

**Bulletin 86-1-4**  
**Electric vehicle charging systems**  
**Rules 8-106, 8-202, 8-204, 8-206, 8-208, 8-210, 86-300, 86-302, 86-304 and 86-306**

**Issued May 2022**  
Supersedes Bulletin 86-1-3

**Scope**

- 1) Electric vehicle energy management systems (EVEMS)
- 2) Electric vehicle supply equipment demand factors without EVEMS
- 3) Calculation of the minimum ampacity of service or feeder conductors for dwellings without EVEMS
  - a) EV supply equipment added to an existing single dwelling service
- 4) Disconnecting means for EVSE
- 5) Mechanical protection of EVSE
- 6) HV requirements for EVSE exceeding 750 V dc

**1) Electric vehicle energy management systems (EVEMS)**

Rule 8-500 permits Electrical Vehicle Energy Management Systems (EVEMS) to monitor loads and automatically control EVSE loads. EVEMS is defined as a means used to control electric vehicle supply equipment loads through the process of connecting, disconnecting, increasing, or reducing electric power to the loads. The system may consist of any of the following: a monitor(s), communications equipment, a controller(s), a timer(s), and other applicable devices.

Rule 86-300 1) requires electric vehicle supply equipment (EVSE) to be supplied by a separate branch circuit. Rule 86-300 2) permits electric vehicle supply equipment to be supplied from a branch circuit supplying other loads, provided that an EVEMS is installed.

EVEMS is permitted to be used in dwellings, apartment buildings, schools, hospitals, hotels, motels, dormitories, etc.

As per Rules 8-106 10) and 11), when electrical vehicle supply equipment is controlled by EVEMS:

- The demand load for the EVSE shall be limited to the maximum load allowed by the EVEMS, and as the result the EVSE(s) supplied by the EVEMS is not required to be considered for the calculated load for service or feeders.

**2) Electric vehicle supply equipment demand factors without EVEMS**

When EVEMS is not provided, any EVSE loads are permitted to be added with a demand factors as specified in Table 38, which is applicable to Rules 8-202 to 8-210 that includes apartment buildings, schools, hospitals, hotels, motels, and dormitories.

### **3) Calculation of the minimum ampacity of service or feeder conductors for dwellings without EVEMS**

Examples of calculations of the minimum ampacity of service or feeder conductors supplying single dwellings and two or more dwelling units that include EVSE (without EVEMS) is provided in Bulletin 8-3-\*

#### **a) EV supply equipment added to an existing single dwelling service**

Questions have been asked if a service upgrade is required when EV supply equipment is added to the existing single dwelling service. In order to calculate the new service rating and determine if a service upgrade is required, a calculation is permitted to be done in accordance with Rule 8-106 8).

Based on Rule 8-106 8) and Bulletin 8-3-\*, it is permitted to use a detailed load (demonstrated load), as obtained from the local distribution company (LDC), indicating the existing peak demand over the last 12 months, plus the EV supply nameplate rating to calculate the new demand. Rule 8-200 3) does not consider the total dwelling unit loads to be continuous, but EVSE loads shall be considered with a demand factor of 100%. The calculation should be based on the following formula:

$$\text{Peak Demand Ampacity (from LDC) + EV supply equipment, nameplate ampacity (typically 32A for Level 2)} \leq \text{Service ampacity}$$

If the existing peak demand over the last 12 months is not provided, the calculation of the new service shall be done in accordance with Rules 8-200, 8-202 and Bulletin 8-3-\*

### **4) Disconnecting means for EVSE**

#### **Question 1**

Is it permitted to base the rating of Electric Vehicle Supply Equipment (EVSE) on the field settings that are part of the equipment, for the purposes of maximum circuit loading, disconnect requirements, or receptacle configurations for such equipment? (Rules 86-302, 86-304, 86-306)

#### **Answer 1**

Yes, provided the adjustable settings are not accessible (i.e. use of tool is required to open the enclosure), the manufacturer supplies installation instructions for settings and circuit requirements and the equipment is field marked to indicate the maximum setting allowed for that installation.\*

#### **(\*) Example**

When the dip switch is set to limit the output to 48 A and is connected to a 60 A branch circuit, a disconnecting means is not required. Rule 86-304 1) requires a separate disconnecting means for each installation of EVSE rated more than 60 A or than 150 volts to ground. When the dip switch is set to limit the current to 64 A with an 80 A branch circuit, a disconnecting means is required.

**Diagram B1 – Example of a dip switch setting for an EV Supply Equipment as per manufacturer instructions**

Rotary Switch Position	Maximum Output Current	Circuit Breaker
0	Test mode	N/A
1	12A	15A
2	16A	20A
3	20A	25A
4	24A	30A
5	28A	35A
6	32A	40A
7	36A	45A
8	40A	50A
9	48A	60A

**5) Mechanical protection of EVSE**

**Question 3**

Are electrical vehicle supply equipment required to be protected from mechanical damage as per Rule 2-200?

**Answer 3**

Yes. EVSE are typically subject to mechanical damage (see photo B2) and protection is required.

**Direction**

Protection of EVSE can be achieved by locating the EVSE where it is unlikely to be struck by a vehicle, such as:

- EVSE installed on a raised curb or sidewalk, at a sufficient distance back from the edge of the curb,
- installing guards such as bollards (Photo B3) or parking stops, or
- Mounted at a height (Photo B4) where it is unlikely to be struck by a vehicle.

**Photo B2 – Potential damage to EVSE without mechanical protection**



**Photo B3 – EVSE protected by bollards by height**



**Photo B4 – EVSE protected**



**6) HV requirements for EVSE exceeding 750 V dc**

**Question 4**

Where the interconnected dc wiring between EVSE exceeds 750 volts, do the requirements of Section 36 apply?

**Answer 4**

Yes; However the following direction is provided by ESA for EV installers

**Direction**

Notwithstanding the requirements of Rule 36-204 (overcurrent and load-break switch), Rule 36-208 (interlocking of fuse compartment) and Rule 36-214 (visible isolation), where the dc voltage for EVSE installations exceeds 750 volts dc but does not exceed 1000 volts dc, it shall be permitted to be exempt from these requirements provided that:

- 1) The installation is serviced by only qualified persons; and
- 2) Enclosures in which circuits exceeding 750 V dc are present are marked with the word “DANGER” followed by the maximum rated circuit voltage of the equipment.