



Decoding What's New: *Let's Talk 2019 Title 4 Part 6*



**Nonresidential
High-Rise Multifamily
Hotel & Motel**



HELPING YOU PLAY YOUR CARDS RIGHT



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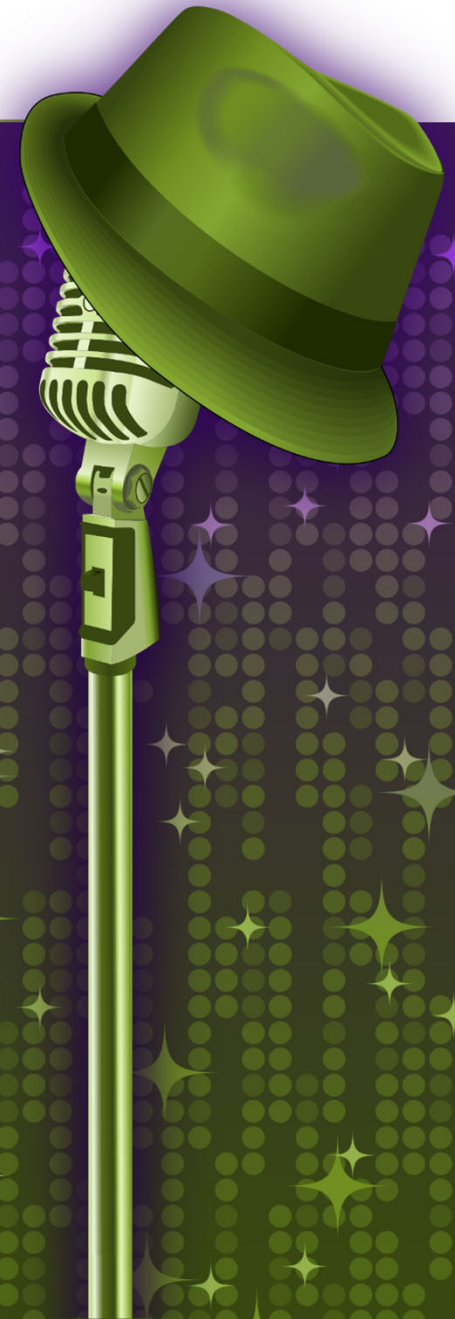
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 *Decoding* * QII™

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being recorded.

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Who Are We?



Gina Rodda
Gabel Energy
gina@gabelenergy.com



BUILDING ENERGY ANALYSIS +
ENERGY CODE COMPLIANCE

Host: Gina Rodda

Gina Rodda, our host for the Decoding Talk series, is a Certified Energy Analyst (CEA) through CABEC, and LEED Accredited Professional (AP).

She is involved in providing residential and non-residential energy calculations for a variety of building types throughout California; an instructor of full day trainings; subject matter expert supporting future code development; aids the improvement to tools and resources supporting energy compliance through the private utility programs and the Energy Commission.

Gina has been in the energy modeling field since 1991.



Who Are We?



Martyn C. Dodd
Energy Soft



Co-Host: Martyn Dodd

Having written software used in California for Title 24 energy code compliance since 1984, Mr. Dodd is principal of EnergySoft, a Bay Area company that specializes in performance-based energy analysis for Title 24 and LEED.

Mr. Dodd has been involved in the California standards development process for the past four decades and has consulted on the Title 24 rules and procedures extensively in that time.

Mr. Dodd has taught over 2,000 training classes throughout North America on energy modeling and code compliance and has developed training curriculums for over 100 different classes related to building energy efficiency.



Decoding What's New



- ✦ Review the major changes associated with Title 24 Part 6 2019 code cycle;
- ✦ Review the design, modeling, installation and enforcement challenges associated with these changes;
- ✦ Provide our opinions on when and how these new measures will affect compliance.



Why?



HELPING YOU PLAY YOUR CARDS RIGHT



Handouts



2019 Title 24, Part 6 Fact Sheet

Low-Rise Residential What's Changed in 2019

This fact sheet is intended to help industry professionals understand changes made to the 2016 Title 24, Part 6 Building Energy Efficiency Standards (Energy Code or Title 24, Part 6) and incorporated in the 2019 Energy Code for the low-rise residential building occupancy by building feature section in Title 24, Part 6 sections Code. Notes on Title 24, Part 6 sections and to highlight related key comments. There is a similar fact sheet covering changes for the low-rise residential type.

For More Information
California Energy Commission
Information & Services

Legend

Background colors are considered and typically revised for 2019

- No Change or Minor Change for 2019 - "Minor Changes" are considered non-substantive changes to code language and typically no further clarification is provided.
- Revised for 2019
- New for 2019

Key Definitions

- Multifamily:** Occupancies R-1 and R-2 (R-3 includes single family, duplexes and townhomes 3-habitable stories or less above grade, and is subject to the single-family requirements of the Energy Code).
 - Multifamily buildings 3-habitable stories or less above grade are addressed in the **residential** requirements of the Energy Code (§§150.0, 150.1, 150.2)
 - Multifamily buildings 4-habitable stories or more above grade are addressed in the **nonresidential** requirements of the Energy Code (§§130-141)
- Healthcare Facilities:** Occupancies I-1 and I-2 are now covered by the requirements of the Energy Code with this 2019 code cycle. There are many exceptions, so see the section devoted to Exceptions for Healthcare Facilities. Occupancy I-3 and I-4 are still not subject to the requirements of Title 24, Part 6.



2019 Title 24, Part 6 Fact Sheet

Nonresidential, High-Rise Residential, Hotel/Motel What's Changed in 2019

This fact sheet is intended to help industry professionals understand changes made to the 2016 Title 24, Part 6 Building Energy Efficiency Standards (Energy Code or Title 24, Part 6) and incorporated in the 2019 Energy Code for nonresidential, high-rise residential and hotel/motel building occupancy types. It is presented in tabular form and divided by building feature (e.g., envelope and lighting). Each building feature section includes explanatory notes on all applicable Title 24, Part 6 sections, but not the actual language of the 2019 Energy Code. Notes on Title 24, Part 1 sections are also included, as applicable. The left-hand column serves to note the Title 24 sub-sections and to highlight related key comments.

For More Information
California Energy Commission
Information & Services

- 2019 Title 24, Part 6 Document (December 2018); www.energy.ca.gov/2018publications/CEC-400-2018-020/CEC-400-2018-020-CMF.pdf
- Draft 2019 Energy Code - October 4 & 5, 2017: Staff Workshop on the Draft 2019 Building Energy Standards ("marked up" for easier viewing of changes); www.energy.ca.gov/title24/2019standards/premaking/documents/2017-10-0405_workshop/2017-10-0405_documents.php
- Energy Code Hotline: 1-800-772-3300 (Free) or Title24@energy.ca.gov
- Online Resource Center: energy.ca.gov/title24/orc/
 - The Energy Commission's main web portal for Energy Code, including information, documents and historical information

Energy Code Ace Information & Services

- Reference Ace™ – Easily navigate Title 24, Part 6 documents using search and hyperlinks
 - 2019 Energy Code
 - 2016 Energy Code
- Training
 - Title 24: Where We're Headed with the 2019 Standards
 - 2019 Title 24, Part 6: Where We're Headed With the Nonresidential Standards
- Energy Code Ace Tools, Training and Resources Updated for the 2019 Code - Coming Soon! Register with EnergyCodeAce.com and select a role in My Profile to receive emails when they are published!

There is a similar fact sheet covering changes for the low-rise residential occupancy type.

Legend
Background colors are used to indicate the degree of change to the 2016 Energy Code.

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Let's Talk 2019 Title 24, Part 6

2019 Overview of Nonresidential / High-Rise Multifamily / Hotel & Motel Occupancies

Application	Building Feature	Brief Description	Code §			
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Scope	Occupancy I-1, I-2					
	All					
Demand Response	All					

Envelope	Fenestration					
	Efficient					
	Fan					
	Air Filtration					

Mechanical	Roof					
	Envelope					
	Walls					
	Walls: Additions					
	Fenestration					
	Solid Doors					
	Quality Insulation Installation (QII)					
	Filter					

Mechanical	IAQ Ventilation Rate					
	ADU IAQ requirement					
	Gas FAU + AC					



Let's Talk 2019 Title 24, Part 6

2019 Overview of Low-Rise Residential

Application	Building Feature	Brief Description	Code §			
-------------	------------------	-------------------	--------	--	--	--

Performance Method	EDR Score	New compliance metric for new single-family homes, new low-rise townhomes & multifamily buildings. Building efficiency must show compliance with no tradeoffs from PV systems	150.1(b)1			X
	PV + Flexibility	New single-family homes, new low-rise townhomes & multifamily buildings to meet PV kW requirements of Table 150.1-C (exceptions may apply)	150.1(c)14		X	X
	Battery	Can be used to reduce PV kW or trade with building efficiency features, depending on kW size, for new single-family homes, new low-rise townhomes & multifamily buildings	150.1(c)14		X	X
Envelope	Prescriptive Tables	There is a separate table for single family versus low-rise multifamily	150.1		X	
	Roof	Above roof deck insulation option removed as prescriptive feature (can still use with performance approach). Below roof deck insulation R-value increased to R-19 and associated with roofing material installed with air gap (i.e. tile roofing) for prescriptive compliance (all other must use performance approach)	150.1(c)1			X
	Roof: Additions	Roof insulation R-value increased to R-30 CZ 2-10, and R-38 in CZ 1&11-16	150.2(c)5		X	
	Walls	Framed: Mandatory min. for 2 x 6 walls increased to R-20	150.0(c)		X	
	Walls: Additions	Framed: Prescriptive U-factor for single family CZ 1-5, 8-16 reduced to 0.048	150.1(c)1B			X
	Walls: Additions	Above Grade Mass. Mandatory U-factor based on prescriptive measure	150.0(c)5		X	
	Fenestration	Extended 2 x 6 framed walls increased to R-21	150.0(c)5			X
	Fenestration	Prescriptive U-factor reduced to 0.30 and SHGC reduced to 0.23 for CZ 2, 4, 6-15	150.1(c)3A			X
Mechanical	Solid Doors	Door considered fenestration (using rough opening) when ≥25% glass	150.1(c)5		X	
	Solid Doors	NFRC rated U-factor of 0.20 or less except for door in home to the garage	150.1(c)5			X
	Quality Insulation Installation (QII)	HERS verification now a prescriptive requirement for new single-family homes, low-rise multifamily, and additions >700 ft² (multifamily in CZ 7 exempt)	150.1(c)1E			X
	Filter	MERV-13 2" (exceptions allowed for 1" meeting Equation 150.0-A) for new ducted >10 ft² of ducting) systems or complete replacement (indoor, outdoor ducting) systems verified by HERS rater	150.0(m)		X	
	IAQ Ventilation Rate	Increased CFM requirements per Equation 150.0-B	150.0(o)		X	
Mechanical	ADU IAQ requirement	All new accessory dwelling units must meet IAQ requirements including HERS verification	150.0(o)		X	
	Gas FAU + AC	HERS verification reduced to 0.45 WJCFM for gas furnaces manufactured as of July 3, 2019 for system including AC	150.0(m)13		X	



Title 24: CA Building Code



- ◆ Part 1: Administrative
- ◆ Part 2: ICC Changes
- ◆ Part 2.5: Residential Buildings
- ◆ Part 3: Electrical Code
- ◆ Part 4: Mechanical Code
- ◆ Part 5: Plumbing Code
- ◆ **Part 6: ENERGY CODE**
- ◆ Part 8: Historic Building
- ◆ Part 9: Fire Code
- ◆ Part 10: Existing Buildings
- ◆ Part 11: Environmental Code



Which Code Year Applies? Permit pulled...

Jan. 2017- Dec. 2019


Jan. 2020- Dec. 2022

2016

BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS

FOR THE 2016 BUILDING ENERGY EFFICIENCY STANDARDS

TITLE 24, PART 6, AND ASSOCIATED ADMINISTRATIVE REGULATIONS IN PART 1.




JUNE 2015
CEC-400-2015-037-CMF
CALIFORNIA ENERGY COMMISSION
Edmund G. Brown Jr., Governor

2019

BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS

FOR THE 2019 BUILDING ENERGY EFFICIENCY STANDARDS

TITLE 24, PART 6, AND ASSOCIATED ADMINISTRATIVE REGULATIONS IN PART 1.



DECEMBER 2018
CEC-400-2018-020-CMF
CALIFORNIA ENERGY COMMISSION
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Helps you navigate the Standards using key word search capabilities, hyperlinked tables and related sections

2019 BUILDING ENERGY EFFICIENCY ...

2019 Building Energy Efficiency Standards - Reference Ace v11

Search...

Administrative Regulations, California Code ...

Efficiency Standards, California Code of Reg...

2019 Building Energy Efficiency Standards
Reference Ace Tool

ReadMe

2019
**BUILDING ENERGY EFFICIENCY
STANDARDS FOR RESIDENTIAL
AND NONRESIDENTIAL
BUILDINGS**

FOR THE 2019 BUILDING
ENERGY EFFICIENCY
STANDARDS

TITLE 24, PART 6, AND ASSOCIATED
ADMINISTRATIVE REGULATIONS
IN PART 1.

DECEMBER 2018
011-480-2018-000-000
CALIFORNIA ENERGY COMMISSION
Edmund G. Brown, Jr., Governor

Contents

Favorites





Compliance Forms



Appendix A

Prescriptive Certificate of Compliance Forms (NRCC)

✦ The new dynamic forms will be the only forms allowed for showing compliance to prescriptive method:

STATE OF CALIFORNIA
Outdoor Lighting
 NRCC-LTO-E (Created 9/17)

CALIFORNIA ENERGY COMMISSION
 NRCC-LTO-E

CERTIFICATE OF COMPLIANCE
This document is used to demonstrate compliance with requirements in §110.9, §130.0, §130.2, §140.7, and §141.0(b)2L for outdoor lighting scopes using the prescriptive path.

Project Name: _____ Report Page: Page 1 of 4
 Project Address: _____ Date Prepared: _____

A. GENERAL INFORMATION

01 Project Location (city) _____ 04 Total Illuminated Hardscape Area (ft²) _____
 02 Climate Zone _____
 03 Outdoor Lighting Zone per Title 24, Part 1 §10-114 or as designated by Authority Having Jurisdiction (AHJ):
 LZ-0: Very Low - Undeveloped Parkland LZ-2: Moderate - Rural Areas LZ-4: High - Must be reviewed by CA Energy Commission for Approval
 LZ-1: Low - Developed Parkland LZ-3: Moderately High - Urban Areas

B. PROJECT SCOPE

Table Instructions: Include any outdoor lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in §140.7 or §141.0(b)2L for alterations.
 My project consists of:
 01 _____ 02 _____
 New Lighting System Must Comply with Allowances from §140.7.
 Altered Lighting System Is your alteration increasing the connected lighting load (Watts)? Yes No
 FOOTNOTES: % of Existing Luminaires Being Altered = (Sum Total of Luminaires Being Added or Altered / Existing Luminaires within the Scope of the Permit Application) x 100

C. COMPLIANCE RESULTS

Table Instructions: If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance.

