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# IECC - Commercial Provisions (All-Electric)

### Chapter 1 – Scope and Application

#### C101 SCOPE AND GENERAL REQUIREMENTS

**Revise as follows:**

**C101.3 Intent.** This code shall regulate the design, and construction of buildings for the ~~effective use and conservation~~ reduction of greenhouse gas emissions and for the efficient production, use and storage of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

# Intent has been modified to include consideration of greenhouse gas emissions as well as both production and storage of energy.

#### C103 Construction documents

**Revise as follows:**

**C103.2 Information on construction documents.** Construction documents shall be drawn to scale upon suitable material. Electronic media documented are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment herein governed. Details shall include the following as applicable:

6. Mechanical and service water heating systems and equipment types, sizes, fuel source and efficiencies.

Fuel sources are a critical piece of code compliance enforcement for the full implementation of this code overlay. Clear identification on the construction documents will allow for easier code compliance review and inspections. Inclusion of fuel sources is most critical in areas where there are multiple fuels available such as fuel oil, propane, and natural gas, as the equipment type alone may not provide this information.

14. Location of pathways for routing of raceways or cable from the renewable energy system to the electrical service panel and electrical energy storage system area.

15. Location and layout of a designated area for electrical energy storage system.

For ease of enforcement, information for both renewable energy and electrical energy storage have been included as part of construction documents. Language has been migrated from Appendix CB Solar-Ready Zone to the applicable location in the base code and modified to fit into current structure.

16. Location of designated *EVSE spaces*, *EV-Ready spaces*, and *EV-Capable spaces* in parking facilities.

To assist in enforcement of electric vehicle infrastructure requirements, and to serve as a plan for full installation of EVSE equipment in EV-ready and EV-capable spaces in the future, plans should clearly indicate the intended locations of EV infrastructure.

### Chapter 2 – Definitions

#### C202 GENERAL DEFINITIONS

**Add new definitions as follows:**

**ALL-ELECTRIC BUILDING.** A *building* that contains no *combustion equipment*, or plumbing for *combustion equipment,* installed within the *building* or *building site.*

**APPLIANCE.** A device or apparatus that is manufactured and designed to utilize energy and for which this code provides specific requirements.

Definition of appliance is mirrored from 2021 IMC to be useful in defining combustion equipment.

**AUTOMATIC LOAD MANAGEMENT SYSTEMS (ALMS).** A control system that allows multiple connected *EVSE* to share a circuit or panel and automatically reduce power at each charger, reducing the total connected electrical capacity of all *EVSE*.

**COMBUSTION EQUIPMENT.** Any*equipment* or *appliance* used for space heating, *service water heating*, cooking, clothes drying and/or lighting that uses *fuel gas* or *fuel oil*.

**COMMERCIAL COOKING APPLIANCES.** Appliances used in a commercial food service establishment for heating or cooking food and which produce grease vapors, steam, fumes, smoke or odors that are required to be removed through a local exhaust ventilation system. Such appliances include deep fat fryers, upright broilers, griddles, broilers, steam-jacketed kettles, hot-top ranges, under-fired broilers (charbroilers), ovens, barbecues, rotisseries, and similar appliances. For the purpose of this definition, a food service establishment shall include any building or a portion thereof used for the preparation and serving of food.

Definition of commercial cooking appliances is mirrored from the 2021 International Fire Code for use in defining requirements for additional electric infrastructure required for cooking under Section C405.14.3.

**DEMAND RESPONSIVE CONTROL.** An automatic control that can receive and automatically respond to demand response requests from a utility, electrical system operator, or third-party demand response program provider.

**ELECTRIC VEHICLE (EV).** An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current. Plug-in hybrid electric vehicles are electric vehicles having a second source of motive power. Off-road, self-propelled electric mobile equipment, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats and the like, are not considered electric vehicles.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE).** The conductors, including the ungrounded, grounded, and equipment grounding conductors and the *electric vehicle* connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *electric vehicle*.

Definitions for EV and EVSE are mirrored from NEC-2020 to be useful in defining requirements for electric vehicle infrastructure.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) SPACE.** A designated parking space with dedicated *electric vehicle supply equipment* capable of supplying not less than 6.2 kW to an *electric vehicle* located within 3 feet (914 mm) of the parking space.

