

Appendix CG: Electric Vehicle Charging Infrastructure

Option B

BACKGROUND INFORMATION
<ul style="list-style-type: none">• Primary code section: 2024 Commercial IECC Appendix CG: Electric Vehicle Charging Infrastructure• Other section(s) where amendments may be needed to implement the primary code section:<ul style="list-style-type: none">○ C101.2.1 Appendices○ C105.2 Information on construction documents○ C401.2: Application• Related code section(s)/dependencies:<ul style="list-style-type: none">○ 2024 Residential IECC Appendix RE: Electric Vehicle Charging Infrastructure○ 2024 IRC Appendix NE: Electric Vehicle Charging Infrastructure
APPENDIX SUMMARY
<ul style="list-style-type: none">• Requires new construction to provide a minimum number of EV capable, EV ready, and EVSE (EV Supply Equipment) spaces, depending on occupancy type.• Provides specific standards for EV capable, EV ready, and EVSE spaces.• Parking facilities with fewer than 15 <i>automobile parking spaces</i> serving occupancies other than R2 are exempt from the standards in Appendix CG.
PROPOSED AMENDMENTS
<p>Appendix CG Electric Vehicle Charging Infrastructure</p> <p>The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance. Appendix CG is adopted as mandatory.</p> <p>Section CG101 Electric Vehicle Power Transfer</p> <p>CG101.1 Definitions.</p> <p>AUTOMOBILE PARKING SPACE. No changes</p> <p>ELECTRIC VEHICLE (EV). No changes</p> <p>ELECTRIC VEHICLE CAPABLE SPACE (EV CAPABLE SPACE). No changes</p> <p>ELECTRIC VEHICLE READY SPACE (EV READY SPACE). No changes</p> <p>ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). No changes</p> <p>Equipment for plug-in power transfer, including ungrounded, grounded and equipment grounding conductors; electric vehicle connectors; attached plugs; any personal protection system; and all other fittings, devices, power outlets or apparatus installed specifically for the purpose of transferring energy</p>

between the premises wiring and the electric vehicle. There are three types of EVSE, categorized by voltage and charging speed: Level 1, Level 2, and Direct Current Fast Charging (DCFC).

ELECTRIC VEHICLE SUPPLY EQUIPMENT INSTALLED SPACE (EVSE SPACE). No changes

CG101.2 Electric vehicle power transfer infrastructure.

CG101.2.1 Quantity.

The number of required electric vehicle (EV) spaces, *EV capable spaces* and *EV ready spaces* shall be determined in accordance with this section and [Table CG101.2.1](#) based on the total number of *automobile parking spaces* and shall be rounded up to the nearest whole number. For Group R-2 buildings, the [Table CG101.2.1](#) requirements shall be based on the total number of *dwelling units* or the total number of *automobile parking spaces*, whichever is less.

1. Where more than one parking facility is provided on a *building site*, the number of required *automobile parking spaces* required to have EV power transfer infrastructure shall be calculated separately for each parking facility.
2. Where one shared parking facility serves multiple building occupancies, the required number of spaces shall be determined proportionally based on the floor area of each building occupancy.
3. Installed [Level 2](#) electric vehicle supply equipment installed spaces (*EVSE spaces*) that exceed the minimum requirements of this section may be used to meet the minimum requirements for *EV ready spaces* and *EV capable spaces* [on a one-to-one ratio](#).
4. Installed *EV ready spaces* that exceed the minimum requirements of this section may be used to meet the minimum requirements for *EV capable spaces* [on a one-to-one ratio](#).
5. Where the number of *EV ready spaces* allocated for R-2 occupancies is equal to the number of *dwelling units* or to the number of *automobile parking spaces* allocated to R-2 occupancies, whichever is less, requirements for *EVSE spaces* for R-2 occupancies shall not apply.
6. Requirements for a Group S-2 parking garage shall be determined by the occupancies served by that parking garage. Where new automobile spaces do not serve specific occupancies, the values for Group S-2 parking garage in [Table CG101.2.1](#) shall be used.
7. For buildings that install DCFC EVSE spaces, each DCFC EVSE space shall be permitted to substitute up to 10 required EV capable, EV ready, or Level 2 EVSE spaces.
8. Group R-2 occupancies shall be permitted to install three Level 1 EVSE spaces for every required Level 2 EVSE space or EV ready space, but cannot exceed 50 percent of the required Level 2 EVSE spaces or EV ready spaces.
9. All attached garages with direct connection to a *dwelling unit* will be required to have one *EV ready* or *EVSE space*.

Exception: Parking facilities serving occupancies other than R2 with fewer than ~~10~~15 *automobile parking spaces*.