Calculation of Total Allowed Lighting Power (Watts) §140.7 or §141.0(b)2L						Compliance Results		
01	02	03	04	05	06	07	08	09
General Hardscape Allowance §140.7(d)1 (See Table I)	+ Per Application §140.7(d)2 (See Table J)	+ Sales Frontage §140.7(d)2 (See Table K)	+ Ornamental §140.7(d)2 (See Table L)	+ Per Specific Area §140.7(d)2 (See Table M)	OR Existing Power §141.0(b)2L (See Table N)	= Total Allowed (Watts)	≥ Total Actual (Watts) (See Table F)	07 Must be ≥ 08
	+	+	+	+	OR	=	≥	
Cutoff Compliance (See Table G for Details)						Not Applicable		
Controls Compliance (See Table H for Details)								

- ✦ NRCC-ENV-E
- ✦ NRCC-MCH-E
- ✦ NRCC-LTI-E
- ✦ NRCC-LTO-E
- ✦ NRCC-LTS-E
- ✦ NRCC-PLB-E
- ✦ NRCC-CXR-E
- ✦ NRCC-ELC-E
- ✦ NRCC-PRC-E
- ✦ NRCC-SRA-E

COST EFFECTIVE



Mandatory Measures



*Cannot be traded via the Performance Approach.
Not typically documented within Certificate of Compliance (CF1R)*

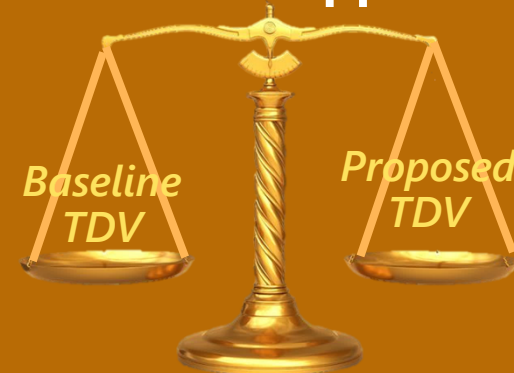
Two Ways to Comply with the Standards

Prescriptive Approach



Each building feature to show compliance independently

Performance Approach



Proposed TDV equal or better than baseline TDV

Compliance Documentation



Occupancy Groups Covered (2019)

Occupancy Group		Example(s)
A2-A5	Assembly	Theaters, churches, arenas, amusement parks
B	Businesses	Office buildings, banks, schools above 12 th grade
E	Educational facilities	K-12 schools
F1-F2	Low & moderate hazard facilities	Food processing, airports, dry cleaning, foundries
H1-H5	High hazard facilities	Detonation, accelerated burning, health hazards
I1-I2	Healthcare facilities * NEW	Convalescent homes, board and care (24 hour), hospitals
M	Mercantile	Grocery store, department store
R1-R4	Residential	Hotels/motels, apartments, homes, assisted living (between 6-16 residents)
S1-S2	Storage, low & moderate hazard	Home goods, tires, food products, parking garages
U	Utility	Agricultural, barns, greenhouses, carports

Institutional Facilities added (Occupancy I-1 & I-2)



I-1 Covers

★ Definitions

I-2 Covers

★ Buildings and structures used for medical care on a 24-hour basis for more than five persons who are incapable of self-preservation or classified as nonambulatory or bedridden.

★ Important exemptions are listed in many sections of the code



Healthcare Facilities (cont)



I-3 Exempt

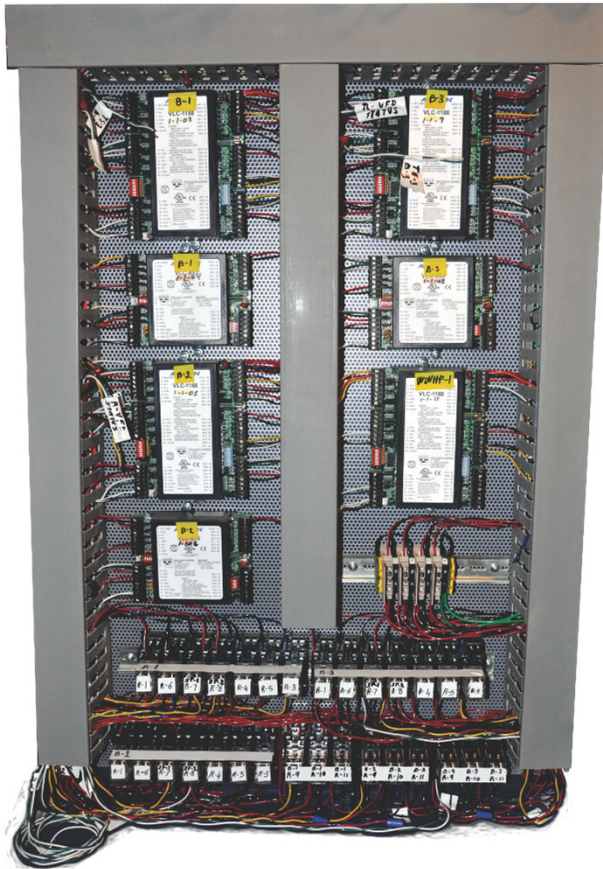
- ✦ Prisons
- ✦ Jails Reformatories
- ✦ Detention Centers
- ✦ Correctional Centers
- ✦ Prerelease centers

I-4 Exempt

- ✦ Daycare facilities



Demand Management



- ✦ New code section that consolidates all Demand Response items
 - ✦ References OpenADR 2.0 protocols (*new*)
 - ✦ HVAC controls
 - ✦ Lighting controls
 - ✦ Electric message centers



Let's Talk



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Challenges



- ✦ Challenge A:
 - ✦ Envelope



- ✦ Challenge B:
 - ✦ Mechanical



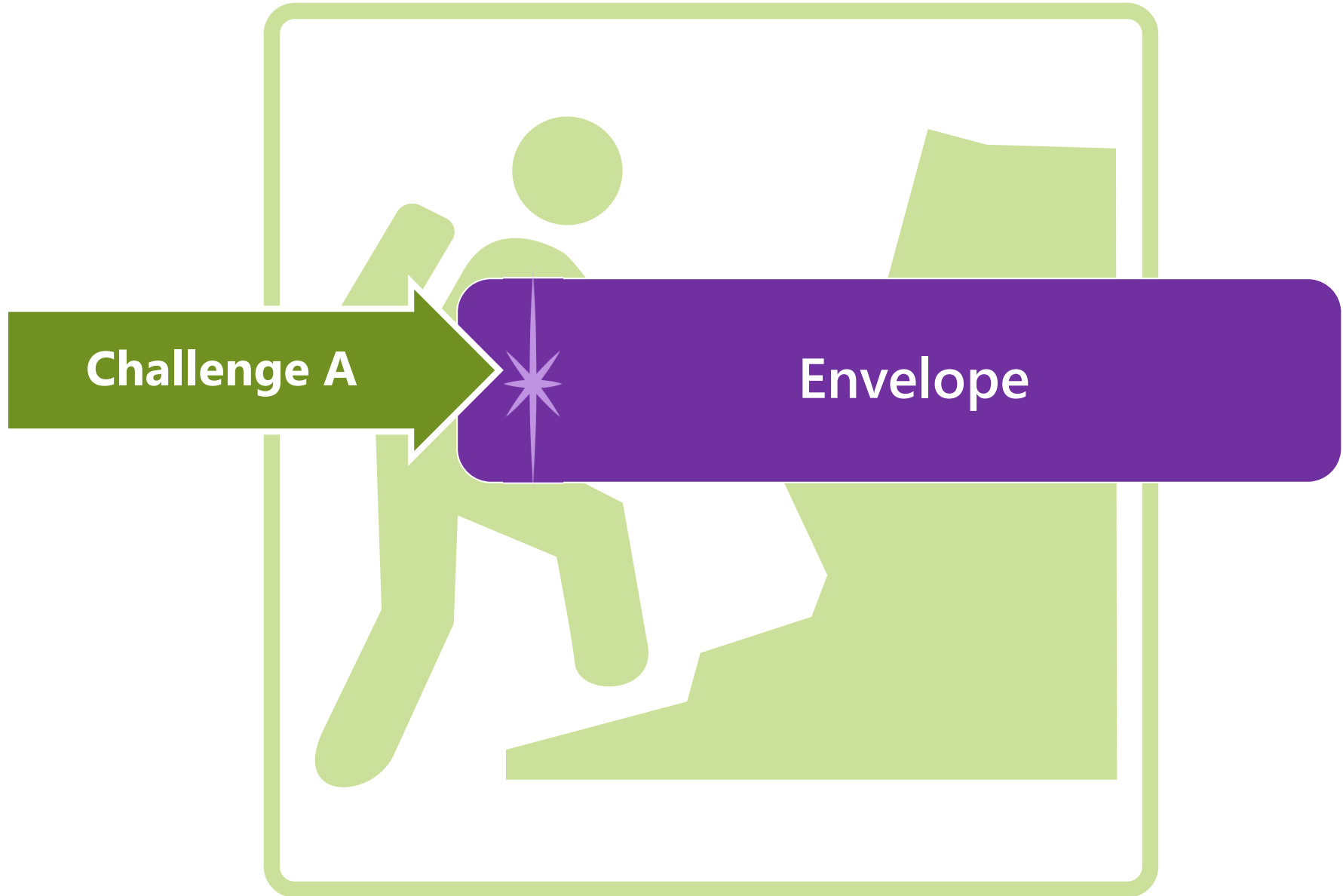
- ✦ Challenge C:
 - ✦ Lighting/Electrical



- ✦ Challenge D:
 - ✦ Covered Process






Challenge A








Fenestration

§ 110.6(a)  
§ 140.3(a) 

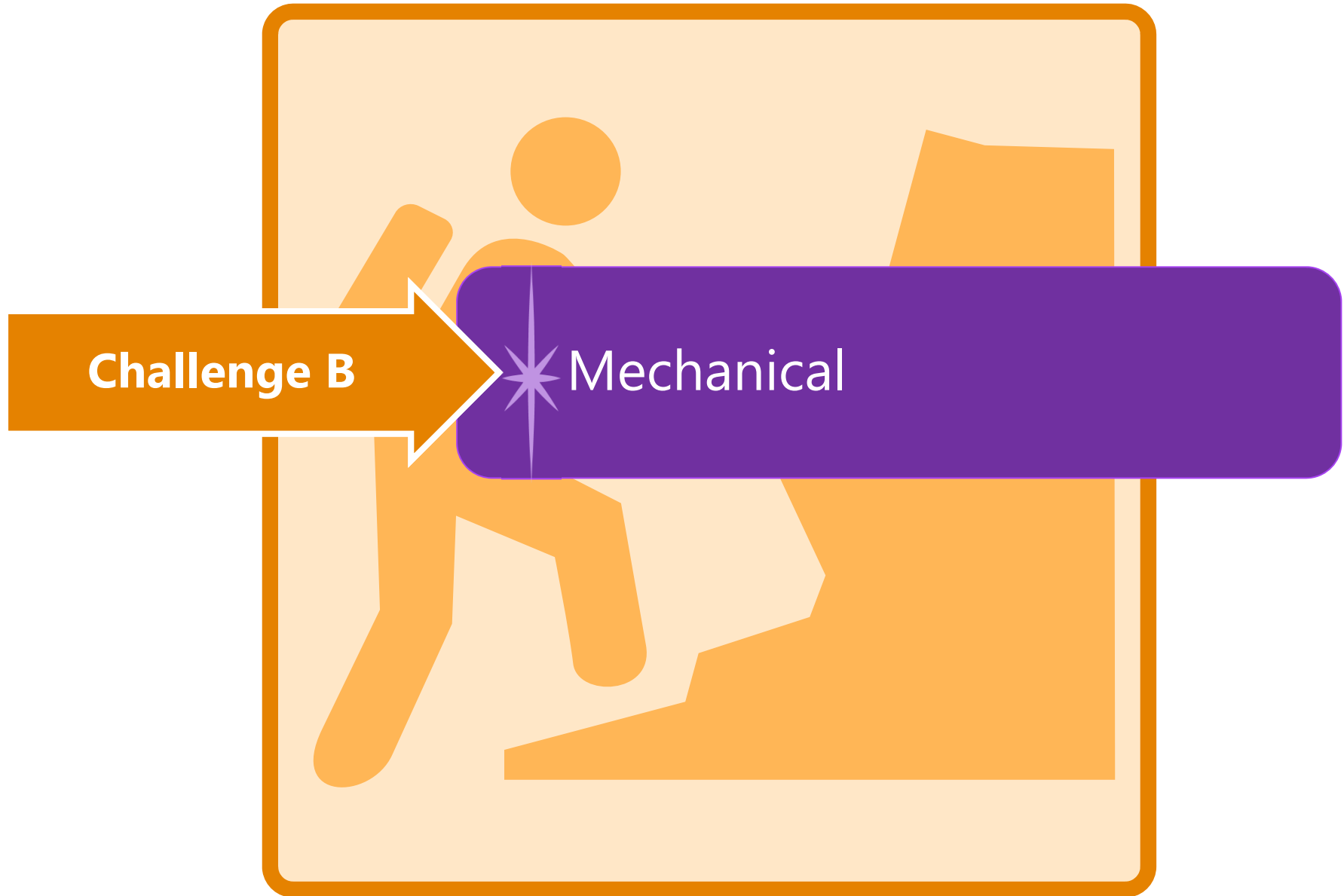
Minimal Changes



-  Center of Glass formula (NA6) allowance now 200 ft² (*was 1,000 ft²*)
-  Windows in “demising walls” only has to meet the U-factor requirements of the applicable climate zone (Table 140.3) (*this was not clear before*)
-  Tubular skylights now have their own prescriptive requirements: (*new*)
 - ✧ U-factor = 0.88
 - ✧ SHGC = N/A
 - ✧ VT = 0.38



Challenge B





HVAC Efficiencies



Single Package Vertical

- ★ SPVAC & SPVHP (Table 110.2-E)
 - ✧ **11 EER** (*was 10 EER*)

Variable Refrigerant Flow (VRF)

- ★ AC's Air Cooled (Table 110.2-H)
 - ✧ $\geq 65,000 - < 135,000$: **15.5 IEER** (*was 13.1 IEER*)
 - ✧ $\geq 135,000 - < 240,000$: **14.9 IEER** (*was 12.9 IEER*)
 - ✧ $\geq 240,000$: **13.9 IEER** (*was 11.6 IEER*)
- ★ Air-to-Air/Applied Heat pumps (Table 110.2-I)
 - ✧ Air Cooled (Table 110.2-I)
 - $\geq 65,000 - < 135,000$: **14.6 IEER** (*was 12.9 IEER*)
 - $\geq 135,000 - < 240,000$: **13.9 IEER** (*was 12.3 IEER*)
 - $\geq 240,000$: **12.7 IEER** (*was 11.0 IEER*)
 - ✧ Water Source (Table 110.2-I)
 - $\geq 65,000 - < 135,000$: **15.8 IEER** (*new*)
 - $\geq 135,000 - < 240,000$: **13.8 IEER** (*new*)
 - $\geq 240,000$: **12.0 IEER** (*new*)



Cooling Towers



Propeller or Axial Fan Closed-Circuit Cooling Towers (Table 110.2-G)

✧ ≥ 16.1 gpm/hp (*was* ≥ 14.0)



Axial Fan Open-Circuit serving condenser water loops for chilled water plants ≥ 900 gpm.

✧ Rated efficiency ≥ 60 gpm/hp *new* (mandatory min. ≥ 42.1 gpm/hp)

- Exceptions include
 - Replacement cooling towers
 - Projects in CZ 1 and 16



Fault Detection & Diagnostics (FDD)



§ 120.2(i)



- ✦ FDD required to ALL systems when:
 - ✧ Cooling is $> 54,000$ Btuh (*Used to be just DX air cooled packaged systems*)
- ✦ FDD controller to:
 - ✧ Detect free cooling available
 - ✧ Detect economizer enabled
 - ✧ Detect compressor enabled (DX systems)
 - ✧ Detect heating enabled
 - ✧ Determine mixed air low limit cycle
- ✦ Exceptions for HVAC alterations



Fan Systems



Total Nameplate Horsepower

- ✦ For space conditioning fan systems (all fans in the HVAC system combined) greater than 5 hp (*was 25 hp*)
- ✦ Fan power limitation (at design conditions) not to exceed system power using either option 1 or 2 below

Fans w/nameplate >5 hp		Constant Volume	Variable Volume
Option 1	Nameplate hp	hp < cfm X 0.0011	hp < cfm X 0.0015
Option 2	Brake hp	bhp < cfm X 0.00094 + A	bhp < cfm X 0.0013 + A
Hp: horsepower		A = sum of pressure drop adjustments per Table 140.4-B	
<i>(was 25 hp)</i>		<i>(was 0.8 w/cfm)</i>	<i>(was 1.25 w/cfm)</i>

Example:

10,000 cfm CV fan would be allowed:

- #1: 11 hp motor (*was: 11 hp*)
- #2: 9.4 bhp (*new*)

10,000 cfm VAV fan would be allowed:

- #1: 15 hp motor (*was: 17 hp*)
- #2: 13 bhp (*new*)



NR & Hotel/Motel & Multifamily Air Filtration



§120.1(c)1



Nonresidential & Hotel/Motel occupancies require **Mandatory**:

- ✦ **Minimum MERV 13** filtration for outdoor air supply
- ✦ **Minimum 2" Filter**
(larger face area formula will allow for 1")



NR & Hotel/Motel Natural Ventilation



§120.1(c)2

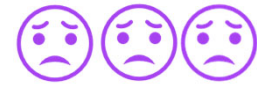


- ✦ *Mechanical ventilation* also required for spaces being served by space conditioning system **unless**:
 - ✧ Openings are permanently open, or
 - ✧ Using controls to prevent closure of openings when space expected to be occupied.

