

2019 Energy Code – Nonresidential Electrical Power Distribution Systems

California Energy Commission

The 2019 Energy Code

- Effective January 1, 2020
 - Based on date of application for building permit
- **30% more efficient** than 2016 Code (nonresidential)
- Applies to occupancy groups:
 A, B, E, F, H, I, M, R, S, and U
 I-1 and I-2 (healthcare facilities)
 Does not apply to I-3, I-4, L
 - (Institution and Labs)
- Sections applicable to EPDS
 - o 130.5, 141.0(b)2P





Nonresidential Electrical Power Distribution Systems (EPDS)



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
 - o Is air-cooled; and
 - Does not use oil as a coolant

• Exceptions:

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



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 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

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• Each service or feeder must have a permanently installed metering system which measures electrical energy

 Utility meter satisfies the metering requirement (show instantaneous kW, kWh over utility defined period)

- \circ 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

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
 - $\circ\,$ 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
 - $\circ\,$ Most projects will not fall under this trigger

o Exceptions:

- $\,\circ\,$ 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 MINIMUM REQUIREMENTS FOR SEPARATION OF ELECTRICAL LOAD

Electrical Services rated Electrical Load Type 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



(i) 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

Voltage drop ≤ 5%



• Controlled receptacles are required in:

- \circ Office areas
- \circ Lobbies
- \circ Conference rooms
- $_{\odot}$ Kitchen areas in office spaces
- \circ Copy rooms
- $_{\odot}$ Hotel and motel guest rooms
- Requirements for controlled receptacles:
 - Automatic time-switch controls (plus 2-hour override) or motion control
 - $_{\odot}$ 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 cont.

- Hotel/Motel Guest rooms
 - $_{\odot}$ At least 50% of receptacles must be controlled
 - Captive card key or occupancy sensing controls
 - \circ 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









Certificate of Compliance (NRCC-XXX)

- Submitted with permit application, included with plans
- $_{\odot}$ Used by plans examiner to verify compliance
- LPA calculations, schedules, lighting controls, PAF, voltage drop, electrical metering, separation of circuits, controlled receptacles, etc.

• Indoor

- NRCC-LTI-E
- Outdoor
 - NRCC-LTO-E
- EPDS, Sign

○ NRCC-ELC-E, NRCC-LTS-E





Certificate of Installation (NRCI-XXX)

- Completed by installing contractor
- $_{\odot}$ Left on-site for building inspector
- Identifies construction documents that show lighting, controls and EPDS systems were installed as proposed in the certificate of compliance

Indoor

- NRCI-LTI-01 NRCI-LTI-06
- Outdoor
 - NRCI-LTO-01 NRCI-LTO-02
- EPDS, Sign

○ NRCI-ELC-01, NRCI-LTS-01

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- Certificate of Compliance forms combined into one interactive PDF
- Auto populate information from user inputs and conduct simple math
- Form expands and collapses based on selections
- Drop down selections
- Interactive instructions
- Add and delete table rows
- One single signature page

ERTIFICATE OF COMPLIANCE						NRCC-ELC
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. GENERAL INFORMATION						
01 Project Location (city)		02 0	Occupancy Type	es Within Projec	t:	
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10	02	05	04	05	Demend	Development Controls
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AND

AND

04

Controlled

Receptacles

§130.5(d)

(See Table I)

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: http://www.energy.ca.gov/title24/2019standards

AND

AND

02

Separation for

Monitoring

§130.5(b)

(See Table G)

01

Service Electrical

Metering

§130.5(a)

(See Table F)

AND

AND

Table Instructions: If this table says "DOES NOT COMPLY" refer to Table D. for guidance and review the Table that indicates "No"

03

Voltage Drop

§130.5(c)

(See Table H)

05

Compliance Result



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Service Electrical Metering <u>§130.5(a)</u> (See Table F)	AND	(See Table G)		(See Table H)	_	((See Table I)				

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: http://www.energy.ca.gov/title24/2019standards



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Domestic and service water systems All loads in aggregate Method 1	E3	
Plug Loads and appliances < 25kVA area Groups of plug loads exceeding 25 kVA connected load in an area less than 5000 sf		
Other non-HVAC loads or appliances ≥ 25kVA All loads in aggregate Method 1	E4	
Charging stations for electric vehicles All loads in aggregate Method 1	E5	

Table Continued

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance: http://www.energy.ca.gov/title24/2019standards