TABLE CG101.2.1 REQUIRED EV POWER TRANSFER INFRASTRUCTURE

OCCUPANCY	LEVEL 2 EVSE SPACES	EV READY SPACES	EV CAPABLE SPACES
Group A	10% 5%	0%	10%
Group B	15% 5%	0% 5%	30% 10%
Group E	15% 5%	0% 5%	30% 10%
Group F	2%	0%	5%
Group H	1%	0%	0%
Group I	15% 5%	0%	30% 10%
Group M	15% 5%	0%	30% 10%
Group R-1	20% 5%	5% 10%	75% 15%
Group R-2	20% 5%	5% 10%	75% 15%
Groups R-3 and R-4	2% 0%	0% 2%	5%
Group S exclusive of parking garages	1%	0%	0%
Group S-2 parking garages	15%	0%	30%

CG101.2.2 EV capable spaces.

Each *EV capable space* used to meet the requirements of [Section CG101.2.1](#) shall comply with **all of** the following:

1. A continuous raceway or cable assembly shall be installed between an enclosure or outlet located within 3 feet (914 mm) of the *EV capable space* and electrical distribution equipment.
2. Installed raceway or cable assembly shall be sized and rated to supply a minimum circuit capacity in accordance with [Section CG101.2.5](#).
3. The electrical distribution equipment to which the raceway or cable assembly connects shall have dedicated overcurrent protection device space and electrical capacity to supply a calculated load in accordance with [Section CG101.2.5](#).
4. The enclosure or outlet and the electrical distribution equipment directory shall be marked: “For electric vehicle supply equipment (EVSE).”

CG101.2.3 EV ready spaces. No changes

CG101.2.4 EVSE spaces.

CG101.2.4.1 Level 2 EVSE Spaces

An installed **Level 2** EVSE with multiple output connections shall be permitted to serve multiple *EVSE spaces*. Each **Level 2** EVSE installed to meet the requirements of Section CG101.2.1, serving either a single *EVSE space* or multiple *EVSE spaces*, shall comply with **all of** the following:

1. Have a minimum system and circuit capacity in accordance with Section CG101.2.5.
2. Have a nameplate rating not less than ~~6.2~~ **8.3** kW.
3. Be located within 3 feet (914 mm) of each *EVSE space* it serves.
4. Be installed in accordance with Section CG101.2.6.

CG101.2.4.1 Level 1 EVSE Spaces.

Each Level 1 *EVSE space* shall comply with all the following:

1. The receptacle shall be located within 3 feet (914 mm) of each Level 1 *EVSE space* it serves.
2. Have a minimum circuit capacity of 1.8 kVA (15A 120V).
3. The electrical panel, electrical distribution equipment directory, and all receptacles or enclosures shall be marked “Level 1 Electric vehicle supply equipment (EVSE).”

CG101.2.5 System and circuit capacity. No changes

CG101.2.5.1 System capacity. No changes

CG101.2.5.2 Circuit capacity. No changes

CG101.2.5.3 System and circuit capacity management. No changes

CG101.2.5.3.1 System capacity management. No changes

CG101.2.5.3.2 Circuit capacity management. No changes

CG101.2.6 EVSE installation. No changes

RE101.2.7 Construction documents

Construction documents shall designate all *EVSE spaces*, *EV ready spaces*, and *EV capable spaces*, and indicate the locations of raceway and/or conduit and termination points serving them. The circuits or spaces reserved for *EVSE spaces*, *EV ready spaces*, and *EV capable spaces* shall be clearly identified in the panel or subpanel directory. The raceway and/or conduit for *EV ready spaces* and *EV capable spaces* shall be clearly identified at both the panel or subpanel and the termination point at the parking space.

Section CG102 Referenced Standards No changes

CG102.1 General. No changes

APPENDIX BENEFITS

- The lack of access to EV charging is one of the top barriers to EV adoption.
- For those living in multifamily unit dwellings, the additional cost to install conduit between the electrical panel and their parking space, and the logistical challenges of securing HOA approval, coordinating the EV charger billing with the building owner, and persuading an owner to make a long-term investment on a rental property, are all significant obstacles to EV ownership. Many existing multifamily residents must rely on workplace or public charging outside the home, so it's important that EV infrastructure requirements be included in both residential and commercial building codes.
- Studies have shown that employees with access to workplace charging are six times more likely than the average worker to drive an EV.
- For more business benefits of commercial EV charging, refer to the Commercial EV Charger Guide at <https://solartechonline.com/blog/commercial-ev-charger-guide/>