- ✦ New requirements on size and location of openings. (*Following requirements as outlined in ASHRAE 62.1*)
 - ✧ **Example:** Size of opening with no coverings or louvers:
 - Exterior room (direct access to outside) 4% of net occupied floor area
 - Interior room (access through adjoining room) 8% of area, or be less than 25 ft²



NR & Hotel/Motel Ventilation Rates



§120.1



- ★ Nonresidential and Hotel/Motel occupancies *will be the larger of*:
 - ✧ CFM/ft² from the expanded **Table 120.1-A**, or
 - ✧ The actual number of occupants
- ★ Number of occupancy categories has **increased dramatically** between Energy Code cycles:
 - **2016:** 11
 - **2019:** 75
- ★ Air Class now defines how air can be recirculated or transferred between spaces.



Space type exceptions expanded, such as:

- ★ Daycare Sickrooms
- ★ Science Labs
- ★ Barber Shops
- ★ Beauty and nail salons

Demand Control Ventilation

- ★ Typically a CO₂ sensor, will be required when:
 - ✧ A high-density spaces (40 ft²/person or less) **AND**
 - System has an outside air economizer **or**
 - Modulating outside air control (*new*) **or**
 - System has Outside Air >3,000 cfm. (*new*)
- ★ Many exceptions removed such as:
 - ✧ Classrooms (*they now must provide if triggered*)
 - ✧ Occupancy sensor ventilation control was required (*now you might need both demand and occupancy sensor control*).



Occupancy Sensor

- ✦ Required for the same spaces in which lighting occupancy sensor controls are required (§130.1(c)5) *(no change)*
 - ✧ Offices 250 ft² or smaller,
 - ✧ Multipurpose rooms of less than 1,000 ft²
 - ✧ Classrooms of any size,
 - ✧ Conference rooms of any size, and
 - ✧ Restrooms of any size *(new)*.
- ✦ If the ventilation Table 120.1-A does not allow for the ventilation to go to ZERO, then the room type is exempt *(new)*
- ✦ Thermostat settings to be reset to “standby mode” when space vacant more than 5 minutes *(new)*.
- ✦ The exception to use demand control ventilation controls instead in these spaces, *has been removed*.

Ventilation Table 120.1-A

§120.1



Table 120.1-A – Minimum Ventilation Rates — p. 1 of 6

Occupancy Category	Area Outdoor Air Rate ¹ Ra cfm/ft ²	Min Air Rate for DCV ² cfm/ft ²	Air Class	Notes
Educational Facilities				
Daycare (through age 4)	0.2	0.1		
Daycare sickroom	0.1			
Classrooms (ages 5-8)	0.3	0.15	1	
Classrooms (age 9 -18)	0.3	0.15	1	
Lecture/postsecondary classroom	0.3	0.15	1	F
Lecture hall (fixed seats)	-	0.15	1	F
Art classroom	0.15		2	
Science laboratories	0.15		2	
University/college laboratories	0.15		2	
Wood/metal shop	0.15		2	
Computer lab	0.15		1	
Media center	0.15		1	A
Music/theater/dance	1.07	0.15	1	F
Multiuse assembly	0.50			F
Food and Beverage Service				
Restaurant dining rooms	0.50			
Cafeteria/fast-food dining	0.50			
Bars, cocktail lounges	0.50			
Kitchen (cooking)	0.15		2	

Air rates have not changed

Occupancy Categories revised and increased

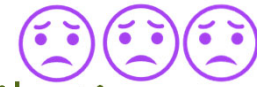
Min. air rates when Demand Control Ventilation required or provided

Transfer/recirc. allowances

Note F Occupancy Sensor allowed to turn off ventilation when not occupied



NR & Hotel/Motel Exhaust Ventilation



§120.1



§140.4(o)



Exhaust Ventilation

NEW

- ✧ Min. required per **Table 120.1-B**
- ✧ Exhaust makeup air can use combination of
 - Outdoor air **AND/OR**
 - Recirculated air **AND/OR**
 - Transfer air



Exhaust Transfer Air

NEW

- ✧ Supply air shall **not exceed** greater of:
 - Supply flow required to meet heating or cooling load **OR**
 - Required ventilation rate **OR**
 - Mechanical exhaust flow minus available transfer air (Transfer air allowed to be used has requirements)
- ✧ Also applies to Lab and Factory systems

Ventilation Table 120.1-B

§120.1



Table 120.1-B – Minimum Exhaust Rates [ASHRAE 62.1: TABLE 6.5] — p. 1 of 2

Occupancy Category	Exhaust Rate, cfm/unit	Exhaust Rate, cfm/ft ²	Air Class	Notes	
Arenas	-	Transfer/recirc. allowances	1	Guidance on specifics for that occupancy	
Art classrooms	-		2		
Auto repair rooms	-	1.5	2		
Barber shops	-	0.50	2		
Beauty and nail salons	-	0.60	2		
Cells with toilet	-	1.00	2		
Copy, printing rooms	-	0.50	2		
Darkrooms	-	1.00	2		
Educational science laboratories	-	1.00	2		
Janitor closets, trash rooms, recycling	-	1.00	3		
Kitchenettes	-	0.30	2		
Kitchens – commercial	-	0.70	2		
Locker rooms for athletic or industrial facilities	-	0.50	2		
All other locker rooms	-	0.25	2		
Shower rooms	20/50	-	2		G,H
Paint spray booths	-	-	4		F
Parking garages	-	0.75	2	C	
Pet shops (animal areas)	-	0.90	2		

New occupancy requirements



Hotel/Motel & Multifamily Drain Water Heat Recovery



§ 150.1(c)8B



✦ Solar savings fraction (SSF) can be reduced by 5% if HERS verified drain water heat recovery system used:

✧ CZ 1-9: 20% SSF

■ **Reduced to 15% SSF**

✧ CZ 10-16: 35% SSF

■ **Reduced to 30% SSF**

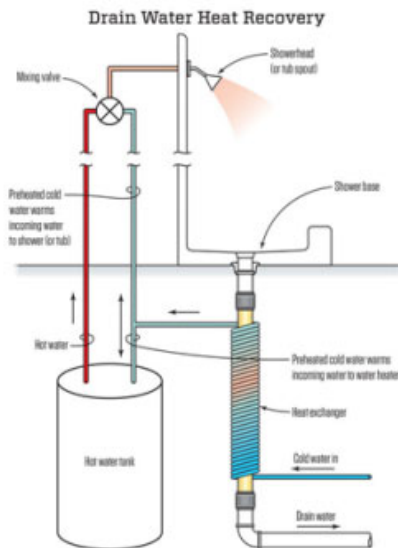


Figure 1: DWHR in equal flow configuration

Source: Journal of Light Construction, September 2016

✦ Min. rated effectiveness = $\geq 42\%$

✦ Recover heat from 50% of the showers located above the first floor and:

✧ Must at least transfer that heat either back to all the respective showers, or the water heater.



Multifamily Specific



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Multifamily Ventilation

NEW

§120.1(b)1B



2019 Energy Code allows these **three methods** for providing mechanical ventilation for high-rise residential attached dwellings using individual systems for each unit

Exhaust Only Ventilation (Continuous)

- ✦ Creates infiltration due to negative pressure in home
- ✦ Could potentially pull in air from other dwellings as well as other air contaminants

Not great

Supply Only Ventilation (Continuous)

- ✦ Creates exfiltration due to positive pressure in home
- ✦ In contrast to exhaust only, at least incoming air is filtered

Better

Balanced System Ventilation

- ✦ Creates neither positive nor negative pressure (no infiltration)
- ✦ Separate, balanced fans exhaust indoor air and bring in outdoor air in equal amounts

Best



Multifamily Ventilation *NEW



§120.1(b)2



Ventilation Rate

$$Q_{\text{tot}} = 0.03A_{\text{floor}} + 7.5(N_{\text{br}} + 1)$$

Q_{tot} = total required ventilation rate, cfm

A_{floor} = dwelling-unit floor area, ft²

N_{br} = number of bedrooms (not to be less than 1)

Exhaust Only and Supply Only Ventilation methods will require HERS blower door test

HERS verified blower door test requires:

- ★ No more than 0.3 cubic ft per minute at 50 Pa (0.2" water) per ft² leakage based on dwelling unit's envelope surface area
- ★ Ventilation rates based on **Equation 120.1-B** (ASHRAE 62.2)
- ★ Dwelling unit mechanical ventilation field verification & diagnostic testing in accordance with Reference NR Appendix **NA7.18.1**

Not permitted as a ventilation source:

- ★ Operable windows
- ★ Continuous operation of the forced air system



Multifamily HERS: Range Hoods



§120.1(b)2B



High-rise Res Range Hoods Require (in order):

NEW

1) **Acceptance Testing Verification (NRCA)**

- ✦ Does NOT have to be performed by ATT
- ✦ Can be done by installing contractor confirming range hood HVI certified as meeting ASHRAE 62.2 airflow (100 CFM for most kitchens) and sound rating (3 sones or less) reqs

2) **HERS inspection in the field (NRCV)**

- ✦ Acceptance Testing Verification required **before** HERS inspection (see above) to confirm range hood HVI certification

3) **Form Registration**

- ✦ **NRCC** – No HERS registration required
- ✦ **NRCA** – No HERS registration required
- ✦ **NRCV** – **Must be registered** with NR HERS Provider:
 - ✦ NRCV-MCH-32-H



Challenge C

Challenge C

 **Lighting/Electrical**



Clean up

- ★ Control functionality clarified and expanded for:
 - ✧ Time switch controls
 - ✧ Daylighting controls
 - ✧ Dimmers
 - ✧ Occupancy sensing controls and for the sensor used in these controls
 - ✧ Part-Night controls
 - ✧ Indicator lights





Indoor Lighting



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Luminaire Wattage

§130.0(c)2  





Rated Wattage

- ✦ Line voltage medium screw-based socket recessed luminaires shall be the larger of:
 - ✧ 50 watts **OR**
 - ✧ Rated JA8 lamp wattage installed *(new)*
- ✦ SSL (LED) that are inseparable, or with remote drivers, to use max. rated of SSL luminaire *(new)*
- ✦ LED tape and linear lighting *(new)*:
 - ✧ Sum of installed length times rated W/ft **OR**
 - ✧ Max. rated input of driver/power supply



Track Lighting

§130.0(c)6  



PoE (power over ethernet) lighting can subtract non-lighting devices from maximum total power rating (*new*)

Rated Wattage

- A. No Current Limiter** being used, then greater of:
- ❖ 30 W/ft of track or plug-in busway (*was 45 W/ft*)
 - ❖ Max. rated wattage of luminaires shown on plans
- B. With a Current Limiter** (*12.5 W/ft removed*) or Overcurrent Protection Panel:
- ❖ Volt-ampere rating of current limiter **OR**
 - ❖ Ampere rating of all current protection devices combined times branch circuit voltage
- C. Other** modular systems powered by driver, power supply or transformer (i.e. low-voltage lighting)
- ❖ Maximum wattage of driver, power supply or transformer (*new*)



Controls

§130.1



Photo: WattStopper

- ✦ **Manual area controls:** *New* language related to Healthcare for switching location
- ✦ **Multi-level controls:** *Removed* classroom exception but adds a *new* exception for bathrooms and Healthcare
- ✦ **Shut-off controls:** *New* occupant sensors requirement to restrooms and *new* exceptions for Healthcare
- ✦ **Automatic daylighting controls:**
 - ✦ *New* specifications regarding stable level of light and requirements that at least one sensor in daylit zone not be readily accessible to public
 - ✦ *New* exceptions regarding spaces blocked from direct sunlight (skylights and vertical fenestration)
 - ✦ *New* exception for retail sidelit zones
- ✦ **Control Interactions:** *New* language to determine programming of control protocol






New Power Adjustment Factors

§140.6-A



Excerpt from 2019 Table 140.6-A: Lighting Power Adjustment Factors (PAF)

	<p>5. Clerestories</p> <ul style="list-style-type: none"> <input type="checkbox"/> Luminaires in daylit areas adjacent to clerestories (<i>vertical fenestration above 8 ft from finished floor</i>). <input type="checkbox"/> Luminaires that qualify for daylight dimming plus OFF control may also qualify for this PAF. 	<p>5%</p>
 <p>Figure 5: Fixed slats Source: Airolite</p>	<p>6. Horizontal Slats</p> <ul style="list-style-type: none"> <input type="checkbox"/> Luminaires in daylit areas adjacent to vertical fenestration with interior or exterior horizontal slats. <input type="checkbox"/> Luminaires that qualify for daylight dimming plus OFF control may also qualify for this PAF. 	<p>5%</p>
 <p>Figure 9: LightLouver profile and field installation Source: LightLouver, Sacramento Municipal Utility District</p>	<p>7. Light Shelves</p> <ul style="list-style-type: none"> <input type="checkbox"/> Luminaires in daylit areas adjacent to clerestories with interior or exterior light shelves. This PAF may be combined with the PAF for clerestories. <input type="checkbox"/> Luminaires that qualify for daylight dimming plus OFF control may also qualify for this PAF 	<p>10%</p>



Complete Building Method



§140.6(c)1



Table 140.6-B Complete Building Method Lighting Power Density Values

Complete Building Type <i>Mixed Occupancy: 90% or more of CFA</i> <i>Not mixed use: 100% of CFA</i> <i>Parking Garage: Can always be used (if applicable)</i>	Allowed Lighting Power Density (watts per square foot)		% Reduction from 2016
	2016	2019	
Auditorium Assembly Building	1.4	0.70	50%
Classroom Building	1.1	Eliminated	---
Commercial and Industrial Storage Building	0.6	Eliminated	---
Convention Center Building	1.0	Eliminated	---
Financial Institution Building	1.1	0.65	35%
General Commercial/ Building/Industrial/ Work Building	0.6	Eliminated	---
Industrial/Manufacturing Facility Building	1.0	0.60	40%
Grocery Store Building	1.5	0.95	37%
Gymnasium Building (New)	---	0.65	---
Library Building	1.2	0.70	42%
Healthcare Facility (New)	---	0.90	---
Medical Building/Clinic Building	0.6	---	---
Office Building	0.8	0.65	19%
Parking Garage Building	0.2	0.13	35%
Religious Facility Building	1.5	0.70	53%
Restaurant Building	1.1	0.70	29%
Retail Store Building (New)	---	0.90	---
School Building	0.95	0.65	32%
Sports Arena Building (New)	---	0.75	---
Theater Building	1.3	Eliminated	---
Motion Picture Theater Building (New)	---	0.70	---
Performing Arts Theater Building	1.3	0.80	38%
All other buildings	0.5	0.40	20%

Reduced ~36%
Moving Toward Alignment
with ASHRAE 90.1

Table courtesy of David L. Morgan



Area Category Lighting Allowances

§140.6(c)2



Table 140.6-C Area Category Method — Lighting Power Density Values (Watts/Ft²) — p. 1 of 3