The charging rate for an EVSE space is set at 6.2 kW. This is equivalent to a 30A/208V EVSE. 30 and 32A chargers are the most common Level 2 chargers and the highest capacity chargers that can be installed on a 40A branch circuit. kW is used as the metric to indicate total power delivered rather than the specific combination of Volts and Amps.

**EQUIPMENT.** Piping, ducts, vents, control devices and other components of systems other than appliances that are permanently installed and integrated to provide control of environmental conditions for buildings. This definition shall also include other systems specifically regulated in this code.

Definition of equipment is mirrored from 2021 IMC to be useful in defining combustion equipment.

**EV-CAPABLE SPACE.** A parking space that is provided with conduit that meets the following requirements:

1. The conduit shall be continuous between a junction box or receptacle located within 3 feet (914 mm) of the parking space and an electrical panel serving the area of the parking space with sufficient dedicated physical space for a dual-pole, 40-amp breaker
2. The conduit shall be sized and rated to accommodate a 40-amp, 208/240-volt branch circuit and have a minimum nominal trade size of 1 inch
3. The electrical junction box and the electrical panel directory entry for the dedicated space in the electrical panel shall have labels stating “For future *electric vehicle* charging”

**EV-READY SPACE.** A parking space that is provided with dedicated branch circuit that meets the following requirements:

1. Wiring capable of supporting a 40-amp, 208/240-volt circuit,
2. Terminates at a junction box or receptacle located within 3 feet (914 mm) of the parking space, and
3. The electrical panel directory shall designate the branch circuit as “For electric vehicle charging” and the junction box or receptacle shall be labelled “For electric vehicle charging”.

EV Ready and EV Capable definitions do not include requirements for minimum capacity for the branch circuit. Different levels of capacity are appropriate for different EV charging scenarios (charging at different building types, parking types, residential types, business types, times of day, etc.) as well as different levels of penetration of EV charging spaces in a parking lot. Therefore, capacity requirements are set in the code text itself to allow for consistent use of the definitions while the capacity requirements change to match the specific EVCI requirements of the jurisdiction.

**FUEL GAS.** A natural gas, manufactured gas, liquified petroleum gas or a mixture of these.

Definition of fuel gas is mirrored from 2021 IMC to be useful in defining combustion equipment.

**FUEL OIL.** Kerosene or any hydrocarbon oil having a flash point not less than 100°F (38°C).

Definition of fuel oil is mirrored from 2021 IMC to be useful in defining combustion equipment.

**MIXED-FUEL BUILDING.** A *building* that contains *combustion equipment* or includes piping for such *equipment*.

**RENEWABLE ENERGY CERTIFICATE (REC).** An instrument that represents the environmental attributes of one megawatt-hour of renewable electricity; also known as an energy attribute certificate (EAC).

### Chapter 4 – Commercial Energy Efficiency

#### C401 GENERAL

**Revise text as follows:**

**C401.2 Application.** Commercial buildings shall be *all-electric buildings* and shall comply with Section C401.2.1 or C401.2.2.

The change in application requires that new construction be all-electric. Where a jurisdiction does not wish to require electrification of specific end uses but wants to advance electric buildings further than electric-readiness, exception language can be added. Where exception language is added, electric infrastructure language should be brought over from the mixed-fuel version of the overlay to ensure easy accessibility to future electric equipment installation. Recommended exception language is: Exception: The following combustion equipment is permitted as approved by the code official (list specific equipment types).

#### C402 BUILDING ENVELOPE REQUIREMENTS

**Revise text as follows:**

**C402.1.1 Low energy buildings and greenhouses.** The following low-energy buildings, or portions thereof separated from the remainder of the *building*-by-*building thermal envelope assemblies* complying with this section shall be exempt from the building thermal envelope provisions of Section C402.

1. Those containing no *combustion equipment* with a peak design rate of energy usage less than 3.4 Btu/h·ft2 (10.7 W/m2) or 1.0 watt/ft2 of floor area for space conditioning purposes.