TICLOATE :	ACC 01/20/					CALIFORNIA ENERGY	COMMISSIO	N The second		
TIFICATE	OF COMPL	IANCE					NR	CC-ELC-I		
ect Name:	: Califor	nia Energy (Commission	Report Page:			Ра	age 4 of 5		
ect Addres	ss: 1516 9	oth Street, Sa	acramento, CA 95814	Date Prepared:				4/1/2020		
	01		02	03	04	05	0)6		
Ro	om Name		Location/ Type of Controlled	Shut-Off Controls	Permanent Durable	Location of Requirement in Construction	s Field In	spector		
orl	Descriptio	n	Receptacies		be Used	Documents	Pass	Fail		
Confe	erence Ro	om	Within 6ft of uncontrolled receptacles	Occupancy Sensor		E1				
Oper	n office ar	ea	Within 6ft of uncontrolled receptacles	Occupancy Sensor		E1				
Kitche	n/break ro	oom	Within 6ft of uncontrolled receptacles Occupancy Sensor E2							
						Add Row	Remo	ve Last		
"Other*" i	is selected	under Comp	pliance Method above, please indicate h	ow compliance has been achieved in the spo	ice provided b	elow.				
ECLARAT	ION OF F	REQUIRED	CERTIFICATES OF INSTALLATION					2		
le Instruct le E. Addit 24/2019st	ions: Sele ional Rem <mark>tandards/</mark> .	ctions have l arks. These 2019_compl	been made based on information provid documents must be provided to the bui iance_documents/Nonresidential_Docu	ed in previous tables of this document. If ar lding inspector during construction and can <u>ments/NRCI/</u>	ny selection ne be found onlin	eds to be changed, please e at <u>https://ww2.energy.</u>	e explain w <mark>ca.gov/</mark>	vhy in		
YES	NO			Form/Title			ield Inspe	ector		
						P	ass	Fail		
		NRCI-ELC-0)1-E - Must be submitted for all building	s.						



Nonresidential EPDS for the Plans Examiner

- Verify plans with NRCC-ELC-E form
 - $_{\odot}$ Verify service electrical metering
 - Metering capability or utility meter
 - Verify separation of electrical circuits
 - Separation of loads based on service kVA rating
 - $_{\odot}$ Verify voltage drop calculations
 - 5% or less
 - Verify controlled receptacles in required spaces

CC-ELC-E (Created 01/20)					CALIF	ORNIA ENERGY COMMISSION
RTIFICATE OF COMPLIAN	ICE					NRCC-ELC-E
is document is used to de	emonstrate compliance with m	andatory requirements	in <u>§130.5</u> for electrical	systems in newly c	onstructed nonresident	al, high-rise residential and
tel/motel occupancies. A	Additions and alterations to ele	ectrical service systems i	n these occupancies wi	ll also use this docu	ıment to demonstrate c	ompliance per <u>§141.0(a)</u> or
<u>41.0(b)2P</u> for alterations			Pop	ort Dago:		Page 1 of 2
piect Address:			Date	Prenared		Fage 1 01 5
			Butt			
GENERAL INFORMATI	ION		02 Occupanc	w Types Within Pro	plect:	8
Office	Retail	Warehouse	Hotel/ Mo	tel	School	Support Areas
] Parking Garage	High-Rise Residential	Relocatable	Healthcare	Facilities	Other (Write In):	
PROJECT SCOPE						2
ble Instructions: Include	any electrical service systems	that are within the scop	e of the permit applicat	ion.		
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Nonresidential EPDS the Building Inspector

- Verify installation matches plans and NRCC-ELC-E
 - Use NRCC-ELC-E as an inspection checklist
- Verify service metering
- Verify separation of electrical circuits
- Verify installed receptacle controls
 - At least one controlled receptacle within 6 feet of an uncontrolled receptacle
- Verify completed NRCI forms











Residential

- CBECC-Res
- EnergyPro
- Right-Energy Title 24

Nonresidential

- CBECC-Com
- EnergyPro

More information and up to date list of approved software



- Published quarterly
- Clarifies frequently asked questions on all topics related to the Energy Code
- Highlights new resources, clarifications, and more on the Energy Code
- Sign up for our list server and receive Blueprint Newsletter email quarterly
- More information about the <u>Blueprint</u> <u>Newsletter</u>



THIS ISSUE

 2019 Energy Code: Low-rise Residential Summary of Major Changes

 2019 Energy Code: Nonresidential, Hotel and Motel, High-rise Residential Summary of Major Changes

- 2019 Energy Code: CBECC Software and ACM Manuals Approved
- 2016 Energy Code: New Fact Sheets and Videos for Covered Processes
- Q&A
 Outdoor Electric Heating

