



2022 Energy Code

Nonresidential Electrical Power Distribution (EPD) Requirements

California Energy Commission

March 2024



Agenda

- 2022 Energy Code basics
- Nonresidential requirements
 - Mandatory
 - Additions and alterations
- Resources



2022 Energy Code Basics



Energy Code History

Warren-Alquist Act established CEC in 1974

Authority to develop and maintain Building Energy Efficiency Standards (Energy Code)

Requires CEC to update periodically, usually every 3 years

Requires Energy Code to be cost-effective over economic life of building

WARREN-ALQUIST ACT

Warren-Alquist
State Energy Resources
Conservation and
Development Act

Public Resources Code
Section 25000 et seq.



CALIFORNIA
ENERGY COMMISSION
Gavin Newsom, Governor

2022 EDITION
JANUARY 2022
CEC-140-2022-001



2022 Energy Code Goals

Increase building energy efficiency cost-effectively

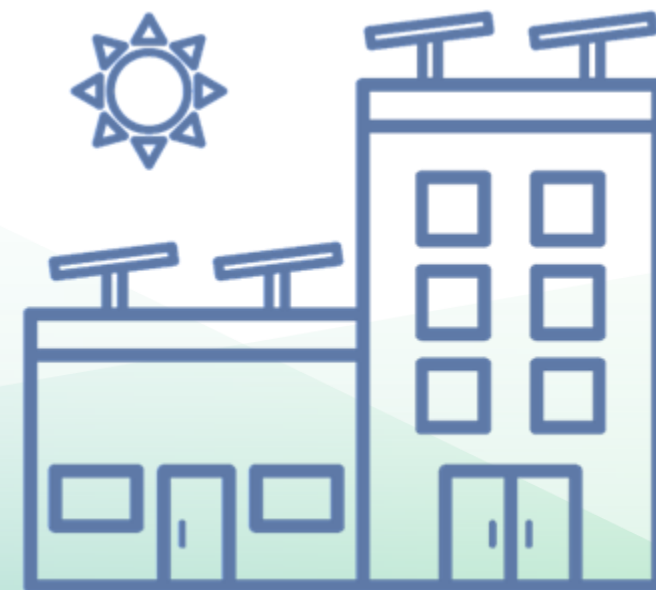
Contribute to California's greenhouse gas (GHG) reduction goals

Enable pathways for all-electric buildings

Reduce residential building impacts on the electricity grid

Promote demand flexibility and self-utilization of photovoltaic (PV)

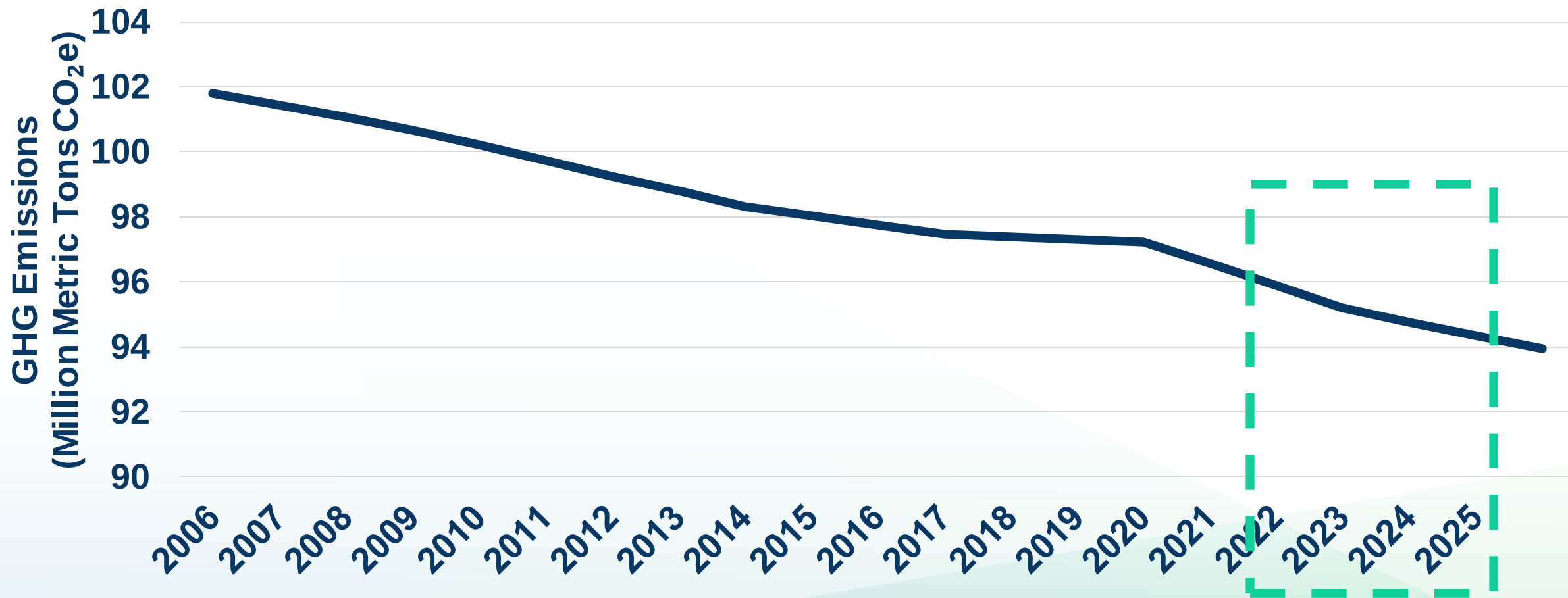
Provide tools for local government reach codes