COST IMPACTS

- **Costs:**
 - EV capable space: approximately \$300
 - EV ready space: \$600 - \$3,300, depending on power sharing, distance from electrical panel to charging receptacle, and other factors. Source: 2022 study by EPA, US Green Building Council, ChargePoint, and ICF available at https://www.energystar.gov/sites/default/files/2024-08/Cracking_the_Code_to_EV_Readiness_in_New_Buildings.pdf (cost estimates are adjusted for inflation from July 2022 – February 2026). **Retrofit costs are estimated at more than \$5,500 per space.**
 - Total installed costs per EVSE space:
 - **Level 2: \$3,000 – \$12,000 per charger**, depending on EV charger selected. Cost estimates include the charger, electrical infrastructure, and labor. However, chargers can serve multiple spaces, and **costs can be reduced by up to 75% through power sharing (see below)**. Sources:
 - <https://www.greenlancer.com/post/guide-commercial-electric-vehicle-charging-stations>
 - https://smartchargeamerica.com/electric-car-chargers/commercial/chargepoint-ct4021-gw1-gateway-unit/?srsltid=AfmBOooh2J2aL65VK6YrAnKnlKqe7SU1SLxz2a_24WeffBayvonv1pwx (this charger has two ports)
 - **DC Fast Chargers (Level 3):** Depending on power (50-350 kW), site prep, and local labor/electrical work, total cost can be \$80,000 to \$250,000+ for a single DC fast charger site. Costs can **be reduced by up to 75% through power sharing (see below)**
- **Cost savings from power sharing:**
 - Power sharing can reduce the costs per space of installing EV infrastructure by allowing more vehicles to use a charger at the same time, thereby reducing the number of chargers that need to be installed and reducing the cost per space of installing an EC charger.
 - The figure below compares the cost per parking space of installing EV charging with power sharing versus without power sharing. The most expensive scenario is listed as “Without Energy

Management” and results in a cost of \$2,500 per parking space. The least expensive option, “4-Way Sharing on 40A Circuit,” shows how power sharing reduces costs per parking space by roughly 75%.

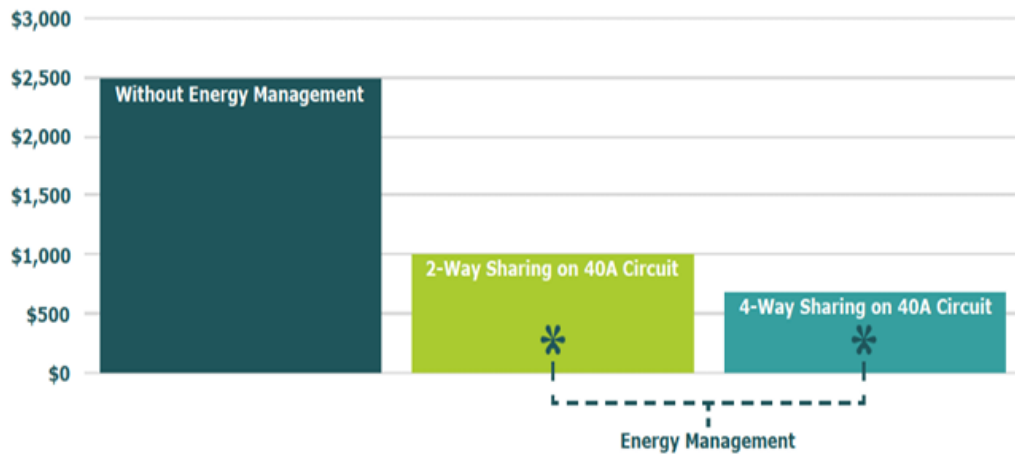


Figure 5. Estimated cost per parking space to provide 100% EV-Ready parking in a new 6-story multifamily building. *Source: McEwen 2021.*

• **Savings**

- **Avoiding costly future retrofits:** This appendix can save residents and building owners and managers hundreds to thousands of dollars by avoiding costly future retrofits in garages and parking spaces. Installing EV charging infrastructure in new buildings is **75% less expensive than retrofitting** an existing building (Papke Waters 2019).

The following cost estimates from the City of Denver show significant cost savings by installing EV spaces during construction vs. as a retrofit.

EV Infrastructure Requirement	During New Construction	During Retrofit	Savings
EV-Capable (panel capacity + raceway)	\$300 per space	\$2,500 per space	\$2,200 per spa
EV-Ready (full circuit)	\$1,300 per space	\$6,300 per space	\$5,000 per spa

Building owners may also **recover costs by charging a fee to use the EV charging stations.**

RELEVANT ENERGY CODE UPDATE OPTION(S)

- Option 1 Option 2 Option 3 Option 4

IS THIS IN FLAGSTAFF’S CURRENT CODE?