Primary Function Area	Allowed LPD (W/ft ²)		% Reduction	Additional Lighting Power ¹			% Reduction	
	2016	2019		Qualified Lighting System	Additional Allowance (W/ft ²)			
					2016	2019		
Auditorium Area	1.40	0.70	50%	Ornamental	0.50	0.30	40%	
				Accent, display and feature ³	---	0.20	-	
Auto Repair / Maintenance Area	0.90	0.55	39%	Detailed Task Work ⁷	0.50	0.20	60%	
Audience Seating Area (New)	---	0.60	-	Ornamental	---	0.30	-	
Beauty Salon Area	1.70	0.80	53%	Detailed Task Work ⁷	---	0.20	-	
				Ornamental	---	0.30	-	
Civic Meeting Place Area	1.30	1.00	23%	Ornamental	0.50	0.30	40%	
Classroom, Lecture, Training, Vocational Areas	1.20	0.70	33%	Whiteboard or Chart Board ¹	5.5 w/ft ²	1.5 w/ft ²	18%	
Commercial / Industrial Warehouse	0.60	0.45	25%	---	---	---	-	
Storage (Modified) Shipping & Handling	---	0.60	-	---	---	---	-	
Commercial and Industrial Storage Areas (Refrigerated)	0.70	---	-	---	---	---	-	
Convention, Conference, Multipurpose and Meeting Area	1.20	0.85	29%	Ornamental	0.50	0.30	40%	
Copy Room (Separate Category)	---	0.50	-	---	---	---	-	
Corridor Area (Separate Category)	0.60	0.60	0%	---	---	---	-	
Dining Area	Bar/Lounge and Fine Dining	1.00	0.55	45%	Ornamental	0.50	0.30	40%
	Cafeteria / Fast Food	1.00	0.40	60%				
	Family and Leisure	1.00	0.50	50%				
Electrical, Mechanical, Telephone Rooms	0.75	0.40	28%	Detailed Task Work ⁷	0.50	0.20	60%	
Exercise / Fitness Center and Gymnasium Areas	1.00	0.50	50%	---	---	---	-	
Hotel Function Area (New)	---	0.85	-	Ornamental	---	0.30	-	
Museum	Exhibition / Display	1.8	0.60	33%	Accent, display and feature ³	---	0.50	-
	Restoration Room (New)	---	0.75	-	Detailed Task Work ⁷	---	0.20	-
Financial Transaction Area	1.00	0.70	30%	Ornamental	0.50	0.30	40%	
General / Commercial and Industrial Work Areas	Low Bay	0.90	0.60	33%	Detailed Task Work ⁷	0.50	0.20	60%
	High Bay	1.0	0.65	35%	Detailed Task Work ⁷	0.50	0.20	60%
	Precision	1.00	0.85	15%	Precision Specialized Work ⁹	1.00	0.70	30%
Library	Reading Area	1.10	0.80	27%	Ornamental	0.50	0.30	40%
	Stacks Area	1.50	1.0	27%	Ornamental	0.50	---	100%
Main Entry Lobby (Modified)	0.95	0.85	11%	Ornamental	0.50	0.30	40%	
Locker Room	0.70	0.45	36%	---	---	---	-	
Lounge, Breakroom or Waiting Areas (Modified)	0.90	0.65	28%	Ornamental	0.50	0.30	40%	
Malls Concourse and Atria Area (Modified)	0.95	0.90	5%	Ornamental	0.50	0.30	40%	
Medical and Clinical Care Area	4.2	---	-	---	---	---	-	
Office Area	> 250 square feet	0.75	0.65	13%	Portable Lighting for office areas ⁶	---	0.20	-
	≤ 250 square feet	1.00	0.70	30%				
	Open plan office (New)	---	0.60	20%				

Reduced ~ 30%
Moving toward Alignment with ASHRAE 90.1



Tailored Lighting Allowances

§140.6(c)3



Changes To Tailored Lighting

- ★ Clarification of what is to be used for “general” lighting versus “additional” lighting power allowances
- ★ Mounting height adjustment application revised
- ★ Display case lighting broken out by:
 - ✧ Installed/directly adjacent to wall = wall display
 - ✧ All other = floor display
- ★ Allowance tables (**Tables 140.6-D/E/G**) have reduced allowance and category cleanup similar to Complete Building and Area Category



Lighting Alterations



§141.0(b)2I



2016 Compliance Options



- 1) Reduced Rated Wattage Method (>70 luminaires per floor/tenant)
 - **50% office/hotel/retail**
 - **35% all others**
- 2) Use **≤85% LPD** (space with >3 luminaires) of the Area Category Method allowance
- 3) Use **>85% LPD** (space with >3 luminaires) of the Area Category Method allowance
- 4) Tailored and Complete Building methods are also available

2019 Compliance Options


- 1) **One-for-One Alteration** Method (>50 luminaires per floor/tenant):
 - **40% Wattage Reduction**
 - **All space types ≤5,000 ft²**
- 2) Use **≤80% LPD** (space with >2 luminaires; **≥10% luminaires in space altered**) of the Area Category Method allowance
- 3) Use **>80% LPD** (space with >2 luminaires; **≥10% luminaires in space altered**) of the Area Category Method allowance
- 4) Tailored and Complete Building methods are also available

Lighting Alteration



§141.0(b)2I



 Mandatory Controls <i>Reqs Based on Lighting Alteration Compliance Method Used</i>		Entire Luminaire Alteration Method		One-for-One Component Method	
		Using > 80% of allowed LPD	Using ≤ 80% of allowed LPD	Total Wattage Reduced ≥ 40% (limited to 5,000 ft ²)	
Acceptance testing requirements of §130.4 are not required for Alterations where lighting controls are added/altere to control ≤ 20 luminaires for the entire permitted project (both indoor, outdoor and sign lighting)					
Manual Area Controls (on/off): §130.1(a)1,2,3 For each enclosed space <ul style="list-style-type: none"> Excluding >0.2 W/ft² egress lighting 		Yes	Yes	Yes	
		Separate switching for "general" versus "other" only required for new or complete replacement circuits			
Multi-level Control: §130.1(b) <ul style="list-style-type: none"> Enclosed spaces ≥ 100 ft² and Connected lighting load >0.5 W/ft² Excluding restrooms Excluding healthcare facilities 		Yes <i>Only for modified luminaires</i>	No	No	
Auto Shut-Off Control: §130.1(c)1-8 Excluding Healthcare Facilities	Whole Bldg. Shut-Off (i.e. time clock/time-switch control or occupancy sensors in each space): §130.1(c)1-4	Yes	Yes	Yes	
			Separate switching for "general" versus "other" only required for new or complete replacement circuits		
	Partial-ON, Vacancy or Occupancy Sensor: §130.1(c)5	Yes	Yes	Yes	
			In offices ≤ 250 ft ² , multipurpose rooms < 1,000 ft ² , and classrooms/conference rooms/restrooms of any size		
	Partial-OFF: §130.1(c)6-7 §130.1(c)6A: Warehouse aisle/stacks §130.1(c)6B: Library book stacks §130.1(c)6C and 7A: Stairs and corridors §130.1(c)7B: Parking garages	Yes	Yes	Yes	
	Hotel/motel room auto shut-off: §130.1(c)8	Yes	Yes	Yes	
Primary Daylight Control: §130.1(d) <ul style="list-style-type: none"> Triggered by ≥ 120 Watts in primary/skylit zone(s) (parking garage ≥ 60 Watts) OR ≥ 24 ft² fenestration (parking garage ≥ 36 ft²) Excluding areas shaded per exception 1 and 2 Excluding retail merchandise sales/wholesale showroom sidelit zones 		Yes	No	No	
Demand Response: §110.12(c) <ul style="list-style-type: none"> Permitted area > 10,000 ft² Excluding spaces ≤ 0.5 W/ft² Excluding where health and safety do not permit reduced lighting 		Yes	No	No	



Outdoor Lighting



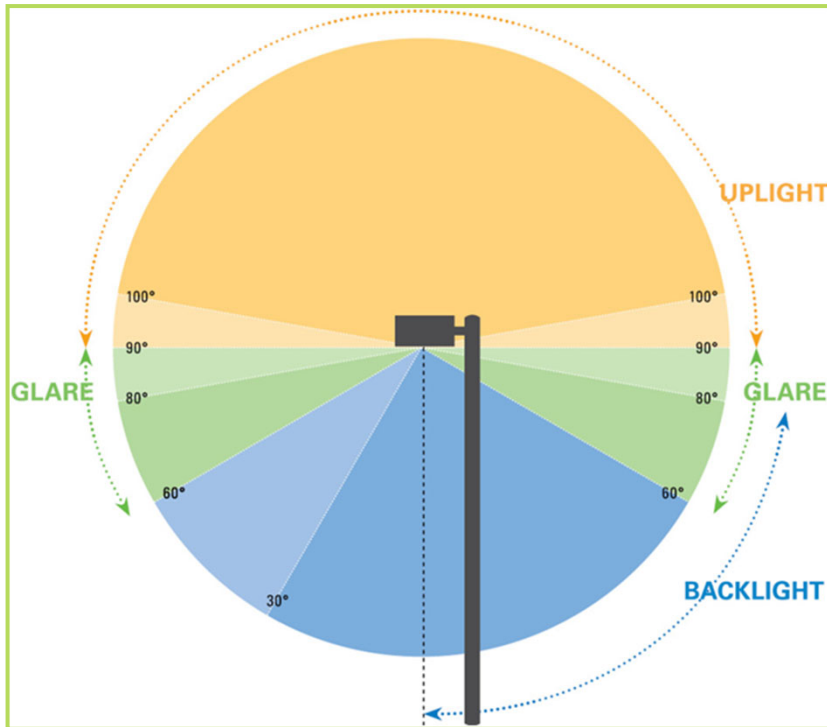
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Cut-Off Requirements



§130.2(b)



- ✦ Cutoff fixture requirement triggered at 6,200 lumens (*was 150 Watts*)
- ✦ Backlight, Uplight and Glare triggered per Title 24, Part 11 (CalGreen) table (*was split up between Part 6 and Part 11*)
 - ✦ Adds the Backlight component to the regulation (*previously in Part 11*)
- ✦ *New* exception for outdoor lighting attached to high-rise Multifamily or Hotel/Motel **if** controlled from within dwelling units



Auto Shut-off Controls



§130.2(c)2-3



Exceptions to motion sensor:

- ★ Luminaires 40 Watts or less
(*was pole = 75W, wall = 30W, linear = 4W/ft*)
- ★ Exempt lighting per §140.7(a)
- ★ Dimming can be above 50%, or turn down/off longer than 15 minutes, if health/safety take precedence. (*new*)
- ★ **Automatic Scheduling:** all lighting must be controlled to allow
 - ◇ At least 50% of lighting off at night (no more than 90% *new*) **AND**
 - ◇ At least two nighttime periods to be programmed (*new*)
- ★ **Motion Sensing:** all lighting within 24 ft above grade must be controlled to allow
 - ◇ At least 50% (*was 40%*) of lighting off at night (but no more than 90%) **AND**
 - ◇ Turn light off/reduce 15 minute or less timeout (*new*)
 - ◇ Single sensor limited to ≤ 1500 Watts of lighting
 - ◇ Including wall packs used for Building Façade, Ornamental Hardscape, or Outdoor Dining that have bilaterally symmetric distribution (up & down) (*new*)



New General Hardscape Allowances



§140.7(d)



Table 140.7-A: General Hardscape Lighting Power Allowance

Type of Power Allowance	Lighting Zone 0 ³		Lighting Zone 1 ³		Lighting Zone 2 ³				Lighting Zone 3 ³				Lighting Zone 4 ³	
	2016	2019	2016	2019	2016		2019		2016		2019		2016	2019
					Asphalt	Concrete ²	Asphalt	Concrete ²	Asphalt	Concrete ²	Asphalt	Concrete ²		
Area Wattage Allowance (AWA)	No allowance ¹		0.020 W/ft ²	0.018 W/ft²	0.030 W/ft ²	0.035 W/ft ²	0.023 W/ft²	0.025 W/ft²	0.030 W/ft ²	0.040 W/ft ²	0.025 W/ft²	0.030 W/ft²	0.050 W/ft ²	0.030 W/ft²
Linear Wattage Allowance (LWA)			0.15 W/lf	0.15 W/lf	0.25 W/lf	0.70 W/lf	0.17 W/lf	0.40 W/lf	0.35 W/lf	0.70 W/lf	0.25 W/lf	0.40 W/lf	0.45 W/lf	0.35 W/lf
Initial Wattage Allowance (IWA)			340 W	180 W	450 W		250 W		520 W		350 W		640 W	400 W

Reduced 35%

1. Continuous lighting is explicitly prohibited in Lighting Zone 0. A single luminaire of 15 Watts or less may be installed at an entrance to a parking area, trail head, fee payment kiosk, outhouse, or toilet facility, as required to provide safe navigation of the site infrastructure. Luminaires installed in Lighting Zone 0 shall meet the maximum zonal lumen limits as specified in §130.2(b).
2. Where greater than 50% of the paved surface of a parking lot is finished with concrete. This does not extend beyond the parking lot, and does not include any other General Hardscape areas.
3. Narrow band spectrum light sources with a dominant peak wavelength greater than 580 nm – as mandated by local, state, or federal agencies to minimize the impact on local, active professional astronomy or nocturnal habitat of specific local fauna, shall be allowed a 2.0 lighting power allowance multiplier. *(new)*



Specific Lighting Applications



§140.7(d)



Table 140.7-B: Additional Lighting Power Allowance for Specific Applications — p. 1 of 4

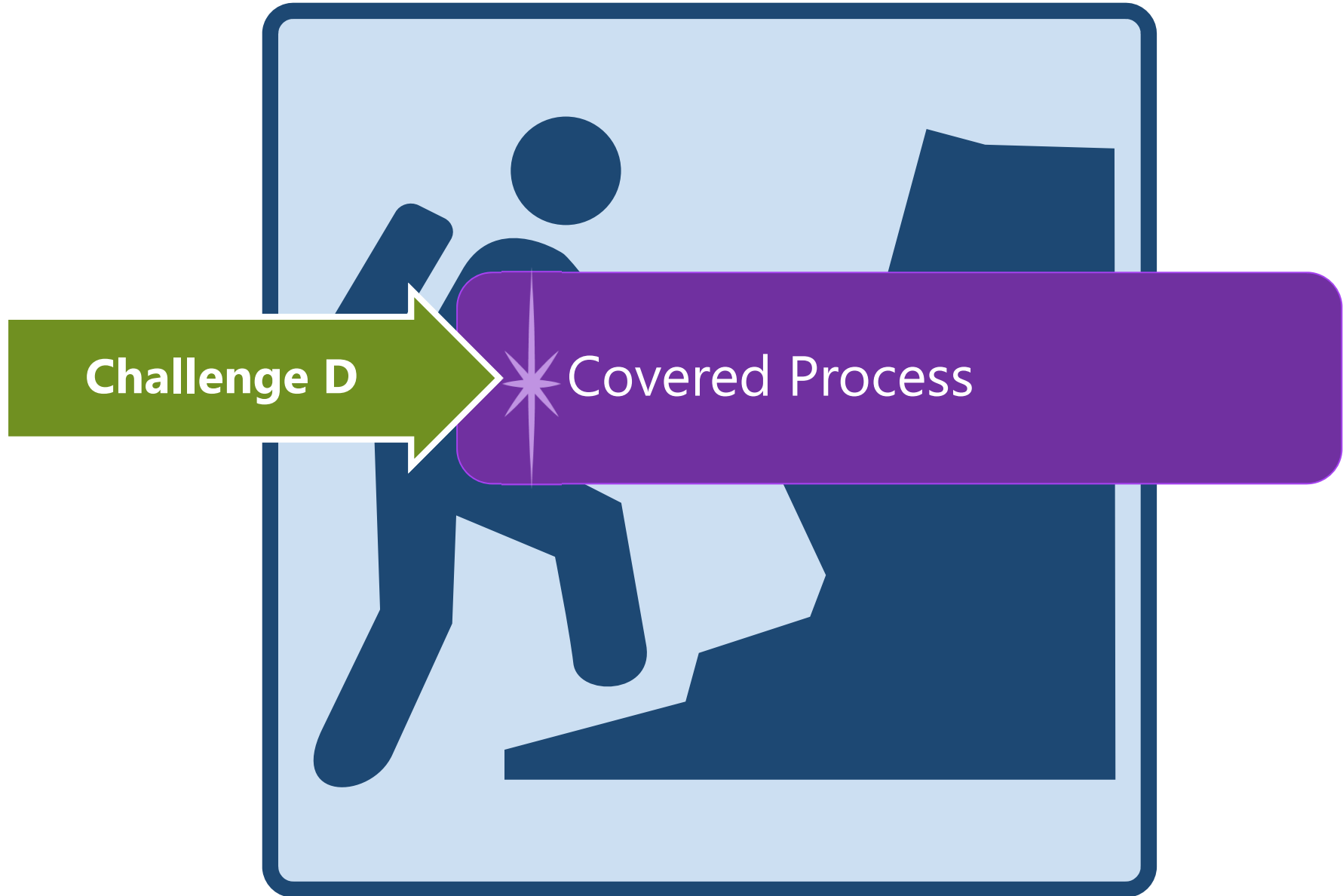
All area and distance measurements in plan view unless otherwise noted.