Energy Code Environmental Benefit

Reduced Statewide Emissions



Source: CEC Impact Analysis 2005, 2008, 2013, 2016, 2019, 2022



2022 Energy Code

Effective January 1, 2023

- Building permit applications submitted on or after Jan 1, 2023
- Must use 2022 tools
 - Software
 - Forms





2022 Documents Online

2022 Building Energy Efficiency Standards

The Building Energy Efficiency Standards (Energy Code) apply to newly constructed buildings, additions, and alterations. They are a vital pillar of California's climate action plan. The 2022 Energy Code will produce benefits to support the state's public health, climate, and clean energy goals.

The California Energy Commission (CEC) updates the Energy Code every three years. On August 11, 2021, the CEC adopted the 2022 Energy Code. In December, it was approved by the California Building Standards Commission for inclusion into the California Building Standards Code. The 2022 Energy Code encourages efficient electric heat pumps, establishes electric-ready requirements for new homes, expands solar photovoltaic and battery storage standards, strengthens ventilation standards, and more. Buildings whose permit applications are applied for on or after January 1, 2023, must comply with the 2022 Energy Code.

2022 Energy Code for Residential and Nonresidential Buildings

[2022 ENERGY CODE >](#)



Expand All

[Supporting Documents – Appendices, Compliance Manuals, and Forms](#) +

[Software – Compliance Software, Manuals, and Tools](#) +

BUILDING ENERGY EFFICIENCY STANDARDS - TITLE 24

2025 Building Energy Efficiency Standards

2022 Building Energy Efficiency Standards ^

— Workshops, Notices, and Documents

2019 Building Energy Efficiency Standards

2016 Building Energy Efficiency Standards

Past Building Energy Efficiency Standards

Climate Zone tool, maps, and information supporting the California Energy Code

Online Resource Center

Solar Assessment Tools

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Building Energy Efficiency Standards