**C402.1.1.1 Greenhouses.** Greenhouse structures or areas containing no *combustion equipment* that are mechanically heated or cooled and that comply with all of the following shall be exempt from the building envelope requirements of this code:

**C402.1.2 Equipment buildings.** Buildings that comply with the following shall be exempt from the *building thermal envelope* provisions of this code:

6. Contain no *combustion equipment*.

Low energy buildings are currently exempt from thermal envelope requirements. This revision applies the same intention of low greenhouse gas impact that was given to low energy use impact when these building types were exempted.

#### C403 BUILDING MECHANICAL SYSTEMS

**Add new text as follows:**

**C403.4.1.6 Demand responsive thermostats.** All thermostats shall be provided with *demand responsive controls*capable of increasing the cooling setpoint by no less than 4°F (2.2°C) and decreasing the heating setpoint by no less than 4°F (2.2°C).

**Exception:** Health care and assisted living facilities.

Demand responsive controls for thermostats are added based on language from California Title 24. In health care and assisted living facilities, thermostat setpoints can impact more than just thermal comfort, and temperature can be part of the health care being provided. To ensure that this requirement cannot have an adverse impact on those services, these facilities have been exempted from this requirement.

#### C404 SERVICE WATER HEATING

**Revise text as follows:**

**C404.9.1 Heaters.** The electric power to all heaters shall be controlled by an on-off switch that is an integral part of the heater, mounted on the exterior of the heater, or external to and within 3 feet (914 mm) of the heater in a location with ready access. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Gas-fired heaters shall not be ~~equipped with continuously burning ignition pilots~~ permitted.

All electric buildings will not need language that relates to fossil fuel systems. Vestigial language around pool heaters has been removed to avoid confusion in implementation of this overlay.

**Add new text as follows:**

**C404.11 Demand responsive water heating.** All electric water heating systems with a storage tank larger than 20 gallons (76 L) shall be provided with *demand responsive controls* that comply with ANSI/CTA-2045-B or another *approved demand responsive control*.

**Exception:** Health care facilities.

ANSI/CTA-2045-B standardizes the socket, and communications protocol, for heat pump water heaters so they can communicate with the grid, and with demand response signal providers. In addition, 2045-B adds control and communications requirements for mixing valves in HPWH to enable them to provide greater storage capacity to support increased load shifting. Versions of this standard are included in codes or other requirements in California, Oregon, and Washington

In health care facilities, such as hospitals, nursing facilities, and outpatient facilities, hot water can be critical to support the care being provided. To ensure that this requirement cannot have an adverse impact on those services, health care facilities have been exempted from this requirement.

#### C405 Electrical power and lighting systems

**Add new text as follows:**

**C405.2 Lighting controls.** Lighting systems shall be provided with controls that comply with one of the following.

1. Luminaire level lighting controls (LLLC) and lighting controls as specified in Sections C405.2.1, C405.2.4 and C405.2.5. The LLLC luminaire shall be independently capable of:

2.4 Reducing lighting power in a uniform manner by no less than 10 percent when signaled by a *demand responsive control*.

This approach to DR controls for lighting limits the requirement to LLLC lighting, which uses control technology that generally already includes DR functionality or for which DR functionality comes at a minimal additional cost. The threshold for lighting power reduction is drawn from California’s T24 DR requirements.

**Revise text as follows:**

**C405.4.3 Gas lighting.** Gas-fired lighting appliances shall not be ~~equipped with continuously burning pilot ignition systems~~ permitted.

While the use of gas lighting is nearly extinct for both indoor and outdoor new construction uses, gas lamps remain a nostalgic feature in historic neighborhoods. Since the IBC and IFGC do not prohibit the installation of fuel gas lighting, it is critical to ensure that the adoption of this overlay does prohibit these installations.