Lighting Application	Lighting Zone 0		Lighting Zone 1		Lighting Zone 2		Lighting Zone 3		Lighting Zone 4	
	2016	2019	2016	2019	2016	2019	2016	2019	2016	2019
WATTAGE ALLOWANCE PER APPLICATION. Use all that apply as appropriate.										
Building Entrances or Exits. Allowance per door. Luminaires qualifying for this allowance shall be within 20 feet of the door.			15 Watts	9 Watts	25 Watts	15 Watts	35 Watts	19 Watts	45 Watts	21 Watts
Primary Entrances to Senior Care Facilities, Police Stations, Healthcare Facilities, Fire Stations, and Emergency Vehicle Facilities. Allowance per primary entrance(s) only. Primary entrances shall provide access for the general public and shall not be used exclusively for staff or service personnel. This allowance shall be in addition to the building entrance or exit allowance above. Luminaires qualifying for this allowance shall be within 100 feet of the primary entrance.			45 Watts	20 Watts	80 Watts	40 Watts	120 Watts	57 Watts	130 Watts	60 Watts
Drive Up Windows. Allowance per customer service location. Luminaires qualifying for this allowance shall be within 2 mounting heights of the sill of the window.			40 Watts	16 Watts	75 Watts	30 Watts	125 Watts	50 Watts	200 Watts	75 Watts
Vehicle Service Station Uncovered Fuel Dispenser. Allowance per fueling dispenser. Luminaires qualifying for this allowance shall be within 2 mounting heights of the dispenser.			120 Watts	55 Watts	175 Watts	77 Watts	185 Watts	81 Watts	330 Watts	135 Watts
ATM Machine Lighting. Allowance per ATM machine. Luminaires qualifying for this allowance shall be within 50 feet of the dispenser.			[2016] 250 Watts for first ATM machine, 70 Watts for each additional ATM machine.							
			[2019] 100 Watts for first ATM machine, 35 Watts for each additional ATM machine.							

Reduced ~ 50%



Challenge D





Process Exhaust



§ 140.9(c)2-3



Laboratory and Factory Exhaust Systems (New)

- ✦ Exhaust system transfer air using conditioned supply air in a space must comply with 140.4(o)
- ✦ Fan power regulated on fans > 10,000 cfm by either:
 - A. Discharge per ANSI Z-5-2012 OR
 - B. Systems with filtration, scrubbers or air treatment = 0.85 w/cfm
 - All others = 0.65 w/cfm OR
 - C. Variable volume flow rate based upon wind speed and direction using anemometers OR
 - D. Variable volume flow rate based upon contaminant concentration
- ✦ Requires field verification of fan system via Acceptance Testing



Variable Volume Fume Hoods



§ 140.9(c)4



Automatic Sash Closures (New)

- ✦ Vertical sashes triggered per Table 140.9-B based upon ACH and hood density
 - ✧ Occupancy sensor based
 - ✧ Closes in 5 minutes after detecting no motion
 - ✧ Must have obstruction detecting capability
- ✦ Requires field verification of sash system via Acceptance Testing

Table 140.9-B Fume Hood Intensive Laboratories

Occupied Minimum Ventilation ACH	≤ 4	> 4 and ≤ 6	> 6 and ≤ 8	> 8 and ≤ 10	> 10 and ≤ 12	> 12 and ≤ 14
Hood Density (linear feet per 10,000 ft ³ of laboratory space)	≥ 6	≥ 8	≥ 10	≥ 12	≥ 14	≥ 16



Next Steps



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Compliance Software

2019 Performance Software




Nonresidential Buildings, 2019 Standards			
Program Name	Approved versions usable for permit	Contact Information	Additional Information
CBECC-Com	<p>CBECC-Com 2019.1.0 was approved 5/15/2019 for demonstrating performance compliance with the nonresidential provisions of the 2019 Building Energy Efficiency Standards. Download CBECC-Com 2019.1.0 (1079) setup (.exe file)</p> <p>All CBECC-Com 2019 resolutions can be found here.</p>	<p>California Energy Commission Building Standards Office 1516 9th Street, MS 37 Sacramento, CA 95814 ATTN: Larry Froess 916-854-4525 Larry.Froess@energy.ca.gov</p>	<p>Quick Start Guide</p> <p>User Manual</p> <p>See the CBCECC-Com Website for:</p> <ul style="list-style-type: none">» SketchUp and OpenStudio SketchUp Plugin» Prototype Models & Tutorials» FAQ/Training» Software Archive <p>Support: cbec.com@energy.ca.gov</p>

Software updated every 6 months, and October 2019 is the next time we may see an update, and maybe approval for Energy Pro.

2019 Overview of Nonresidential / High-Rise Multifamily / Hotel & Motel Occupancies

Application	Building Feature	Brief Description	Code §	 1	 2	 3	
Scope	Occupancy: I-1, I-2	Now subject to the Energy Code requirements, many exceptions apply to lighting and mechanical control requirements. Reviewed by OSHPD	100.0(a)	X	X	X	
	All	New prescriptive NRCC dynamic forms must be used	Appendix A		X		
Demand Response	All	Demand response controls to use Open ADR 2.0 or above protocols	110.12	X			
Envelope	Fenestration	NA6 center of glass formula limited to 200 ft ² or less	110.6(a)	X			
		Demising fenestration only required to meet U-factor requirements of Table 140.3	140.3(a)		X		
		Tubular skylights have their own allowances per Table 140.3	140.3(a)		X		
Mechanical	Efficiency	Increased efficiency requirements for VRF, Air-to-Air/Applies Heat Pumps, Single Package Vertical units, propeller/axial fan closed circuit cooling towers	110.2	X			
		Axial fan open-circuit cooling towers	140.4(h)		X		
	FDD	Required for all HVAC systems >54,000 Btuh (exceptions to alterations)	120.2(i)	X			
	Fan Systems	Requirements apply to fan systems >5 hp	140.4(c)		X		
	Air Filtration	MERV-13 2" filter (1" alternative option available)	120.1(b)1 & (c)1	X			
	Ventilation	Nonresidential/Hotel & Motel: Natural ventilation design and allowances have changed		120.1(c)2	X		
		Nonresidential/Hotel & Motel: Ventilation rate categories have changed; Required ventilation rate larger of CFM/ft ² or actual # of occupants; Air class recirculation/transfer requirements added; Exhaust ventilation requirements added		120.1(c)3	X		
		Multifamily specific: Natural ventilation not allowed for dwelling units; Revised airflow rate; Balanced ventilation method encouraged; Continuous supply/exhaust method will require HERS compartmentalized blower door verification; Kitchen hood HVI HERS verification		120.1(b)	X		
		Controls: Demand control ventilation (CO ₂) has new triggers and exceptions; Occupancy sensor triggers and design criteria has changed		120.1(d)5 & 120.2(e)3	X		

2019 Overview of Nonresidential / High-Rise Multifamily / Hotel & Motel Occupancies

Application	Building Feature	Brief Description	Code §	 1	 2	 3
Lighting	Title 20 Certification	Controls and track current limiters no longer subject to Title 20 certification requirements	110.9	X		
	Rated Wattage	Revised methods for determining input wattage for line voltage medium screw based socket recessed luminaires; Inseparable or remote driver SSL/LED luminaires; LED tape and linear luminaires; Track lighting; PoE lighting	130.0(c)2 & 130.0(c)6	X		
	Indoor Controls	Healthcare control location and type exceptions included; Restrooms have occupancy sensor (shut-off) requirements but new exception to multilevel controls; Retail sidelit and shaded spaces have new auto daylighting exceptions; Control interaction protocol provided	130.1	X		
		New Power Adjustment Factor (PAF) control options	140.6-A		X	
	Indoor Lighting Power Density (LPD)	Revised building/space/tailored categories and allowances (LPD) for Complete Building Method, Area Category Method, Tailored Method	140.6(c)		X	
	Tailored Method	Revised mounting height adjustment formulas and display case considerations	140.6(c)		X	
	Indoor Alterations	Revised triggers and control exceptions	141.0(b)2l		X	
	Outdoor BUG	Revised trigger (6,200 lumens), and BUG requirements moved to Title 24 Part 11; new exception for multifamily & hotel/motel	130.2(b)	X		
	Outdoor Controls	Automatic scheduling requirements expanded; Motion sensor triggers and exceptions revised	130.2(c)	X		
	Outdoor Lighting Allowances	General hardscape and specific allowance allowances have been reduced	140.7(d)		X	
Covered Process	Laboratory and Factory Exhaust Systems	Fans with >10,000 CFM have new control requirements and acceptance testing verification	140.9(c)2 & 140.9(c)3		X	
	Fume Hoods	New automatic sash closure control requirements and acceptance testing verification	140.9(c)4		X	

1. Mandatory: Cannot be traded away
2. Prescriptive: Sets baseline for performance & prescriptive approach
3. Performance: Allows for greater flexibility in performance approach

This fact sheet is intended to help industry professionals understand changes made to the 2016 Title 24, Part 6 Building Energy Efficiency Standards (Energy Code or Title 24, Part 6) and incorporated in the 2019 Energy Code for nonresidential, high-rise residential and hotel/motel building occupancy types. It is presented in tabular form and divided by building feature (e.g., envelope and lighting). Each building feature section includes explanatory notes on all applicable Title 24, Part 6 sections, but not the actual language of the 2019 Energy Code. Notes on Title 24, Part 1 sections are also included, as applicable. The left-hand column serves to note the Title 24 sub-sections and to highlight related key comments.

There is a similar fact sheet covering changes for the [low-rise residential occupancy type](#).

Legend

Background colors are used to indicate the degree of change to the 2016 Energy Code.

No Change or Minor Change for 2019 - "Minor Changes" are considered non-substantive changes to code language and typically no further clarification is provided.

Revised for 2019

New for 2019

Key Definitions

- Multifamily:** Occupancies R-1 and R-2 (R-3 includes single family, duplexes and townhomes 3-habitable stories or less above grade, and is subject to the single-family requirements of the Energy Code):
 - Multifamily buildings 3-habitable stories or less above grade are addressed in the **residential** requirements of the Energy Code (§§150.0, 150.1, 150.2)
 - Multifamily buildings 4-habitable stories or more above grade are addressed in the **nonresidential** requirements of the Energy Code (§§130-141)
- Healthcare Facilities:** Occupancies I-1 and I-2 are now covered by the requirements of the Energy Code with this 2019 code cycle. There are many exceptions, so see the section devoted to Exceptions for Healthcare Facilities. Occupancy I-3 and I-4 are still not subject to the requirements of Title 24, Part 6.

For More Information

California Energy Commission Information & Services

- 2019 Title 24, Part 6 Document (December 2018):
www.energy.ca.gov/2018publications/CEC-400-2018-020/CEC-400-2018-020-CMF.pdf
- Draft 2019 Energy Code - October 4 & 5, 2017: Staff Workshop on the Draft 2019 Building Energy Standards ("marked up" for easier viewing of changes):
www.energy.ca.gov/title24/2019standards/prerulemaking/documents/2017-10-0405_workshop/2017-10-0405_documents.php
- Energy Code Hotline: 1-800-772-3300 (Free) or Title24@energy.ca.gov
- Online Resource Center:
energy.ca.gov/title24/orc/
 - The Energy Commission's main web portal for Energy Code, including information, documents and historical information

Energy Code Ace Information & Services





- Reference Ace™ – Easily navigate Title 24, Part 6 documents using search and hyperlinks
 - 2019 Energy Code
 - 2016 Energy Code
- Training
 - [Title 24: Where We're Headed with the 2019 Standards](#)
 - [2019 Title 24, Part 6: Where We're Headed With the Nonresidential Standards](#)
- Energy Code Ace Tools, Training and Resources Updated for the 2019 Code - Coming Soon! Register with EnergyCodeAce.com and select a role in My Profile to receive emails when they are published!

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MECHANICAL

Color background indicates: NO CHANGE/MINOR CHANGE REVISED NEW FOR 2019

Building Application	 Mandatory		 Prescriptive	 Performance	 Additions Alterations
	All Occupancy Subchapters 1-2 (§§100.0-110.11)	Nonresidential Occupancy Subchapter 3 (§§120.0-120.9)	Subchapter 8 (§150.1)	Subchapter 8 (§150.1)	Subchapter 9 (§150.2)
General	§§100.0, 100.1-2, 110.0, 110.1	§120.0	§§140, 140.2	§§140.0, 140.1	§141.0
HVAC (conditioned)	§§110.2, 110.5	§§120.1, 120.2, 120.3, 120.4, 120.5, 120.8	§140.4		
Water Heating	§110.3	§§120.3, 120.8, 120.9	§140.5		
Pool & Spa Systems	§§110.4, 110.5	See Residential §150.0(p)	N/A	N/A	

T24 Section & Notes  **Mandatory – Change Summaries**

Title 24, Part 1, Section 10-103 – PERMIT, CERTIFICATE, INFORMATIONAL, AND ENFORCEMENT REQUIREMENTS FOR DESIGNERS, INSTALLERS, BUILDERS, MANUFACTURERS, AND SUPPLIERS

10-103.1 **Nonresidential Acceptance Test Training and Certification:** Changes to how ATTCPs (acceptance test technician certification providers) recertify ATTs (acceptance test technicians) and ATEs (acceptance test employers), and how to deal with those “decertified” by an ATTCP. Quality assurance procedures and reporting have been revised.

Title 24, Part 1, Section 10-106 – LOCALLY ADOPTED ENERGY STANDARDS

10-106 Clarification that cost-effectiveness studies submitted as part of applications from public agencies for the adoption of local energy codes must first be made available for public review within the jurisdiction of the public entity, then the Energy Commission must confirm that the cost-effectiveness study demonstrates that the proposed new local code will use less energy than what is permitted by Title 24, Part 6. Only then may it be filed with the Energy Commission.

Title 24, Part 6, Section 100.0 – Scope

100.0(h) Clarification that if manufactured equipment, a product or a device is NOT specified in Title 24, Part 6, it will be found in Title 20, Sections 1601-1609.

Title 24, Part 6, Section 100.1 – Definitions

Updates to various references to resources and standards other than the Energy Code (e.g., revisions to list newer applicable versions or editions).

ADIABATIC PAD is a material located before the heat transfer surface of an adiabatic condenser, which pre-cools the ambient air by becoming fully wetted during pre-cool mode operation.

Definition for ventilation changes. **AIR, AVAILABLE TRANSFER** is that portion of total outdoor ventilation air that is not required to satisfy other exhaust needs or to maintain pressurization of other spaces and that is transferable according to Section 120.1(g).

CASCADE REFRIGERATION SYSTEM is a type of refrigeration system that uses a low-stage refrigeration system where the heat rejected from condensing the low-stage refrigerant is absorbed using a heat-exchanger by a separate high-stage refrigeration system, and the ultimate heat rejection to ambient air is accomplished by the highstage refrigeration system.

New definitions to support refrigeration measures. **CONDENSER** is a refrigeration component that condenses refrigerant vapor by rejecting heat to air mechanically circulated over its heat transfer surface.
CONDENSER, ADIABATIC is a condenser that has the ability to use two heat transfer processes in series as accomplished by a single factory-made unit. The first heat transfer process is the pre-cooling of the entering air by lowering the entering air drybulb temperature. The second heat transfer process is forced-air circulation cooling over the heat transfer surface of the condenser.
DRY MODE is an operating condition of an adiabatic condenser wherein the only means of heat transfer is accomplished through forced-air circulation over the heat transfer surface of the condenser without any pre-cooling of the entering air.