- Yes Yes, but new requirements are stronger No

AMENDMENT JUSTIFICATION

- The proposed amendments soften EV infrastructure requirements for commercial developments while still enabling the adoption of EVs in the community.

RELATED REQUIREMENTS IN FLAGSTAFF’S CURRENT CODE

2018 IECC

CHAPTER 39 POWER AND LIGHTING DISTRIBUTION

Section E3901 Receptacle Outlets

Amend 2018 IRC E3901.9, Basements, garages and accessory buildings, by adding:

At least one required garage receptacle shall be a 208/240-volt individual branch circuit for purposes of electric vehicle (EV) charging. The service panel or subpanel circuit directory shall provide a 50-ampere minimum dedicated branch circuit and a branch circuit overcurrent device. Electric vehicle supply equipment shall be installed in accordance with 2017 NFPA 70/NEC.

Exception: Additions and alterations to existing one- or two-family dwellings and townhouses constructed per the IRC are exempt from the EV charging requirement.

CHAPTER 4 SPECIAL DETAILED REQUIREMENTS BASED ON OCCUPANCY AND USE

Amend 2018 IBC by adding Section 429, Electric vehicle (EV) charging.

Amend 2018 IBC by adding 429.1, General:

429.1 General. Every newly permitted multi-family dwelling, commercial, and industrial structure shall provide parking space with “EV-ready outlets” per Table 429.1 and shall be identified on the construction documents. Construction documents shall indicate the location of the proposed EV-ready outlet(s). At least one EV-ready outlet shall be located in common use areas and available for use by all occupants.

An EV-ready outlet is “ready-to-go” with the addition of a plug-in electric vehicle (PEV) charging station. An EV-ready outlet consists of 208/240V, 50 ampere panel capacity, conduit, wiring, receptacle, and overcurrent protection device. The end point of the system must be near the planned location of the future EV charging station. Electric vehicle supply equipment shall be installed in accordance with 2017 NFPA 70/NEC.

Table 429.1

Parking Spaces Provided EV-ready Parking Spaces Required

- 1-19 None
- 20-50 One (1)
- 51-100 Two (2)

100+ Three (3)

OTHER CITIES AND STATES THAT HAVE ADOPTED THIS AMENDMENT OR SIMILAR AMENDMENTS

Denver residential EV charging requirements: [Residential Electric Vehicle \(EV\) Requirements - City and County of Denver](#)

If you're building a new home with a garage or carport or adding a new garage or carport to an existing home, the DEC (Denver Energy Code) requires that at least one EV-ready space be provided per dwelling unit. This means:

- A 240-volt, 40-amp branch circuit must be installed.
- The electrical panel must have a dedicated space for a two-pole circuit breaker, labeled “EV Ready.”
- An outlet, receptacle, or EV charging connection must be installed at the EV-ready parking space.

These requirements apply to:

- Single-family homes
- Duplexes
- Townhouses

Note:

Denver’s Commercial EV charging requirements: [Commercial Electric Vehicle \(EV\) Requirements - City and County of Denver](#)

Includes all residential occupancies other than single-family, duplexes, and townhouses.

2025 DEC Table C405.13.1 Required EV Charging Infrastructure

- **EV Capable Space** – Parking space provided with electrical infrastructure for future EVSE, such as conduit. No electrical service or panel capacity is required.
- **Electrical Vehicle Charging Station** – Vehicle spaces served by an electrical vehicle charging system (i.e., EVSE Installed space or DCFC EVSE Installed space).

Occupancy Served	EVSE Installed Spaces	EV Capable Spaces
Occupancy Groups R-1 and R-2	15%	45%
All Other Occupancy Groups	10%	20%

Colorado Model Energy Code: [Final MLECC Amendment Package with Code Insights.docx](#)

Table C410.5.2.1 EV Power Transfer Infrastructure Requirements

Building Type/Space Type	Level 2 EVSE Installed Spaces	Level 2 EV Ready Spaces	Level 2 EV Capable Spaces	Level 2 EV Capable Light Spaces
Commercial buildings, except for Group R-2 occupancies, with 15 or fewer parking spaces	0	2 spaces 20% of spaces (not fewer than 2)	0	0
Commercial buildings, except for Group R-2 occupancies, with greater than 15 parking spaces	2% of spaces	8% of spaces	10% of spaces	10% of spaces
Group R-2 occupancies with 10 or fewer parking spaces	0	15% of spaces	10% of spaces	10% of spaces
Group R-2 occupancies with greater than 10 parking spaces	5% of spaces	15% of spaces	10% of spaces	30% of spaces

COMMUNITY FEEDBACK ON THIS CODE SECTION

- **Source:**
- **Date:**
- **Comments:**

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