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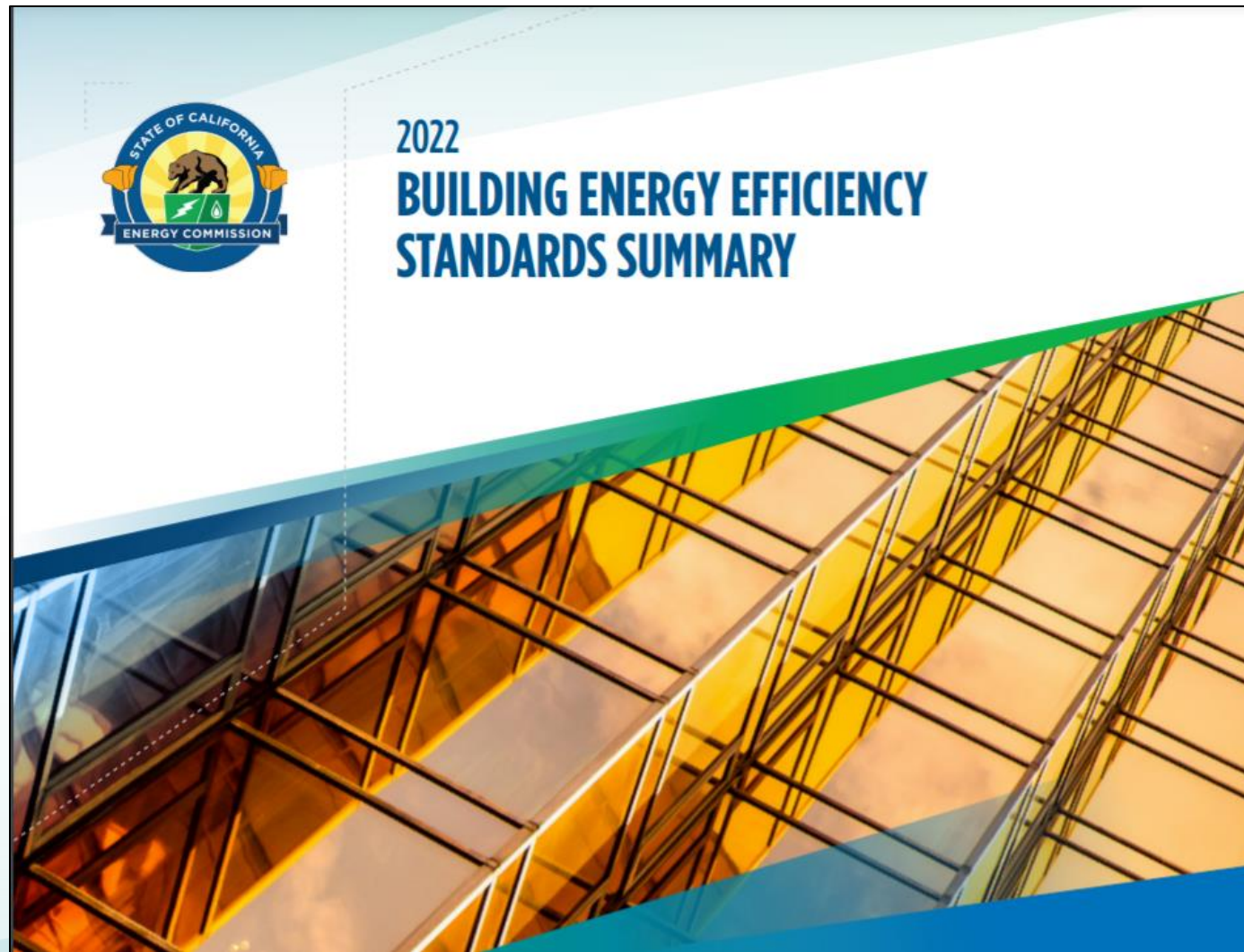
- Energy Code
- Reference Appendices
- Compliance Manuals
- Software
- Forms





2022 Energy Code Highlights

- Heat pump baselines
- Solar and battery storage
- Ventilation requirements
- Lighting
- Multifamily restructuring





Energy Code Requirements

Mandatory requirements

- Minimum efficiency requirements must always be met
- Can never trade off

Prescriptive requirements

- Predefined efficiency requirements
- May supersede mandatory requirements
- Different requirements for newly constructed buildings, additions, and alterations



Compliance Approaches

Prescriptive approach

- Simple approach, no trade-offs
- Defines the standard building design
- 2022 heat pump baselines

Performance approach

- Most flexible approach, allows for trade-offs
- Must meet all mandatory requirements
- Requires the use of CEC-approved software
- Proposed building design meets or exceed standard building design





2022 Performance Metrics

New for 2022

Source energy performance calculations

- Nonresidential and multifamily
 - Hourly source energy
 - TDV Efficiency
 - TDV Total
 - Efficiency, PV + battery



Demonstrating Compliance

Compliance forms confirm Energy Code is met

Updated for 2022

- Completed by responsible party
 - Designers, consultants, builders, contractors, technicians, HERS raters, etc.
- Submitted to enforcement agencies for verification

Type of form	Single-family	Multifamily 3 or less habitable stories	Nonresidential Multifamily 4 or more habitable stories
Certificate of compliance	CF1R	LMCC	NRCC
Certificate of installation	CF2R	LMCI	NRCI
Certificate of verification	CF3R	LMCV	NRCV
Certificate of acceptance	-	-	NRCA



Forms Registration and Certification

All Buildings § 10-103

Updated for 2022

Multifamily buildings 3 or fewer habitable stories

- When HERS verification is required all LMCC, LMCI, and LMCV forms must be registered with HERS provider data registry

Multifamily buildings 4 or more habitable stories

- NRCV must be registered with HERS provider when required
- When lighting or mechanical acceptance test is required all NRCC, NRCI, and NRCA forms must be recorded with ATTCP



2022 Compliance Software

Performance approach must use approved compliance software versions

- Nonresidential and multifamily
 - CBECC 2022.3.0
 - EnergyPro 9.2
 - IES 2.0



Mandatory Requirements (Incl. Additions and Alterations)



110.11 Low-Voltage Dry-type Distribution Transformers

Low-voltage dry-type distribution transformers:

- Must be certified by the manufacturer as required by the Title 20 Appliance Efficiency Regulations
- Must be listed in the Modernized Appliance Efficiency Database System

Low-voltage dry-type distribution transformer is a distribution transformer that:

- Has an input voltage of 600 volts or less; and
- Is air-cooled; and
- Does not use oil as a coolant

The screenshot shows the 'Advanced Search' page of the California Energy Commission's Appliance Efficiency Database. The page has a header with the 'CA.GOV' logo and 'CALIFORNIA ENERGY COMMISSION' text. A 'SEARCH' button is visible in the header. The main content area is titled 'Advanced Search' and includes a brief explanation of the search functionality. Below this, there are three sections: 'Select Appliance Type', 'Select Fields to Display', and 'Filters'. The 'Select Appliance Type' section has three dropdown menus: 'Select Category' (set to 'Transformer Products'), 'Select Appliance' (set to 'Transformers'), and 'Select Appliance Status' (set to 'Approved'). The 'Select Fields to Display' section has a grid of checkboxes for various fields, including 'Manufacturer', 'Brand', 'Model Number', 'Transformer Type', 'Phase', 'KVA', 'Output Power', 'Total Loss Power', 'Nameplate Efficiency', 'Efficiency Std', 'Nameplate Efficiency 2', 'Efficiency 2 Std', 'Nameplate Efficiency 3', 'Efficiency 3 Std', 'Regulatory Status', 'Add Date', and 'Reference Number'. The 'Filters' section has five rows of dropdown menus, each labeled 'Please Select'. At the bottom right, there are 'Search' and 'Clear' buttons.

CA.GOV CALIFORNIA ENERGY COMMISSION

SEARCH

Help | Back To Login

Advanced Search

The Advanced Search allows you to create a narrower search by selecting unique model criteria. You will be guided to select the category, type, then narrow your search results with additional filters. In this search you can select the fields displayed in the results by checking the "Select All" box. There are also additional filters that can be applied to look up specific model information.

To search historical models, please set the appliance status to archived.

Questions can be directed to Appliances@energy.ca.gov or to the Appliances Hotline, toll free at (888) 838-1467 or outside California (916) 651-7100. [Search Instructions](#) are also available.

Select Appliance Type

Select Category: Transformer Products | Select Appliance: Transformers | Select Appliance Status: Approved

Select Fields to Display

☐ Select/Deselect All

☒ Manufacturer	☒ Brand	☒ Model Number	☒ Transformer Type
☒ Phase	☐ KVA	☐ Output Power	☐ Total Loss Power
☐ Nameplate Efficiency	☐ Efficiency Std	☐ Nameplate Efficiency 2	☐ Efficiency 2 Std
☐ Nameplate Efficiency 3	☐ Efficiency 3 Std	☒ Regulatory Status	☒ Add Date
☐ Reference Number			

Filters

Please Select		
Please Select		
Please Select		
Please Select		
Please Select		

Search Clear



110.11 Low-Voltage Dry-type Distribution Transformers Cont.

Exceptions:

- Autotransformer, drive transformer, grounding transformer
- Machine tool transformer, non-ventilated transformer
- Rectifier transformer, regulating transformer
- Sealed transformer, special-impedance transformer
- Testing transformer, transformer with tap range of 20 percent or more
- Uninterruptible power supply transformer
- Welding transformer



130.5(a) Service Electrical Metering

Each electrical service or feeder must have a permanently installed metering system which measures electrical energy per Table 130.5-A

- Utility meter satisfies the metering requirement (show instantaneous kW, kWh over utility defined period)
- If a utility meter is not installed, meter capability is dependent on kVA of the service
- Exception: EPDS subject to California Electrical Code Article 517

TABLE 130.5-A MINIMUM REQUIREMENTS FOR METERING OF ELECTRICAL LOAD

Metering Functionality	Electrical Services rated 50 kVA or less	Electrical Services rated more than 50kVA and less than or equal to 250 kVA	Electrical Services rated more than 250 kVA and less than or equal to 1000kVA	Electrical Services rated more than 1000kVA
Instantaneous (at the time) kW demand	Required	Required	Required	Required
Historical peak demand (kW)	Not required	Not required	Required	Required
Tracking kWh for a user-definable period.	Required	Required	Required	Required
kWh per rate period	Not required	Not required	Not required	Required





130.5(b), 141.0(b)2P Separation of Electrical Circuits

Newly constructed buildings

- EPDS designed to allow for measuring loads according to TABLE 130.5-B
- Allows flexible approaches for providing measuring ability

Alterations

- Only applicable for complete replacements of power distribution systems
- Most projects will not fall under this trigger
- **Exceptions:**
 - For each load type, up to 10% of connected load may be of any type
 - EPDS subject to California Electrical Code Article 517