	PRE-COOL MODE is an operating condition of an adiabatic condenser wherein the entering air is pre-cooled.
	CONDITIONED SPACE is an enclosed space within a building that is directly conditioned or indirectly conditioned.
Revised to clarify process space conditioning.	CONDITIONED SPACE, DIRECTLY is an enclosed space that is provided with wood heating, mechanical heating that has a capacity exceeding 10 Btu/hr-ft ² , mechanical cooling that has a capacity exceeding 5 Btu/hr-ft ² . Directly conditioned space does not include process space. (See PROCESS SPACE.) CONDITIONED SPACE, INDIRECTLY is enclosed space, that (1) is not directly conditioned space; and (2) either (a) has a thermal transmittance area product (UA) to directly conditioned space exceeding that to the outdoors or to unconditioned space and does not have fixed vents or openings to the outdoors or to unconditioned space, or (b) is a space through which air from directly conditioned spaces is transferred at a rate exceeding three air changes per hour.
	FACTORY is building, structure or space designated as Factory Group F that is used for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations.
Updated refrigeration options.	GAS COOLER is a refrigeration component that reduces the temperature of a refrigerant vapor by rejecting heat to air mechanically circulated over its heat transfer surface. Used by a CO ₂ refrigeration system in transcritical mode, and normally also capable of operating in subcritical mode.
Clarifications to habitable space.	HABITABLE SPACE is space in a building for living, sleeping, eating or cooking, excluding bathrooms, toilets, hallways, storage areas, closets, utility rooms and similar areas. (See also OCCUPIABLE SPACE.) HABITABLE STORY is a story that contains habitable space, and that has at least 50% of its volume above grade.
Revised to clarify source energy and how that applies to Energy Code triggers.	MECHANICAL COOLING is lowering the temperature within a space using refrigerant compressors or absorbers, desiccant dehumidifiers, or other systems that require energy to directly condition the space (language regarding energy from depletable sources has been removed). In nonresidential, high-rise residential, and hotel/motel buildings, cooling of a space by direct or indirect evaporation of water alone is not considered mechanical cooling. MECHANICAL HEATING is raising the temperature within a space using electric resistance heaters, fossil fuel burners, heat pumps, or other systems that require energy to directly condition the space. (Language regarding energy from depletable sources has been removed.)
	NATURAL GAS AVAILABILITY: For newly constructed buildings, natural gas is available if a gas service line can be connected to the site without a gas main extension. For additions and alterations, natural gas is available if a gas service line is connected to the existing building.
Revised to align with ASHRAE 90.1.	NONRESIDENTIAL BUILDING OCCUPANCY TYPES: Assembly Building, Commercial and Industrial Storage Building, Financial Institution Building, Industrial/Manufacturing Facility Building, Grocery Store Building, Gymnasium Building, Library Building, Office Building, Parking Garage Building, Religious Facility Building, Restaurant Building, Retail Store Building, School Building, Sports Arena Building, Motion Picture Theater Building, Performance Art Theater Building. (See OCCUPANCY TYPE.) NONRESIDENTIAL FUNCTION AREAS: Revised to align with ASHRAE 90.1
Definitions to support ventilation changes.	OCCUPANCY is the purpose for which a building or part thereof is used or intended to be used. OCCUPANCY, HUMAN is any occupancy that is intended primarily for human activities. OCCUPANCY GROUP is a classification of occupancy defined in Chapter 3 of the California Building Code (CBC) (Title 24, Part 2). OCCUPANCY TYPE is a description of occupancy that is more specific than occupancy group and that relates to determining the amount of lighting, ventilation or other services needed for that portion of the building.
	OCCUPIABLE SPACE is any enclosed space that intended for human occupancy, including, all habitable spaces as well as bathrooms, toilets, closets, halls, storage and utility areas, laundry areas, and similar areas (See also "habitable space".)
	OCCUPIED STANDBY MODE is when a zone is scheduled to be occupied and an occupant sensor indicates zero population within the zone.
Revised definition to the "baseline" building used in Performance software.	STANDARD DESIGN BUILDING is a building that is automatically simulated by Commission-approved compliance software to establish the Energy Budget that is the maximum energy consumption allowed by a Proposed Design Building to comply with the Energy Code. The Standard Design Building is simulated using the same location and having the same characteristics of the Proposed Design Building, but assuming minimal compliance with the Mandatory and Prescriptive requirements applicable to the proposed building, as specified by the Alternative Calculation Methods Approval Manual.
New definitions to support refrigeration measures.	TRANSCRITICAL CO₂ REFRIGERATION SYSTEM is a type of refrigeration system that uses CO ₂ as the refrigerant where the ultimate heat rejection to ambient air can take place above the critical point. TRANSCRITICAL MODE is a system operating condition for a refrigeration system wherein the refrigerant pressure and temperature leaving the compressor is such that the refrigerant is at or above the critical point. Typically used in reference to CO ₂ refrigeration systems. SUBCRITICAL MODE is a system operating condition for a refrigeration system wherein the refrigerant pressure and temperature leaving the compressor is such that the refrigerant is below the critical point. Typically used in reference to CO ₂ refrigeration systems.

New definitions to support ventilation measures.	<p>VENTILATION SYSTEM, BALANCED is a mechanical device intended to remove air from buildings, and simultaneously replace it with outdoor air.</p> <p>VENTILATION SYSTEM, CENTRAL FAN INTEGRATED (CFI) is a central fan forced air space conditioning system that is also designed to bring outdoor air into buildings, causing indoor air to flow out of the building through ventilation relief outlets or normal leakage paths through the building envelope.</p> <p>VENTILATION SYSTEM, ENERGY RECOVERY (ERV) is a mechanical device intended to remove air from buildings, simultaneously replace it with outdoor air and, in the process, transfer heat from the warmer to the colder of the simultaneous airflows, and transfer moisture from the most humid to least humid of the simultaneous airflows.</p> <p>VENTILATION SYSTEM, EXHAUST is a mechanical device intended to remove air from buildings, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope.</p> <p>VENTILATION SYSTEM, HEAT RECOVERY (HRV) is a mechanical device intended to remove air from buildings, simultaneously replace it with outdoor air and, in the process, transfer heat from the warmer to the colder of the simultaneous airflows.</p> <p>VENTILATION SYSTEM, SUPPLY is a mechanical device intended to bring outdoor air into buildings, causing indoor air to flow out of the building through ventilation relief outlets or normal leakage paths through the building envelope.</p>
Title 24, Part 6, Section 110.2 – SPACE CONDITIONING EQUIPMENT	
Revised efficiency requirements for some Mechanical equipment covered by Title 24, Part 6.	<p>Tables 110.2-A-110.2-D: Minor Changes.</p> <p>Table 110.2-E: Revised Efficiencies.</p> <p>Table 110.2-F: Minor Changes.</p> <p>Table 110.2-G: Revised Efficiencies.</p> <p>Table 110.2-H: Revised Efficiencies.</p> <p>Table 110.2-I: Revised Efficiencies.</p> <p>Table 110.2-J: Minor Changes.</p> <p>Table 110.2-K: Minor Changes.</p>
Title 24, Part 6, Section 110.3 – SERVICE WATER-HEATING SYSTEMS AND EQUIPMENT	
110.3(a)	Certification by Manufacturers: Changes specific to Healthcare.
110.3(b)	Efficiency: No Change.
110.3(c)1	<p>Outlet Temperature Controls: Systems covered by CA Plumbing Code Section 613.0 for outlet temperature controls must meet those requirements instead of Title 24, Part 6 requirements.</p> <p>Temperature controls for public lavatories are no longer limited by Title 24, Part 6.</p>
110.3(c)2-4	Water Heating Recirculation Loops / Insulation: No Change.
110.3(c)5	Service water heaters in new state buildings shall meet the 60% solar energy/recovered energy requirements of CA Public Resources Code Section 25498.
110.3(c)6	Isolation Valves: No Change.
Title 24, Part 6, Section 110.4 – POOL AND SPA SYSTEMS AND EQUIPMENT	
	No Change.
Title 24, Part 6, Section 110.5 – NATURAL GAS CENTRAL FURNACES, COOKING EQUIPMENT, AND POOL SPA HEATERS, AND FIREPLACES	
	Pilot Lights Prohibited: Indoor and outdoor fireplaces have been added.
Title 24, Part 6, Section 120.0 – GENERAL	
	No Change.





Title 24, Part 6, Section 120.1 – VENTILATION AND INDOOR AIR QUALITY	
120.1(b)	See "MULTIFAMILY SPECIFIC" section of this Energy Code Ace fact sheet for multifamily ventilation requirements.
<p style="text-align: center;">120.1(c)</p> <p style="text-align: center;">Aligning with ASHRAE 62.1</p> <p style="text-align: center;">EQUATION 120.1-A $A_{face} = Q_{filter} / V_{face}$</p> <p style="text-align: center;">EQUATION 120.1-F $V_z = R_g \times A_z$</p> <p style="text-align: center;">EQUATION 120.1-G $V_z = R_p \times P_z$</p>	<p>Nonresidential and Hotel/Motel Buildings: All occupiable spaces shall meet the requirements of subsection 1 and either 2 or 3:</p> <ol style="list-style-type: none"> 1. Air Filtration <ol style="list-style-type: none"> A. Mechanical system types that use forced air ducts to supply air to an occupiable space, supply only ventilation systems that provide outside air to an occupiable space and the supply side of mechanical balanced ventilation systems, including heat/energy recovery ventilation systems, shall be provided with air filters to clean the outside and return air prior to its introduction into occupied spaces B. Air Filter Efficiency: MERV 13, or use a particle size efficiency rating specified in the Energy Code AND systems shall be equipped with air filters min. 2" depth or min. 1" if the filter(s) are sized according to Equation 120.1-A, based on a maximum face velocity of 150 ft per minute. 2. Natural Ventilation: Naturally ventilated spaces must ALSO use mechanical UNLESS ventilation openings are permanently open or controlled (controls easily accessible to occupants) to stay open during occupied times. There are specific design criteria to using ceiling height to determine side and corner opening locations used for natural ventilation with minimum openings dependent on floor area. 3. Mechanical Ventilation: Occupiable spaces that are served by space conditioning equipment, shall be ventilated with an outdoor airflow rate no less than the larger of Table 120.1-A and/or the number of occupants (EQUATION 120.1-F). If using transfer air, that transfer air must also meet these requirements in addition to the air class requirements of Section 120.1(g). 4. Exhaust Ventilation: The design exhaust airflow shall be determined in accordance with the requirements in Table 120.1-D.
120.1(d)	<p>Operation and Control Requirements for Minimum Quantities of Outdoor Air</p> <ol style="list-style-type: none"> 1. Times of occupancy: Minor Change. 2. Pre-occupancy: Minor Change.
<p style="text-align: center;">Completely revised Table 120.1-A for min. ventilation requirements including DCV airflow rates.</p>	<ol style="list-style-type: none"> 3. Required Demand Control Ventilation: Demand ventilation controls complying with 120.1(d)4 (Table 120.1-A) are required for a space with a design occupant density, or a maximum occupant load factor for egress purposes in the CBC, greater than or equal to 25 people/1,000 ft² (≤ 40 ft²/person) if the system serving the space has one or more of the following: <ol style="list-style-type: none"> A. an air economizer OR B. modulating outside air control OR C. design outdoor airflow rate > 3,000 CFM <p>EXCEPTIONS: Multiple zones of specific occupancies and healthcare/medical building are no longer exempt. (#1 has been removed.) In #2 a few new space types not served by local exhaust have been added as exempt because of health and safety reasons, including daycare sickrooms, science labs, barber shops and nail salons.</p> 4. Demand Control Ventilation Devices: See Table 120.1-A for minimum air rate requirements.
	<ol style="list-style-type: none"> 5. Occupant Sensor Ventilation Control Devices: When occupancy sensor ventilation devices are required by Section 120.2(e)3, which points to Section 130.1(c)5 requirements for offices ≤ 250 ft², multipurpose rooms >1,000 ft², classrooms of any size, and conference rooms and restrooms of any size, Table 120.1-A allows ventilation to go down to zero when in stand-by mode. This reduces the 30-minute vacancy period requirement but be aware of Section 120.2(e)3 requiring stand-by mode after five minutes of the space being unoccupied. There is no minimum time requirement for the occupancy sensor to reduce airflow when space is not occupied, nor a minimum cycling or operation of outside air while space is vacant. Demand control ventilation no longer is an exception to occupancy sensor controls. TABLE 120.1-A has been completely revised.
120.1(e)	Ducting for Zonal Heating and Cooling Units: Minor Change.
120.1(f)	Design and Control Requirements for Quantities of Outdoor Air: Minor Change.
<p style="text-align: center;">120.1(g)</p> <p style="text-align: center;">Table 120.1-A</p> <p style="text-align: center;">Table 120.1-B</p> <p style="text-align: center;">Table 120.1-C</p>	<p>Air Classification and Recirculation Limitations: Air classification and recirculation limitations must be based on the air classification as listed in Table 120.1-A (which now includes number of occupants or CFM/ft², use whichever is greater) or Table 120.1-C, and in accordance with the requirements of Sections 120.1(g)1-120.1(g)4.</p> <ol style="list-style-type: none"> 1. Class 1 Air: Recirculation or transfer of Class 1 air to any space shall be permitted. 2. Class 2 Air: Recirculation or transfer of Class 2 air shall be permitted with special requirements to Class 2, Class 3 and Class 4 (but NOT Class 1), with the exception of energy recovery leakage/transfer air, but cannot exceed 10% of outdoor air intake flow when sharing with Class 1. 3. Class 3 Air: Recirculation or transfer of Class 3 air shall be permitted within Class 3 only, with the exception of energy recovery leakage/transfer air, but cannot exceed 5% of outdoor air intake flow. 4. Class 4 Air: Class 4 air shall not be recirculated or transferred to any space. 5. Ancillary spaces: Redesignation of Class 1 air to Class 2 air shall be permitted for Class 1 spaces that are ancillary to Class 2 spaces. 6. Transfer: A mixture of air that has been transferred through or returned from spaces or locations with different air classes shall be redesignated with the highest classification among the air classes mixed. 7. Classification: See Tables 120.1-A - 120.1-C for expected (or the most similar) air-quality classification of air leaving the space.