**Revise table as follows:**

**TABLE C405.12.2 ENERGY USE CATEGORIES**

|  |  |
| --- | --- |
| **LOAD CATEGORY** | **DESCRIPTION OF ENERGY CUSE** |
| Total HVAC system | Heating, cooling and ventilation, including but not limited to fans, pumps, boilers, chillers, and water heating. Energy used by 120-volt equipment, or by 208/120-volt equipment that is located in a building where the main service is 480/277-volt power, is permitted to be excluded from total HVAC system energy use. |
| Interior lighting | Lighting systems located within the building. |
| Exterior lighting | Lighting systems located on the building site but not within the building. |
| Plug loads | Devices, appliances and equipment connected to convenience receptacle outlets. |
| Process load | Any single load that is not included in HVAC, lighting or plug load category and that exceeds 5 percent of the peak connected load of the whole building, including but not limited to data centers, manufacturing equipment, and commercial kitchens. |
| *Electric vehicle* charging | *Electric vehicle* charging loads. |
| Building operations and other miscellaneous | The remaining loads not included in this table, including but not limited to vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, in-ground spas and snow-melt systems. |

Electric Vehicle charging is a transportation load, not a building load, but is often provided through a building electrical service connection. Adding a category for monitoring EV charging separately allows the building load to be measured independently from this non-building load. This will be critical with the wider adoption of Building Performance Standards or other existing building energy use policies as it will allow EV charging to be easily excluded from the building loads for the purposes of regulating actual energy use in buildings.

**Add new text as follows:**

**C405.13 On site renewable energy.** Each building site shall have equipment for on-site renewable energy with a rated capacity of not less than 0.25 W/ft² (2.7 W/m²) multiplied by the sum of the gross conditioned floor area of the three largest floors.

**Exceptions:**

1. Any building located where an unshaded flat plate collector oriented towards the equator and tilted at an angle from horizontal equal to the latitude receives an annual daily average incident solar radiation less than 3.5 kWh/m²·day (1.1 kBtu/ft²·day).

2. Any building where more than 80 percent of the roof area is covered by any combination of equipment other than for on-site renewable energy systems, planters, vegetated space, skylights, or occupied roof deck.

3. Any building where more than 50 percent of roof area is shaded from direct-beam sunlight by natural objects or by structures that are not part of the building for more than 2,500 annual hours between 8:00 AM and 4:00 PM.

**C405.13.1 Renewable energy certificate documentation.** Documentation shall be provided to the code official that indicates that renewable energy certificates (RECs) associated with the on-site renewable energy will be retained and retired by or on behalf of the owner or tenant.

A version of this requirement has been approved for ASHRAE 90.1-2019 as Addendum by,*[[1]](#footnote-1)* and will be published in ASHRAE 90.1-2022. The three exceptions are written to ensure that the requirement is not being applied to buildings without adequate space on the roof, to buildings that are in areas of the country where unblocked insolation levels do not provide enough energy to make the equipment cost-effective (according to ASHRAE cost-effective criteria), and to buildings where solar access is wholly or partially blocked.

**Add new text as follows:**

**C405.14 Electric vehicle charging infrastructure.** Parking facilities shall be provided with electric vehicle charging infrastructure in accordance with Table C405.14 based on the total number of parking spaces and rounded up to the nearest whole number*.* Where more than one parking facility is provided on a building site, the number of parking spaces required shall be calculated separately for each parking facility. The branch circuit serving *EV ready spaces* shall have a minimum capacity of 1.8 kVA. *EVSE, EV ready spaces* and *EV capable spaces* may be counted toward meeting minimum parking requirements. *EVSE spaces* may be used to meet requirements for *EV ready spaces* and *EV capable spaces. EV ready spaces* may be used to meet requirements for *EV capable spaces.* An *ALMS* may be used to reduce the total electrical capacity required by *EVSE spaces* provided that all *EVSE spaces* are capable of simultaneously charging at a minimum rate of 1.4 kW.

**Exception:** In parking garages, the conduit required for *EV capable spaces* may be omitted provided the parking garage electrical service has no less than 1.8 kVA of additional reserved capacity per *EV capable space.*

The EV charging infrastructure requirements have been tailored to different charging scenarios. EV Ready spaces are utilized in residential occupancies where EV owners are more likely to choose specific EVSEs with features that meet their personal, long-term needs. The minimum capacity of those EV Ready spaces has been set at Level 1 charging in order to maximize access to EV charging:

1. Residential park times are generally much longer which makes Level 1 charging more feasible.
2. All EVs come with at least a Level 1 charger, eliminating the need for EV owners to invest in additional equipment to charge at their homes.
3. Level 1 charging minimizes the cost of enabling EV charging at a parking space, allowing for the maximization of the number of EV spaces, which maximizes access to charging.