Flag Pole Lighting
 Continuous Insulation and

Z-Clips • Energy Code Ace

Class Schedule
 Energy Code Ace

2019 Reference Ace

2019 ENERGY CODE: LOW-RISE RESIDENTIAL SUMMARY OF MAJOR CHANGES

The most significant change in the 2019 Building Energy Efficiency Standards (Energy Code) for low-rise residential buildings is the introduction of photovoltaic (PV) requirements in the prescriptive standards. There are also significant changes related to the indoor air quality requirements. This is a summary of these and other major changes:

these and other major changes: Mandatory Measures

 Walls with 2x6 framing require R-20 minimum insulation for wood-framed, or 0.071 maximum U-factor. § 150.0(c)2
 O.Modifications to the indoor air quality requirements of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 62.2 are included for various building and dwelling unit configurations such as horizontally attached buildings, or central ventilation systems. Balanced or continuously operating supply or exhaust ventilation system required. Home Energy Rating System (HERS) verification required when kitchen range hoods are installed. § 150.0(o)

3. Minimum efficiency reporting value (MERV) 13 air filters (or equivalent) are required for heating, cooling, and on the supply side of ventilation systems. § 150.0(m)12 4. Fan efficacy requirements are 0.45 watts/cubic feet per minute (CFM) or less for gas furnace air-handling units; or 0.58 watts/CFM or less for air-handling units that are not gas furnaces. New fan efficacy requirement for small-duct high-velocity forced-air systems. § 150.0(m)13B, C, D

Prescriptive Compliance

1. New PV solar electric generation requirement. § 150.1(c)14

4. New exterior door U-factor 0.20

2. New prescriptive Table 150.1-B for multifamily buildings. § 150.1(c) 3. Wall U-factors in climate zones 1-5 and 8-16 reduced to 0.048 maximum in 6single-family buildings; climate zones 6-7 remain at 0.065 maximum. § 150.1(c)1B

maximum and National Fenestration Rating Council (NFRC) labeling requirements. § 150.1(c)5, § 110.6(a)5 5. Quality insulation installation (QII) for all single-family buildings in all climate zones, and multifamily buildings in all climate zones except climate zone 7. HERS verification required. § 150.1(c)1E 6. New prescriptive options for beat pum

6. New prescriptive options for heat pump water heaters for newly constructed buildings, additions, and alterations. § 150.1(c)8, § 150.2(a)1D, § 150.2(b)1H

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Online Resource Center

BUILDING ENERGY EFFICIENCY

2022 Building Energy Efficiency Standards

2019 Building Energy Efficiency Standards

2016 Building Energy Efficiency Standards

e Center

nergy Efficiency Standards

<u>e Efficiency Standards - Title 24</u> fornia: 800-772-3300 nia: 916-654-5106

Efficiency Standards

STANDARDS - TITLE 24

Online Resource Center

The Online Resource Center provides educational assistance about the Building Energy Efficiency Standards to building and enforcement communities. The California Energy Commission and utilities developed the resources, which include fact sheets, energy videos, and presentations.

	Online Resource
Expand All	Past Building E
Compliance Forms +	CONTACT
Energy Videos +	Building Energy
Trainings and Upcoming Events +	Outside Californ
Exhibitor Booth Handouts +	SUBSCRIBE
	Building Energy
ENERGY STANDARDS AND FORMS	First Name *

RESOURCES AND TRAINING MATERIALS





Overview

Look for informational resources that cover multiple building components in a single document for residential and nonresidential buildings. Commissioning Mandatory commissioning requirements for

nonresidential buildings.



Covered Processes Mandatory and prescriptive covered processes requirements for nonresidential buildings. Electrical Power Distribution Mandatory electrical power distribution requirements for nonresidential buildings.





Online Resource Center webpage





- Forms & Resource tools
- Free training (in person and online)
- Checklists, Trigger Sheets for building departments
- Energy Code Ace webpage



- Open Monday through Friday
 - \circ 8:00 a.m. to noon
 - 1:00 p.m. to 4:30 p.m.
- Call at:
 - 1-800-772-3300 (In CA, toll free)
 1-916-654-5106 (Outside CA)
- Email at: Title24@energy.ca.gov



- Main conduit for communicating with stakeholders
- Sign up on <u>CEC listserver</u> webpage
- Subscribe to the following Efficiency Lists:
 - **o Building Standards**
 - \circ Blueprint







Thank You!

