and labeling or testing.

Another common question: When are permits required for the installation of the charging systems for electric vehicles? At N.J.A.C. 5:23-2.14, Construction permits, when required, the UCC does not require a permit for cord-and-plug-connected electrical equipment. This includes equipment that is capable of being plugged in to an existing receptacle, no matter what the voltage rating of the equipment is. If the existing receptacle has the proper voltage rating, but the configuration is not compatible with the plug on the equipment, the replacement of the receptacle to one with the proper configuration would be considered Ordinary Electrical Maintenance (N.J.A.C. 5:23-2.7(c)3.i.) and no permit for, inspection, or notice to the enforcing agency of Ordinary Maintenance, is required. However, there are exceptions to this rule. For example: if there is an existing 120 volt receptacle on a 15 amp circuit that is to be replaced by a

higher current 120 volt receptacle that requires a 20 amp circuit (NEMA 5-20R), the upgrade of the circuit would be considered Minor Work (N.J.A.C. 5:23-2.17A(c)3).

When a vehicle charging system is being installed that requires a new 120 or 240 volt receptacle or an electrical line that will be directly connected to the system, it also is subject to the Minor Work provisions. As with all Minor Work, the issuance of a permit is not required before the work may proceed. However, the owner or contractor acting on behalf of the owner must provide notice to the enforcing agency before the work begins. Also, a permit application must be filed and must be delivered in person or by mail within five business days from the date of oral notice. The inspection of Minor Work must be performed within 30 days of the request for inspection and is based upon what is visible at the time of the inspection with the certificate of approval stating so.

Recognizing that electric vehicles and their charging stations are not yet the norm in most communities, here are some examples that describe the different charging needs of vehicles that you may encounter:

- With the launch of the 2011 Chevrolet Volt and the 2011 Nissan Leaf, 240volt (level 2) EV charging stations are being hardwired in homes to reduce charging times. Chevrolet states that their 240 volt EV charging station will take about 4 hours to recharge the Volt's batteries. Nissan states that their 240 volt EV charging station will take about 7 hours to recharge the Leaf's batteries with the option of a 480 volt (level 3) "quick-charge" EV charging station to further reduce charging time. However, due to their high cost and the lack of an adopted SAE standard, it is highly unlikely that level 3 charging stations will be installed in homes at this time. Why the difference in charging times for Chevrolet and Nissan? This is because the Volt can go approximately 40 miles before recharge and the Leaf can go approximately 100.
- Owners of the high end Tesla Roadster, are offered similar charging stations as described above. However, they also have the option of a "universal mobile connector" which provides multiple adapters, such as one that works with an electric dryer receptacle (NEMA 14-50R) and 10 additional adapters. Therefore, dependent on adapter, there may be more issues to look at along with the example given above where the 120 volt receptacle is upgraded from 15 amps to 20 amps.

Although home charging of electric vehicles will likely necessitate the installation of an EV charging station, it should not be a deterrent to considering these cars.

If you have any questions on this matter, you may reach us at (609) 984-7609.

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