EVSE spaces are required for commercial parking lots where shorter parking times are typical and Level 2 or 3 parking is more appropriate. Additionally, while the car connection side of Level 2 EVSE are standard, the grid connection side is not, so utilizing EVSE rather than EV Ready spaces maximizes the utility of parking spaces in commercial lots that have more transient parking.

This EVCI language is based on the approach used in the electrification reach codes adopted by various California cities. It captures recent developments in the national conversation about the best way to bring EVCI requirements to code in a way that is consistent, understandable, feasible and ensures the societal benefit of the widest penetration of EV charging possible.

The exception is added to allow capacity to be substituted for conduit in parking garages. EVCI retrofits have different cost considerations in parking garages compared to surface parking lots. Parking garage retrofits do not require retrenching, so the conduit in EV capable spaces does not come with the same future avoided costs.

**TABLE C405.14**

**ELECTRIC VEHICLE CHARGING INFRASTRUCTURE REQUIREMENTS**

|  |  |  |  |
| --- | --- | --- | --- |
| **Occupancy** | ***EVSE spaces*** | ***EV ready spaces*** | ***EV capable spaces*** |
| Group B Occupancies | 15% | NA | 40% |
| Group M Occupancies | 25% | NA | 40% |
| R-2 Occupancy | NA | 100%a | NA |
| All other Occupancies | 10% | NA | 40% |

a. Or one *EV ready space* per *dwelling unit.*

The percentages in Table C405.14 can be adjusted to tailor the requirements for the specific market needs of a jurisdiction. However, the EV Capable space requirements included for all commercial lots recognizes that future needs for EV charging will be much greater than they are now. EV capable spaces avoid the significant cost of parking lot re-trenching, which is one of the largest single costs of EVCI retrofits but only a minor investment in new construction.

**Add new text as follows:**

**C405.15 Electric infrastructure for energy storage.** Each building site shall have equipment for on-site energy storage not less than 2 feet (610 mm) in one dimension and 4 feet (1219 mm) in another dimension and located in accordance with Section 1206.2.8 of the International Fire Code and Section110.26 of the NFPA 70.

**Exception:** Where an onsite electrical energy system storage system is installed.

**C405.15.1 Electrical service reserved space.** The main electrical service panel shall have a reserved space to allow installation of a two-pole circuit breaker for future electrical energy storage system installation This space shall be labeled “For Future Electric Storage.” The reserved spaces shall be positioned at the end of the panel that is opposite from the panel supply conductor connection.

Infrastructure for energy storage has been migrated up from Appendix CB Solar-Ready Zone into the main body of the code. This language includes revisions from the 2019 Group B Public Comment that were not incorporated into the final text of the 2021 IECC but modify the language to ensure needed correlation with the IFC and NFPA.

#### C406 Additional efficiency requirements

**Revise text as follows:**

**C406.5 Onsite renewable energy.** The total minimum ratings of on-site renewable energy systems, not including onsite renewable energy system capacity used for compliance with Section C405.13, shall be one of the following:

With the addition of C405.13 for mandatory inclusion of onsite renewable energy this section is revised to allow only additional renewable energy to be counted toward compliance with the additional efficiency requirements.

### Chapter 6 – Referenced Standards

**Add new standard as follows:**

|  |  |  |
| --- | --- | --- |
| **CTA** | Consumer Technology Association  1919 S. Eads Street  Arlington, VA 22202 |  |
| Standard  reference  number | Title | Referenced  in code  section number |
| ANSI/CTA-2045-B | Modular Communications Interface for Energy Management . . . . . . . | . . . . . . . C404.11 |
|  |  |  |

1. Addendum by to ASHRAE 90.1-2019 is posted at <https://www.ashrae.org/file%20library/technical%20resources/standards%20and%20guidelines/standards%20addenda/90_1_2019_by_ck_cp_20200731.pdf> [↑](#footnote-ref-1)