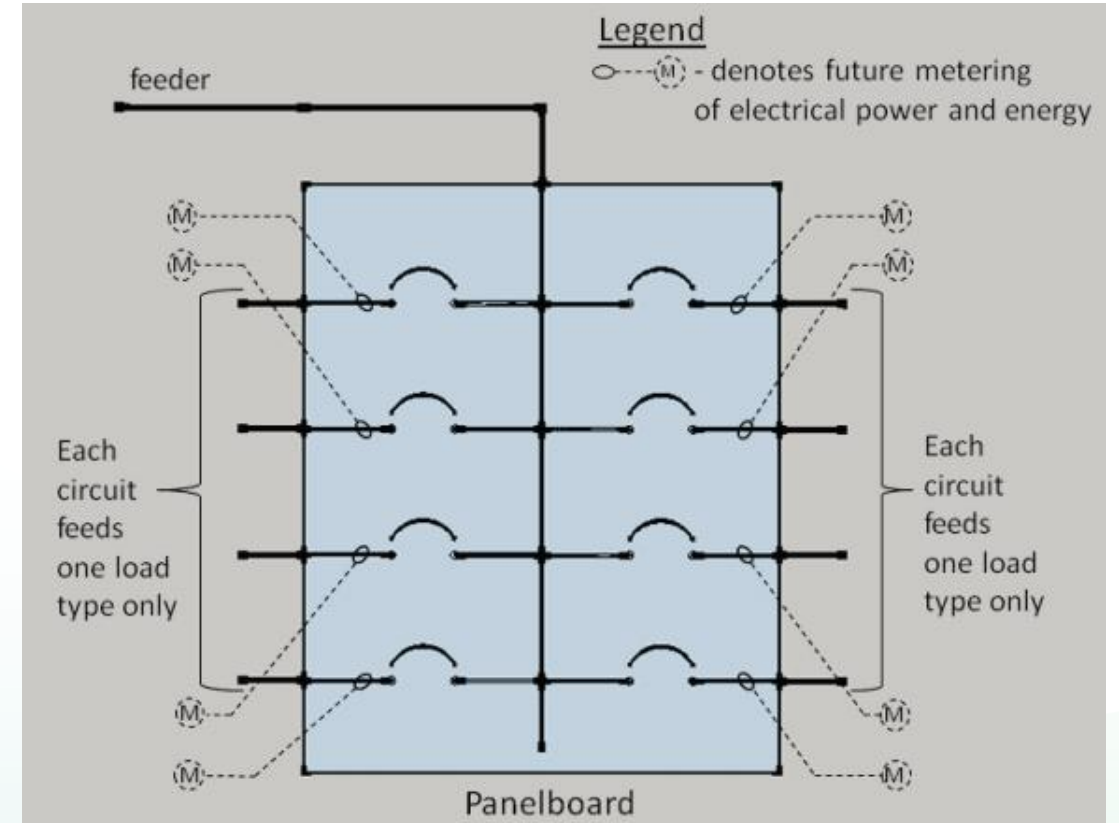




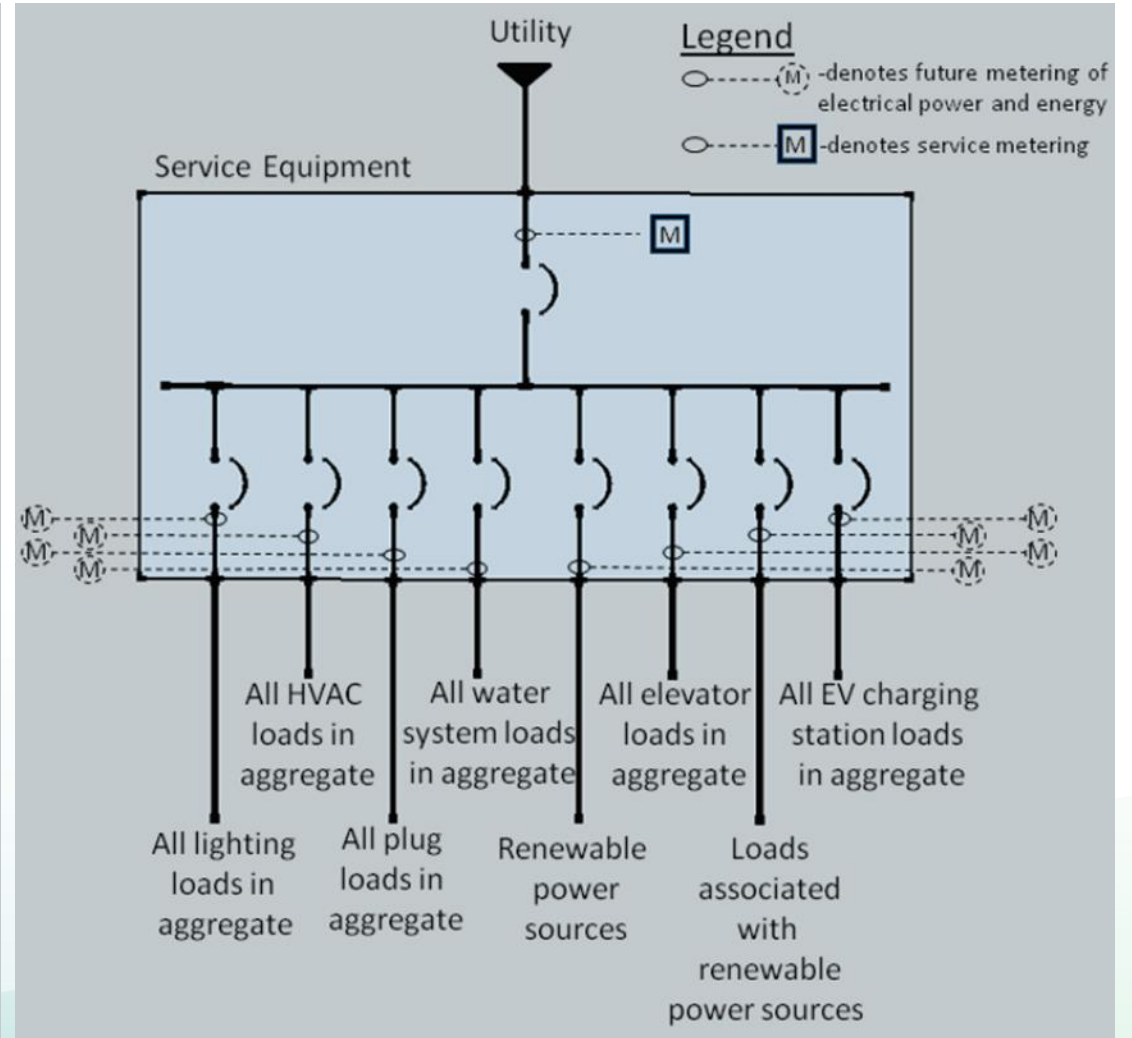