Title 24, Part 6, Section 120.2 – CONTROLS FOR SPACE-CONDITIONING SYSTEMS	
120.2(a)	Thermostatic Controls for Each Zone: No Change.
120.2(b)	Criteria for Zonal Thermostatic Controls: Minor Change.
120.2(c)	Hotel/Motel Guest Room and High-rise Residential Dwelling Unit Thermostats: Meet requirements of Section 110.2(c) instead of Section 150.0.
120.2(e)	Heat Pump Controls: No Change. Shut-off and Reset Controls for Space-conditioning Systems <ol style="list-style-type: none"> 1. No Change. 2. No Change.
	3. Occupancy Sensing Zone Controls: If a space type has occupancy control requirements (in offices ≤ 250 ft ² , multipurpose rooms $< 1,000$ ft ² , and classrooms, conference rooms and restrooms of any size), then the space will also have occupancy sensor ventilation requirements that turn the ventilation air to "0" AND will reset the thermostat settings (slightly different thermostats requirements when DDC being used) when not occupied for more than five minutes. There is no longer an exception associated with demand control ventilation. Healthcare facilities ARE exempt.
120.2(f)	Dampers for Air Supply and Exhaust Equipment: Minor Change.
120.2(g)	Isolation Area Devices: Minor Change.
120.2(h)	Automatic Demand Shed Controls: Moved to Section 110.12.
120.2(i)	Economizer Fault Detection and Diagnostics (FDD): Applies to all air handlers with mechanical cooling having a capacity $> 54,000$ Btuh.
120.2(j)	Direct Digital Controls (DDC): Minor Change.
120.2(k)	Optimum Start/Stop Controls: New exception for systems that operate continuously.
Title 24, Part 6, Section 120.3 – PIPE INSULATION	
120.3(a)	General Requirements: Minor Changes AND Fluid distribution systems include all elements that are in series with the fluid flow but do not include elements that are not in series with the fluid flow.
120.3(b)	Insulation Protection: Minor Change.
120.3(c)	Insulation Thickness: Table 120.3-A revised to support insulation thickness in alignment with CA Plumbing Code.
Title 24, Part 6, Section 120.4 – AIR DISTRIBUTION SYSTEM DUCTS AND PLENUMS	
	Minor Changes.
Title 24, Part 6, Section 120.5 – MECHANICAL SYSTEM ACCEPTANCE	
	Occupancy sensing zone controls acceptance testing has been added.
T24 Section & Notes	 Prescriptive – Change Summaries
Title 24, Part 6, Section 140.4 – SPACE CONDITIONING SYSTEMS	
140.4(a)	Sizing and Equipment Selection: Minor Change.
140.4(b)	Calculations: High-Rise multifamily, hotel/motel and nonresidential buildings must use the 2017 ASHRAE Handbook – Fundamentals or Energy Commission-approved method. Otherwise, only minor changes.
140.4(c)	Fan Systems: Each fan system having a total fan system motor nameplate horsepower exceeding 5 hp used for space conditioning must meet the requirements of Items 1, 2 and 3. <ol style="list-style-type: none"> 1. Fan Power Limitation: Per Table 140.4-A and Table 140.4-B, new formulas for calculating allowed fan power. 2. Variable Air Volume (VAV) System: Fan power limit of 1.25 watts per CFM of supply air when fan system greater than 25 hp AND the fan power treatment/filter adjustment have been removed. Otherwise, only minor changes. 3. Fractional HVAC Motors for Fans: Minor Change.
140.4(d)	Space-conditioning Zone Controls: Minor Change.
140.4(e)	Economizers: New chilled water cooling system requirements have been added with a new Table 140.4-C "Chilled Water System Cooling Capacity." Max. pressure drop and integrated partial cooling controls added. New EXCEPTION to economizers for systems designed to operate with 100% outside air all the time. Otherwise, only minor changes.
140.4(f)	Supply Air Temperature Reset Controls: Minor Change.
140.4(g)	Electric Resistance Heating: Revisions to EXCEPTION 5 making it no longer required to have the utility deem a gas line extension to be impractical. Exception added for emergency backup systems.

140.4(h)	<p>Heat Rejection Systems: There are new requirements for cooling tower efficiency.</p> <p>Cooling Tower Efficiency: Axial fan, open-circuit cooling towers serving condenser water loops for chilled water plants with a total of 900 gpm or greater must have a rated efficiency of no less than 60 gpm/hp when rated in accordance with the conditions as listed in Table 110.2-G.</p> <p>EXCEPTION 1 to Section 140.4(h)5: Replacement of existing cooling towers that are inside an existing building or on an existing roof.</p> <p>EXCEPTION 2 to Section 140.4(h)5: Cooling towers serving buildings in Climate Zone 1 or 16.</p>
140.4(i)-(m)	No Change.
140.4(n)	Mechanical System Shut-off: New EXCEPTION for high-rise multifamily dwelling units.
140.4(o)	<p>Exhaust System Transfer Air: Conditioned supply air delivered to any space with mechanical exhaust shall not exceed the greater of:</p> <ol style="list-style-type: none"> 1. The supply flow required to meet the space heating or cooling load; or 2. The ventilation rate required by the authority having jurisdiction, the facility Environmental Health and Safety Department, or by Section 120.1(c)3; or 3. The mechanical exhaust flow minus the available transfer air. Available transfer air must be from another conditioned space or return air plenums on the same floor and same smoke or fire compartment, and are within 15 feet of each other at their closest point. <p>EXCEPTION 1 to Section 140.4(o): Biosafety level classified laboratories 3 or higher.</p> <p>EXCEPTION 2 to Section 140.4(o): Vivarium spaces.</p> <p>EXCEPTION 3 to Section 140.4(o): Spaces that are required by applicable codes and standards to be maintained at a positive pressure differential relative to adjacent spaces.</p> <p>EXCEPTION 4 to Section 140.4(o): Spaces where the highest amount of transfer air that could be used for exhaust makeup may exceed the available transfer airflow rate and where the spaces have a required negative pressure relationship.</p> <p>EXCEPTION 5 to Section 140.4(o): Healthcare facilities.</p>
Title 24, Part 6, Section 140.5 – SERVICE WATER HEATING SYSTEMS	
140.5(a)	Nonresidential Occupancies: No Change.
Title 24, Part 6, Section 141.0 – ADDITIONS, ALTERATIONS, AND REPAIRS	
141.0(a)	Additions: Minor Changes.
141.0(b) Table 141.0-D	<p>Alterations</p> <ol style="list-style-type: none"> 1. Mandatory Requirements: No Change. 2. Prescriptive Approach <ol style="list-style-type: none"> C. New or Replacement Space-Conditioning Systems or Components: New allowance for additional fan power adjustment credits to Section 140.4(c)1 using Table 141.0-D. D. Altered Duct Systems: Minor Changes. E. Altered Space-Conditioning Systems: See Section 110.12 for demand responsive control requirements. 3. Performance Approach: New EXCEPTION in which Section 120.2(i) (Economizer FDD) shall not apply to alterations to HVAC systems or components. Otherwise, only minor changes.
141.0(b)3	


COVERED PROCESS

Color background indicates: NO CHANGE/MINOR CHANGE REVISED NEW FOR 2019

Building Application	 Mandatory			 Prescriptive	 Performance	 Additions Alterations
	All Occupancy Subchapters 1-2 (§§100.0-110.11)	Nonresidential Occupancy Subchapter 3 (§§120.0-120.9)	Nonresidential Lighting/ELP Subchapter 4 (§§130.0-130.5)	Subchapter 5 (§§140.0-140.9)	Subchapter 5 (§§140.0-140.1)	Subchapter 6 (§§141.0-141.1)
Envelope, Ventilation, Process Loads	§110.2	§120.6	N/A	§140.9	§140.1	§§120.6, 140.9, 141.1

T24 Section & Notes  **Mandatory – Change Summaries**





Title 24, Part 6, Section 120.6 – COVERED PROCESSES	
120.6(a)1-3	Refrigerated Warehouses: Refrigerated spaces with a sum total of 3,000 ft ² or more that are served by the same refrigeration system must meet all of the requirements of Section 120.6(a).
120.6(a)4	Condensers: Adiabatic chiller requirements included.
New Table 120.6-B Min. Efficiency. Adiabatic Dry Mode	<p>A. Design Saturated Condensing Temperatures: No Change.</p> <p>B. Design Saturated Condensing Temperatures: No Change.</p> <p>C. The saturated condensing temperature necessary for adiabatic condensers to reject the design total heat of rejection of a refrigeration system assuming dry mode performance must be less than or equal to:</p> <ul style="list-style-type: none"> i. The design drybulb temperature plus 20°F for systems serving freezers ii. The design drybulb temperature plus 30°F for systems serving coolers <p>EXCEPTION 1 to Section 120.6(a)4C: Compressors and condensers on a refrigeration system for which more than 20% of the total design refrigeration cooling load is for quick chilling or freezing, or process refrigeration cooling for other than a refrigerated space.</p> <p>D. All condenser fans for air-cooled condensers, evaporative-cooled condensers, adiabatic condensers, gas coolers, air or water fluid coolers or cooling towers must be continuously variable speed, with the speed of all fans serving a common condenser high side controlled in unison.</p> <p>E. Min. Condensing Setpoint: 70°F for systems stated above.</p> <p>F. Condensing Temperature Reset: Allowances added for adiabatic condensers including EXCEPTIONS to reset controls in CZ 1, 3, 5, 12, 14 and 16.</p> <p>G. Condenser Efficiency: New EXCEPTION for adiabatic condensers with ammonia as refrigerant. New EXCEPTION for transcritical CO₂ refrigeration systems for all of the above EXCEPT D and E.</p>
120.6(a)6	Infiltration Barriers: No Change.
120.6(a)7	Refrigeration System Acceptance: Adiabatic condensers added.
120.6(b)	Commercial Refrigeration: Trigger for remote compressor and condensing units removed. Added language for adiabatic condensers and gas coolers with some new EXCEPTIONS for transcritical CO ₂ refrigeration systems.
120.6(c)	Enclosed Parking Garages: No Change.
120.6(d)	Process Boilers: No Change.
120.6(e)	Compressed Air Systems: No Change.
120.6(f)	Elevators: New EXCEPTION excluding interior signal and display lighting from calculation of lighting power density.
120.6(g)	Escalators and Moving Walkways: No Change.
Title 24, Part 6, Section 120.9 – COMMERCIAL BOILERS	
	No Change.

T24 Section & Notes		 Prescriptive – Change Summaries					
Title 24, Part 6, Section 140.0 – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES							
	No Change.						
Title 24, Part 6, Section 140.9 – COVERED PROCESSES							
140.9(a)	Computer Rooms: Minor Changes.						
	1. Economizers: If an air economizer is used, FDD per Section 120.2(i) has been added.						
140.9(b)	Commercial Kitchens: Minor Changes.						
140.9(c)	Laboratory and Factory Exhaust Systems						
	1. Airflow Reduction Requirements: No Change.						
	2. Exhaust System Transfer Air: Conditioned supply air delivered to any space with mechanical exhaust must comply with the requirements of Subsection 140.4(o).						
	3. Fan System Power Consumption: All newly installed fan exhaust systems serving a laboratory or factory greater than 10,000 CFM must meet requirements of Subsection A and either B, C or D.						
	A. Systems discharge per ANSI Z9.5-2012.						
	B. The exhaust fan system power must not exceed 0.85 w/CFM of exhaust air for systems with air filtration, scrubbers or other air treatment devices. For all other exhaust fan systems, the system power must not exceed 0.65 w/CFM of exhaust air. Exceptions may apply.						
	C. The volume flow rate at the stack must vary based on the measured 5-minute averaged wind speed and wind direction obtained from a calibrated local anemometer. Acceptance testing is required.						
	D. The volume flow rate at the stack must vary based on the measured contaminant concentration in the exhaust plenum from a calibrated contaminant sensor installed within each exhaust plenum. Acceptance testing is required.						
	4. Fume Hood Automatic Sash Closure: Variable air volume laboratory fume hoods with vertical only sashes located in fume hood intensive laboratories, as described in Table 140.9-B, must have an automatic sash closure system meeting specific requirements including acceptance testing.						
<p>This is a brief overview, make sure to look at code language for requirements in their entirety.</p> <p>Table 140.9-B</p>	Table 140.9-B Fume Hood Intensive Laboratories						
	Occupied Minimum Ventilation ACH	≤ 4	> 4 and ≤ 6	> 6 and ≤ 8	> 8 and ≤ 10	> 10 and ≤ 12	> 12 and ≤ 14
	Hood Density (linear feet per 10,000 ³ of laboratory space)	≥ 6	≥ 8	≥ 10	≥ 12	≥ 14	≥ 16
Title 24, Part 6, Section 141.1 – ADDITIONS, ALTERATIONS							
	Lab and Process Facility Exhaust Systems: All newly installed fan systems for a laboratory or process facility exhaust system greater than 10,000 CFM must meet the requirements of Section 140.9(c). Otherwise, no change.						



ENVELOPE & SOLAR READY

Color background indicates: NO CHANGE/MINOR CHANGE REVISED NEW FOR 2019

Building Application	 Mandatory			 Prescriptive	 Performance	 Additions Alterations
	All Occupancy Subchapters 1-2 (§§100.0-110.11)	Nonresidential Occupancy Subchapter 3 (§§120.0-120.9)	Nonresidential Lighting/ELP Subchapter 4 (§§130.0-130.5)	Subchapter 5 (§§140.0-140.9)	Subchapter 5 (§§140.0-140.1)	Subchapter 6 (§§141.0-141.1)
General	§§100.0, 100.1-2, 110.0, 110.1	§120.0	N/A	§§140, 140.2	§§140.0, 140.1	§141.0
Envelope (conditioned)	§§110.6, 110.7, 110.8	§120.7	N/A	§140.3		
Envelope (unconditioned, process spaces)	N/A		§140.3(c)			

T24 Section & Notes  **Mandatory – Change Summaries**

Title 24, Part 6, Section 100.1 – DEFINITIONS

	Updates to various references to resources and standards other than the Energy Code (e.g., revisions to list newer applicable versions or editions).
To support new Lighting Power Adjustment Factor (PAF)	<p>CLERESTORY is fenestration installed above a roofline ≥ 60 degrees from the horizontal, or any portion of exterior vertical glazing ≥ 8 feet per floor above the finished floor of a space.</p> <p>HORIZONTAL SLATS, when referring to a daylighting device, is a set of adjacent surfaces located directly adjacent to vertical fenestration, oriented horizontally and projecting horizontally from its interior or exterior vertical surface.</p> <p>LIGHT SHELF is an adjacent, opaque surfaced daylighting device located at the sill of clerestory glazing, oriented horizontally and projecting horizontally from an interior or exterior vertical surface.</p> <p>SKYLIGHT ROOF RATIO (SRR) is the ratio of the skylight area to the gross exterior roof area.</p> <p>VERTICAL FENESTRATION is all fenestration other than skylights and doors.</p> <p>VISIBLE REFLECTANCE is the reflectance of light at wavelengths from 410 to 722 nanometers.</p> <p>OVERHANG PROJECTION is the horizontal distance, measured outward horizontally from the surface of exposed exterior glazing at the head of a window to the outward edge of an overhang.</p> <p>OVERHANG RISE is the vertical distance between the projected edge of an overhang and the sill of the vertical fenestration below it.</p>
Revised definition to the “baseline” building used in Performance software.	<p>STANDARD DESIGN BUILDING is a building that is automatically simulated by Commission-approved compliance software to establish the Energy Budget that is the maximum energy consumption allowed by a Proposed Design Building to comply with the Energy Code. The Standard Design Building is simulated using the same location and having the same characteristics of the Proposed Design Building, but assuming minimal compliance with the Mandatory and Prescriptive requirements applicable to the proposed building, as specified by the Alternative Calculation Methods Approval Manual.</p>

Title 24, Part 6, Section 110.6 – FENESTRATION PRODUCTS AND EXTERIOR DOORS


110.6(a)1	Air leakage: Minor Changes.
110.6(a)2	U-factor: EXCEPTION 1 has dropped the max. allowed square footage for the Reference Nonresidential Appendix NA6 COG formula to 200 ft ² .
110.6(a)3	SHGC: EXCEPTION 1 has dropped the max. allowed square footage for the Reference Nonresidential Appendix NA6 COG formula to 200 ft ² .
110.6(a)4	VT: EXCEPTION 1 has dropped the max. allowed square footage for the Reference Nonresidential Appendix NA6 COG formula to 200 ft ² .
110.6(b)	Installation of Field-fabricated Fenestration and Exterior Doors: No Change.
Tables 110.6-A & B	Default Fenestration U-factors and SHGC: No Change.

