

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, e.g. 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 wall receptacle, 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 as alternating current (AC) and direct current (DC) charging categories per standard document J1772:

AC Charge Method	Voltage (AC V)	Phase	Max Current (A, continuous)	Branch Circuit Breaker Rating (A)	Max Power (kW)
AC Level 1	120	1-phase	12	15 (min)	1.44
			16	20	1.92
AC Level 2	208 - 240	1-phase	≤ 80	Per NEC 625	Up to 19.2
DC Charge Method	EVSE DC Output Voltage (DC V)		Max Current (A)	Max Power (kW)	
DC Level 1	50 to 1000		80	80	
DC Level 2	50 to 1000		400	400	

- Appendix M of the SAE J1772, a third AC charge method was also considered but it was never implemented. This AC Level 3 mode would have used up to 96 kW at a nominal voltage of 208 to 240 V AC and a maximum current of 400 A.

As the table above indicates, to speed up the charging process, electric vehicle owners will probably opt to install an AC Level 2 charging station at home, while businesses and local government may provide AC Level 2 and DC Level public charging stations.

Just like any other electrical installation, the charging systems for electric vehicles must comply with the subcodes adopted by the State of New Jersey in the Uniform Construction Code (UCC). In fact, the installation of electric vehicle charging systems is addressed in Article 625 of the 2017 National Electrical Code (NEC) as adopted in the UCC.

The most common questions about electric vehicle charging stations pertain to 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, according to Sections 625.15(B) and (C), 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 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 into an existing receptacle regardless of the equipment's voltage rating. 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, the upgrade of the circuit would be considered Minor Work [N.J.A.C. 5:23-2.17A(c)4].

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When a vehicle charging system is being installed that requires a new 120 or 240-volt receptacle or an electrical line that will connect directly to the system, it is also 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. Additionally, a permit application must be filed with the local enforcing agency within five business days from the date of notice. The inspection of Minor Work must be performed within three business days of the request for inspection and is based upon what is visible at the time of inspection with the certificate of approval stating so.

The following are some examples that describe the different charging needs of vehicles that you may encounter:

- The 2020 Chevrolet Bolt has a 66-kWh lithium-ion battery and a 7.2-kW onboard charging module. The EPA states that the range is 259 miles and the energy efficiency is 118 MPGe. It can use its portable charge cord at AC Level 1 (120 V, 12 A) to get up to 4 miles of range per hour or go off an AC Level 2 charging unit (240 V, 32 A) to get up to 25 miles of range per hour. Using an optional DC fast charging port, the Bolt can also charge at up to 55 kW to get up to 90 miles of range per half hour.
- Owners of the high-end Tesla vehicle are offered similar charging stations as described above (Level 2 charging at 277 V). They are similar to 208 V, but your familiarity would be more so to the receptacle of your electric dryer. In addition, they also have the option of a “universal mobile connector” which provides multiple adapters. Therefore, dependent on adapter, there may be more issues to look at along with the example given above wherein the 120-volt receptacle is upgraded from 15 amps to 20 amps.

Many of those who purchase electrical vehicles will find the installation of a home charging station necessary; this should not be a deterrent for those considering electric vehicles. If you have any questions on this matter, you may reach Code Assistance at (609) 984-7609.

Source: Rob Austin, Code Assistance/Development Unit

Visible Alarm Notification – Updated

Back in the Spring of 2007, a CCC article was published on page 16, entitled “Visible Alarm Notification – IBC/2000 and ICC/ANSI A117.1-1998: Clarification of the Winter 2005 Communicator Article.” Since then, code sections and editions have changed concerning the installation of visible alarm notification devices.

According to Section 907.2 of the 2018 International Building Code (IBC), all new structures must provide “an approved fire alarm system installed in accordance with the provisions of this code and NFPA 72” and provide “occupant notification in accordance with Section 907.5.” More specifically, section 907.5.2.3, entitled “Visible alarms”, identifies “when” the installation of visible alarms devices would be required.

In general, areas open to the public require installation of visible alarm notification devices, in accordance with Section 907.5.2.3.1 from the 2018/IBC. Examples are described on page 12 of the CCC article from Spring/2008, entitled “**Public and Common Area Visible Alarms**”

(https://www.nj.gov/dca/divisions/codes/publications/pdf_ccc/2008_v20.pdf). In addition, for Groups I-1 & R-1, Section 907.5.2.3.2 requires that only a “percentage” of dwelling units and sleeping units be provided with visible alarm notification devices, as specified in Table 907.5.2.3.2.

However, for Group R-2, Section 907.5.2.3.3 states that dwellings units must provide the “capability of supporting visible alarm notification devices in accordance with Chapter 10 of ICC A117.1-2009.” In other words, installation of the visible alarm notification devices may be applied as an “adaptable feature.” Examples of this can be found on page 10 of the CCC article from Fall/2019, entitled “**Accessible and Type A Dwelling Units**”

(https://www.nj.gov/dca/divisions/codes/publications/pdf_ccc/CCC_Fall_2019.pdf). At a minimum, the wiring for the notification appliance must be in place for the future installation of a visible alarm notification appliance.

In short, the 2018/IBC specifies *which* types of alarms systems would be required depending on the use group, then redirects designers to other codes like NFPA 72 (as per Section 907.2/IBC noted above), ICC A117.1 (see Section 1006.4), etc., which explains *how and where* to install the devices. The designer may choose to install devices in any number of locations, as long they meet minimum standards of this code. Devices are required to be specifically “listed and labeled” and cannot be removed or deactivated, unless reviewed and approved to do so by both the local fire official and fire subcode official. For more information, please see page 10 of the CCC article from Spring/2020, “Fire Protection System Removal” (https://www.nj.gov/dca/divisions/codes/publications/pdf_ccc/CCC_Spr_2020.pdf).

Source: Keith Makai, Code Assistance Unit
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