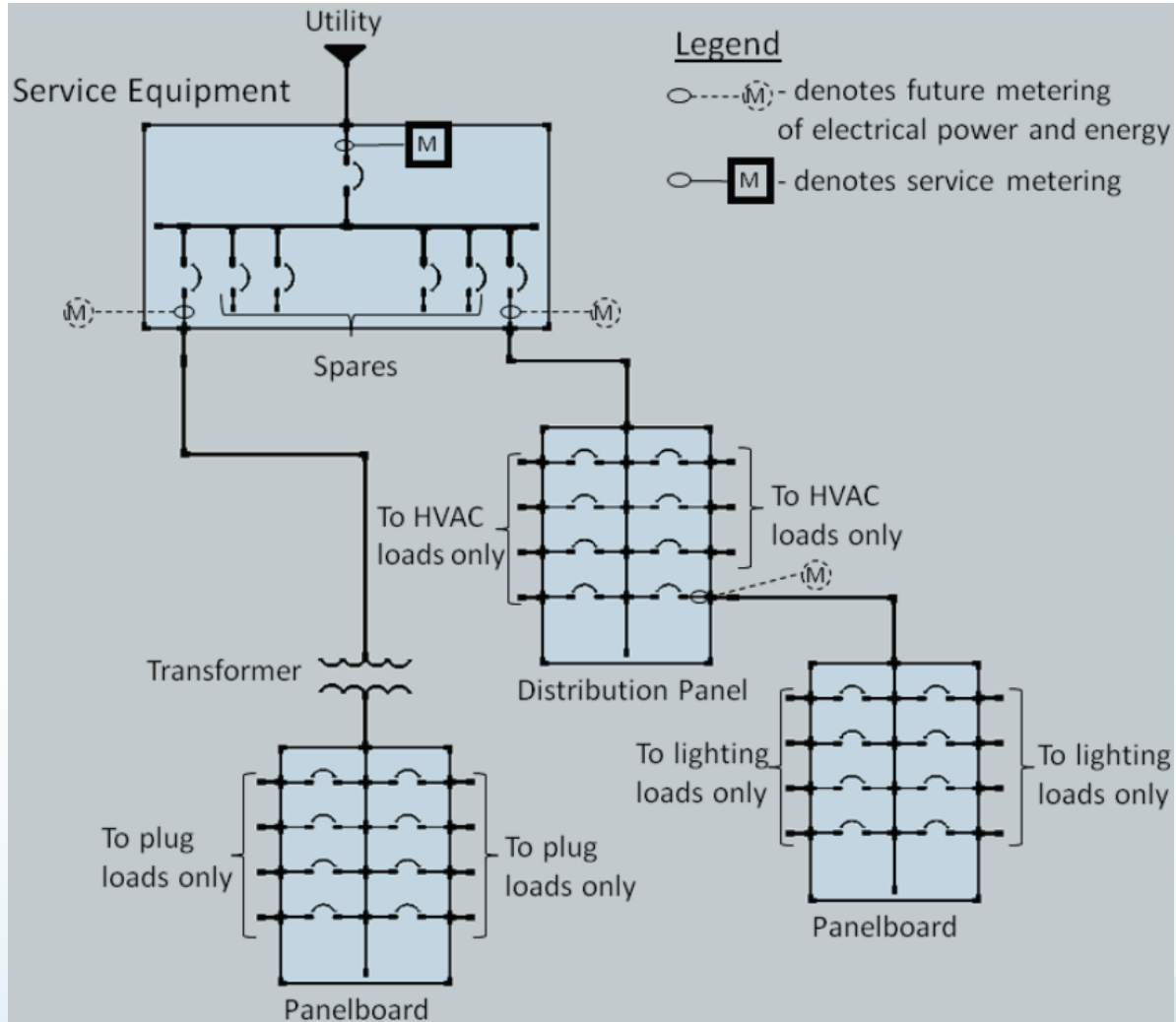
TABLE 130.5-B

TABLE 130.5-B MINIMUM REQUIREMENTS FOR SEPARATION OF ELECTRICAL LOAD

Electrical Load Type	Electrical Services rated 50 kVA or less	Electrical Services rated more than 50kVA and less than or equal to 250 kVA	Electrical Services rated more than 250 kVA and less than or equal to 1000kVA	Electrical Services rated more than 1000kVA
Lighting including exit and egress lighting and exterior lighting	Not required	All lighting in aggregate	All lighting disaggregated by floor, type or area	All lighting disaggregated by floor, type or area
HVAC systems and components including chillers, fans, heaters, furnaces, package units, cooling towers, and circulation pumps associated with HVAC	Not required	All HVAC in aggregate	All HVAC in aggregate and each HVAC load rated at least 50 kVA	All HVAC in aggregate and each HVAC load rated at least 50kVA
Domestic and service water system pumps and related systems and components	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Plug load including appliances rated less than 25 kVA	Not required	All plug load in aggregate Groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf	All plug load separated by floor, type or area Groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf	All plug load separated by floor, type or area All groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf
Elevators, escalators, moving walks, and transit systems	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Other individual non-HVAC loads or appliances rated 25kVA or greater	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Industrial and commercial load centers 25 kVA or greater including theatrical lighting installations and commercial kitchens	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Renewable power source (net or total)	Each group	Each group	Each group	Each group
Loads associated with renewable power source	Not required	All loads in aggregate	All loads in aggregate	All loads in aggregate
Charging stations for electric vehicles	All loads in aggregate	All loads in aggregate	All loads in aggregate	All loads in aggregate



130.5(b) Separation of Electrical Circuits





130.5(c), 141.0(b)2P Voltage Drop

Combined voltage drop of feeder conductors and branch circuits must **not exceed 5%**

Alterations

- Applicable when both feeders and branch circuits are added or replaced
- **Exception:** voltage drop permitted by CA Electrical Code Sections 647.4, 695.6, and 695.7



130.5(d), 141.0(b)2P Controlled Receptacles

Controlled receptacles are required in:

- Office areas
- Lobbies
- Conference rooms
- Kitchen areas in office spaces
- Copy rooms
- Hotel and motel guest rooms

Requirements for controlled receptacles:

- Automatic time-switch controls (plus 2-hour override) or motion control
- Controlled receptacle must be marked
- At least one controlled receptacle or split wired receptacle within 6 feet of uncontrolled receptacle





130.5(d), 141.0(b)2P Controlled Receptacles Continued

Hotel/Motel Guest rooms

- At least 50% of receptacles must be controlled
- Captive card key or occupancy sensing controls
- Shut-off after 30 minutes of vacancy

Alterations

- Only applicable for complete replacements of power distribution systems
- Most alteration projects will not need to meet controlled receptacle requirements

•Exceptions:

- Receptacles specifically for refrigerators and water dispensers in kitchen areas
- Receptacles located a minimum of six feet above the floor that are specifically for clocks
- Receptacles for network copiers, fax machine, A/V and data equipment other than personal computers in copy rooms



130.5(e), 141.0(b)2P Demand Responsive Controls and Equipment

See §110.12 for requirements for demand responsive controls and equipment, including demand responsive controls for controlled receptacles.

(a).Demand responsive controls shall be:

1.All demand responsive controls shall be:

A. Certified OpenADR 2.0a or OpenADR 2.0b Virtual End Node under Clause 11, Conformance, in the applicable OpenADR 2.0 or:

B. Certified by the manufacturer capable of responding to demand response signal from a certified OpenADR 2.0b Virtual End Node.

(e).Demand Responsive Controlled Receptacles where controlled receptacles shall be capable of automatically turning off all loads connected to the receptacle from a response to a demand signal.



Resources



Online Resource Center

www.energy.ca.gov/orc



Handouts

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Links

- Internal resources
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New Resource Hub

Homeowners and renters

- Information about water and space heating, cooking, EV charging, incentives

Contractors

- Information about training, tools, incentives

Local government representatives

- Information about model policies, permitting, training, incentives

Links on the [Building and Home Energy Resource Hub](#)





Blueprint Newsletter

Energy Code quarterly newsletter

- Updates
- Clarifications
- Frequently asked questions



Issue 138 | April - June 2022

BLUEPRINT

CALIFORNIA ENERGY COMMISSION
EFFICIENCY DIVISION

IN THIS ISSUE

- 2022 Energy Code: Multifamily Summary
- 2022 Energy Code: Compliance Software
- 2019 Energy Code: HERS Verifications
- Q&A
 - Solar PV for Multifamily Buildings
 - Multifamily Water Heating
 - Multifamily Common Use Areas

2022 Energy Code: Multifamily Summary

The 2022 Building Energy Efficiency Standards (Energy Code) reorganizes low-rise (three or fewer habitable stories) and high-rise (four or more habitable stories) multifamily buildings into one building type, updates the multifamily buildings definition in § 100.1, and moves all requirements for multifamily buildings to §§ 160.0-180.4. This and other significant changes include:

Mandatory Requirements

- Updates minimum efficiencies for HVAC equipment; adds minimum efficiency requirements for dedicated outdoor air systems (DOAS), heat pump, and heat recovery chiller packages. § 110.2
- Changes demand responsive lighting controls trigger to 4,000 watts or more; adds requirements for controlled receptacles. §§ 110.12, 160.5(b)4E

- Unifies envelope insulation, vapor retarder, and fenestration requirements. § 160.1
- For dwelling units
 - Adds requirements for central fan integrated ventilation systems requiring a motorized controlled damper, damper controls, and variable ventilation. § 160.2(b)2Aii
 - Requires vented kitchen range hoods ventilation rates or capture efficiencies based on conditioned floor area and fuel type per Tables 160.2-E, F, G. § 160.2(b)2Avic2
 - Requires a HERS-verified maximum fan efficacy of 1.0 Watts per cfm for heat recovery ventilation (HRV) and energy recovery ventilation (ERV) systems. § 160.2(b)2Biii
 - Adds mechanical acceptance testing requirements. § 160.3(d)2
 - Adds electric-ready requirements when gas equipment is installed for space heating, cooking, and clothes dryers. § 160.9(a-c)

For additional help with the Energy Code see Energy Code Ace's **online offerings** of trainings, tools, and resources.

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- Title24@energy.ca.gov

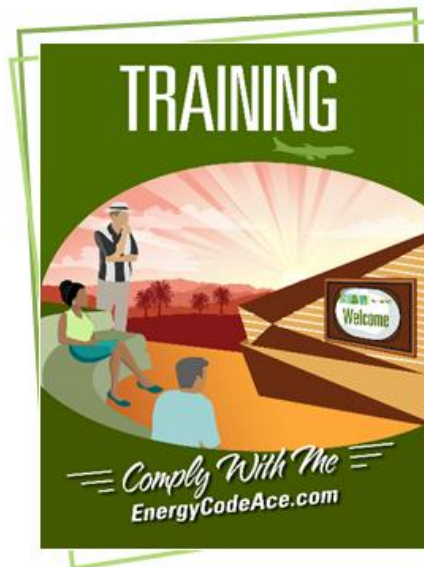


Energy Code Ace



Tools help automate tasks:

- ✦ Energy Code Product Finder
- ✦ Forms Ace
- ✦ Image Ace
- ✦ Navigator Ace
- ✦ Nonres. Indoor Lighting Wheel
- ✦ Q&Ace
- ✦ Reference Ace
- ✦ Timeline Ace
- ✦ Virtual Compliance Assistant



Training is activity based and delivered in a variety of formats:

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- ✦ Recorded webinars
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info@iren.gov

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- Requested training courses can also be scheduled

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