Title 24, Part 6, Section 110.7 – LIMIT AIR LEAKAGE

	No Change.
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Title 24, Part 6, Section 110.8 – INSULATION, ROOFING PRODUCTS AND RADIANT BARRIERS





	Minor Changes.
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Title 24, Part 6, Section 110.10 – SOLAR READY BUILDINGS	
110.10(a)3	Minor Changes.
110.10(a)4	Minor Changes.
110.10(b)1B	Solar Zone EXCEPTION 3 potential solar zone annual solar access has been changed for steep-sloped roofs oriented 90°- 300° of true north (was 110°- 300°). EXCEPTION 4 for multifamily buildings has been revised to apply when a demand response thermostat AND A. Options i, ii and iii: No Change. B. NEW option: OR meet the Title 24, Part 11, Section A4.106.8.2 requirements for EV charging spaces.
110.10(b)2	Azimuth: All sections of the solar zone located on steep-sloped roofs must be oriented 90°- 300° of true north.
110.10(b)3-4	No Change.
110.10(c)-(e)	Minor Changes.
Title 24, Part 6, Section 120.7 – INSULATION REQUIREMENTS	
	Minor Changes.
T24 Section & Notes	 Prescriptive – Change Summaries
Title 24, Part 6, Section 140.0 – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES	
	No Change.
Title 24, Part 6, Section 140.2 – PRESCRIPTIVE APPROACH	
	Minor Changes.
Title 24, Part 6, Section 140.3 – BUILDING ENVELOPES	
140.3(a)	Envelope Component Requirements 1. Exterior Roofs and Ceilings: Minor Changes. 2. Exterior Walls: No Change. 3. Demising Walls: Vertical windows to meet the U-factor requirements only. 4. Exterior Floors and Soffits: No Change. 5. Vertical Exterior Windows in Exterior Walls: Minor Changes. 6. Skylights: Table 140.3-B added Tubular Daylighting Devices (TDD) with a U-factor = 0.88; SHGC = NR; VT = 0.38. 7. Exterior Doors: No Change. 8. Relocatable Public School Buildings: No Change. 9. Air Barrier: Minor Changes.
140.3(b)(c)	Minimum Daylighting Requirement for Large Enclosed Spaces: No Change.
140.3(d)	Daylighting Design Power Adjustment Factor (PAF): Clerestory fenestration, interior/exterior horizontal slats and interior/exterior light shelves have been added as measures that can be used as a PAF for indoor lighting.
Title 24, Part 6, Section 141.0 – ADDITIONS, ALTERATIONS, AND REPAIRS	
	Alterations 1. Mandatory Requirements: Minor Changes. 2. Prescriptive Approach A. Fenestration: New NOTE: Glass replaced in an existing sash and frame or sashes replaced in an existing frame are considered repairs. In these cases, Section 141.0(c) requires that the replacement be at least equivalent to the original in performance. B. Roofs: No Change. O. Interior Walls/Ceiling for First Time: No Change.

ELECTRICAL

- Lighting: Indoor, Outdoor and Signs
- Demand Management
- Electrical Distribution

Color background indicates: NO CHANGE/MINOR CHANGE REVISED NEW FOR 2019

Building Application	 Mandatory			 Prescriptive	 Performance	 Additions Alterations
	All Occupancy Subchapters 1-2 (§§100.0-110.11)	Nonresidential Occupancy Subchapter 3 (§§120.0-120.9)	Nonresidential Lighting/EPD Subchapter 4 (§§130.0-130.5)	Subchapter 5 (§§140.0-140.9)	Subchapter 5 (§§140.0-140.1)	Subchapter 6 (§§141.0-141.1)
General	§§100.0, 100.1-2, 110.0, 110.1, 110.12(c)	§120.0	N/A	§§140, 140.2	§§140.0, 140.1	§141.0
Indoor Lighting (conditioned, process spaces)	§110.9	§120.8	§§130.0, 130.1, 130.4	§§140.3(c), 140.6		
Indoor Lighting (unconditioned, parking garages)	§110.9	N/A	§§130.0, 130.1, 130.4	§§140.3(c), 140.6	N/A	
Outdoor Lighting	§110.9	N/A	§§130.0, 130.1, 130.4	§140.7		
Signs (Indoor and Outdoor)	§110.9	N/A	§§130.0, 130.3	§140.8	N/A	§§141.0, 141.0(b)(2)H

T24 Section & Notes



Mandatory – Change Summaries

Title 24, Part 1, Section 10-103 – PERMIT, CERTIFICATE, INFORMATIONAL, AND ENFORCEMENT REQUIREMENTS FOR DESIGNERS, INSTALLERS, BUILDERS, MANUFACTURERS, AND SUPPLIERS

10-103.1 **Nonresidential Acceptance Test Training and Certification:** Changes to how ATTCPs (acceptance test technician certification providers) recertify ATTs (acceptance test technicians) and ATEs (acceptance test employers), and how to deal with those “decertified” by an ATTCP. Quality assurance procedures and reporting have been revised.

Title 24, Part 1, Section 10-106 – LOCALLY ADOPTED ENERGY STANDARDS

10-106 Clarification that cost-effectiveness studies submitted as part of applications from public agencies for the adoption of local energy codes must first be made available for public review within the jurisdiction of the public entity, then the Energy Commission must confirm that the cost-effectiveness study demonstrates that the proposed new local code will use less energy than what is permitted by Title 24, Part 6. Only then may it be filed with the Energy Commission.

Title 24, Part 6, Section 100.0 – SCOPE

100.0(h) Clarification that if manufactured equipment, a product or device is NOT specified in Title 24, Part 6, it will be in Title 20 Sections 1601-1609.

Title 24, Part 6, Section 100.1 – DEFINITIONS

Updates to various references to resources and standards other than the Energy Code (e.g., revisions to list newer applicable versions or editions).

DEMAND FLEXIBILITY MEASURE is a measure that reduces TDV energy consumption using communication and control technology to shift electricity use across hours of the day to decrease energy use onpeak or increase energy use offpeak, including but not limited to battery storage, or HVAC or water heating load shifting.

DEMAND RESPONSE SIGNAL is a signal that indicates a price or a request to modify electricity consumption for a limited time period.

DEMAND RESPONSIVE CONTROL is an automatic control that is capable of receiving and automatically responding to a demand response signal.


ENERGY MANAGEMENT CONTROL SYSTEM (EMCS) is an automated control system that regulates the energy consumption of a building by controlling the operation of energy consuming systems, and is capable of monitoring loads and adjusting operations in order to optimize energy usage and respond to demand response signals

Cleaned up and added to support lighting.

	<p>FACTORY is a building, structure or space designated as Factory Group F that is used for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations.</p>
	<p>LIGHTING:</p> <p>LAMP is an electrical appliance that produces optical radiation for the purpose of visual illumination, designed with a base to provide an electrical connection between the lamp and a luminaire. A lamp is not a luminaire nor an LED retrofit kit.</p>
	<p>LED RETROFIT KIT is a solid state lighting product intended to replace existing light sources and systems, including incandescent and fluorescent light sources, in previously installed luminaires that already comply with safety standards. These kits replace the existing light source and related electrical components, and are classified or certified to UL 1598C. They may employ an ANSI standard lamp base, either integral or connected to the retrofit by wire leads. LED retrofit kit does not include self-ballasted lamps.</p>
	<p>NON-INTEGRATED LED LAMP is an assembly composed of an LED array (module) or LED packages (components), and an ANSI standard base. The device is intended to connect to the LED driver of an LED luminaire through an ANSI standard lamp-holder (socket). The device cannot be connected directly to the branch circuit. (ANSI/IES RP-16-17)</p> <p>INTEGRATED LED LAMP is an integrated assembly composed of LED packages (components) or LED arrays (modules), as well as an LED driver, an ANSI standard base, and other optical, thermal, mechanical and electrical components. The device is intended to connect directly to the branch circuit through a corresponding ANSI standard lamp-holder (socket). (ANSI/IES RP-16-17)</p>
	<p>NARROW BAND SPECTRUM is a limited range of wavelengths (nm) concentric to a dominant peak wavelength in the visible spectrum. The limited range of wavelength must be within 20 nm on either side of the peak wavelength at 50% of the peak wavelength's relative spectral power, and within 75 nm on either side of the peak wavelength at 10% of the peak wavelength's relative spectral power.</p> <p>SOLID STATE LIGHTING (SSL) is a family of light sources that includes semiconductor LEDs and organic LEDs (OLED).</p> <p>DRIVER when used in relation to solid state lighting, is a device that uses semiconductors to control and supply DC power for LED starting and operation.</p> <p>Various lighting control definitions cleaned up</p> <p>OPENADR 2.0a is the OpenADR Alliance document, "OpenADR 2.0 Profile Specification A Profile," published 2011.</p> <p>OPENADR 2.0b is the OpenADR Alliance document, "OpenADR 2.0 Profile Specification B Profile," published 2015.</p> <p>VIRTUAL END NODE (VEN) is an interface with a demand responsive control system that accepts signals transmitted through OpenADR, consistent with the specifications in OpenADR 2.0a or 2.0b</p>
Title 24, Part 6, Section 110.9 – LIGHTING CONTROLS	
110.9(a)	<p>All lighting control devices and systems, and all light sources subject to the requirements of Section 110.9 must meet the following requirements:</p> <ol style="list-style-type: none"> Lighting controls consist of individual devices AND systems (two or more lighting control components). Must meet lighting control installation requirements of Section 130.4. Removed: Self-contained lighting controls no longer need to be Title 20-certified.
110.9(b)	<p>Lighting Controls</p> <ol style="list-style-type: none"> Time-Switch: All controls that provide time-switch functionality must have program backup capabilities including date, time AND: <ol style="list-style-type: none"> Time-Switch Installed: Must have a 2-hour override and holiday shutoff feature. No longer needs to be Title 20-certified since those requirements were moved to Title 24, Part 6. Astronomical Time-Switch Installed: Must have sunrise and sunset prediction and timekeeping accuracy and display dates and times for programming, adjusting for daylight savings time and allow each channel to be programmed independently. No longer needs to be Title 20 certified since those requirements were moved to Title 24, Part 6. Multi-Level Time Switch Controls: Must have at least 2 separate steps per zone. Time-Switch Controls Installed Outdoors: Minor Changes. Daylighting Controls: Controls that provide automatic daylighting functionality must meet specific setting, calibration and accuracy requirements. Dimmers: Controls that provide dimming functionality must have power consumption minimums and reduced flicker operation, and be able to reduce "0" lumen output with special requirements for 3-way circuits. Occupant Sensing Controls: Occupant sensing controls include occupant sensors, motion sensors and vacancy sensors, including those with a Partial-ON or Partial-OFF function. Occupant sensing controls must have min. time functions, grace period and visible status signals. Exceptions apply to controls that combine functions if they cannot be changed by occupants to override required features. Part-Night Outdoor Lighting Controls: Must have sunrise and sunset prediction using both light sensing and time measurement; and the ability to reduce or turn off outdoor luminaire power at night as required in Section 130.2(c); and to be programmable to engage reduced/off functionality during the night. Sensors Used to Detect Occupants: Sensors that are used by occupant sensing controls to detect occupants cannot be easily disabled and have special requirements if using ultrasonic (see Table 110.9-A) or microwave radiation. Indicator Lights: Indicator lights integral to lighting controls must not consume more than 1W/indicator light.
	<p>New: Table 110.9-A Ultrasound Max. Decibel Values</p>

110.9(c)	Track Lighting Integral Current Limiter: No longer has special requirements outlined in Sections 110.9(c)1-3 of the 2016 Energy Code, such as being Title 20-certified, verified through Acceptance Testing by an ATT and tamper resistant. Note that there are now ONLY subsections 1-3.
110.9(c)1-3	Renumbered from 110.9(c)6-8: No Change (other than renumbering).
110.9(d)	Track Lighting Supplementary Overcurrent Protection Panel: Cleanup of the requirements. <ol style="list-style-type: none"> 1. Must be listed as defined in Section 100.1 AND 2. Must have a permanently installed label that is prominently located and uses language specified in Section 110.9(d)2.
Title 24, Part 6, Section 110.11 – ELECTRICAL POWER DISTRIBUTION SYSTEM	
	No Change.
Title 24, Part 6, Section 110.12 – DEMAND MANAGEMENT	
110.12(a)	Demand Responsive Controls <ol style="list-style-type: none"> 1. All demand responsive controls must be either: <ol style="list-style-type: none"> A. Capable of functioning as a certified OpenADR 2.0a or OpenADR 2.0b Virtual End Node (VEN), as specified under Clause 11, Conformance, in the applicable OpenADR 2.0 Specification OR B. Certified by the manufacturer as being capable of responding to a demand response signal from a certified OpenADR 2.0b VEN by automatically implementing the control functions requested by the VEN for the equipment it controls. 2. All demand responsive controls must be capable of communicating using one or more of the following for communications that occur within the building: Wi-Fi, ZigBee, BACnet, Ethernet or hard-wiring. 3. Demand responsive controls may incorporate and use additional protocols beyond those specified in Sections 110.12(a)1 and 2. 4. When communications are disabled or unavailable, all demand responsive controls must continue to perform all other control functions provided by the control. 5. Demand responsive control thermostats must comply with Reference Joint Appendix 5 (JA5), Technical Specifications For Occupant Controlled Smart Thermostats.
110.12(b)	Demand Responsive Zonal HVAC Controls: Minor Changes.
110.12(c)	Demand Responsive Lighting Controls: Minor Changes.
110.12(d)	Demand Responsive Electronic Message Center Control: Minor Changes.
Title 24, Part 6, Section 130.0 – LIGHTING SYSTEMS AND EQUIPMENT, AND ELECTRICAL POWER DISTRIBUTION SYSTEMS	
130.0(a)	Scope: No Change.
130.0(b)	Functional Areas Where Compliance with Residential Lighting Standards is Required: Minor Changes.
130.0(c)1	Luminaire Classification and Power: Minor Change.
130.0(c)2	Wattage of Non-permanently Installed Ballasts or Transformers: Must be the max. rated wattage of luminaire and, for recessed luminaires with line-voltage medium screw base sockets, you can choose 50 watts OR the rated wattage of a Reference Joint Appendix 8 (JA8)-compliant lamp.
130.0(c)3	Incandescent: Language removed.
130.0(c)4	Lamp/ballast Combinations: Input wattage per UL1598.
130.0(c)5	Inseparable and Remote Driver SSL Luminaires Max: Input wattage per UL1598,2108, 8750 or IES LM-79.
130.0(c)5	LED Tape and Linear Lighting Max: Input wattage to be length times rated power density wattage OR max. rated input wattage of driver/power supply when tested per UL 2108, 8750 or IES LM-79.
130.0(c)	Modular Lighting Systems That Can Be Added or Relocated Without Rewiring: Input wattage must be <ol style="list-style-type: none"> A. 30W/linear foot of track/plug-in busway OR rated wattage of ALL the luminaires in the system per 130.0(c)1; OR B. When using current limiter/supplementary overcurrent protection panel, volt-ampere rating of current limiter OR sum of ampere rating of all devices times branch circuit voltage of all panels. C. When powered by a driver, power supply or transformer, max. rated input per manufacturer’s catalogs (per UL2108 or 8750). <p style="background-color: #d9e1f2; padding: 5px;">EXCEPTION to modular lighting requirements: If power-over-Ethernet system, non-lighting devices can be subtracted from max. rated input power.</p>
130.0(c)7	Anything Not Addressed by Sections 130.0(c)1-6: Wattage must be max labeled rated input.
130.0(d)	Lighting Controls: Minor Changes.
130.0(e)	Energy Management Control System (EMCS): Minor Changes.

Title 24, Part 6, Section 130.1 – INDOOR LIGHTING CONTROLS	
130.1(a)	Manual Area Controls: Minor Changes.
130.1(b)	Multi-Level Lighting Controls: New EXCEPTION added for restrooms. The classroom exception has been removed.
130.1(c)	Shut-OFF Controls: Must be able to reduce lighting. Partial-off controls configured to provide the min. lighting as required for egress in CA Building Code Section 1008. New occupancy sensor requirements for bathrooms.
130.1(d)	Automatic Daylighting Controls: Clean up of how atria skylit/daylit areas must be defined. If multi-level controls are required, the auto daylighting must be done using continuous dimming. New requirements about accessibility of sensors. Clean up of exceptions and some new ones: EXCEPTION 1: If existing structures or objects block the sunlight through a skylight for more than 1,500 daytime hours per year 8 am – 4 pm. EXCEPTION 2: If an overhang covers the entire vertical fenestration, and there is no fenestration above the overhang, and the ratio of overhang rise is > 1.5 for south, east and west orientations, and > 1 for north orientations. EXCEPTIONS 3-5: No change to < 120W in primary/skylit zones, parking garages ≤ 60W, 24 ft ² glazing/36 ft ² for garage, and parking garage adaption/dedicated ramps. EXCEPTION 6: Sidelit zones in retail merchandise sales and wholesale showroom areas.
130.1(e)	Demand Responsive Controls: Moved to Section 110.12
130.1(f)	Control Interactions: New language on how controls should interact with each other without limiting the control requirements of Sections 130.1 and 110.12.
Title 24, Part 6, Section 130.2 – OUTDOOR LIGHTING CONTROLS AND EQUIPMENT	
130.2(a)	REMOVED: Motion sensor requirement for incandescent lighting over 100 watts.
130.2(b)	Luminaire Cutoff Requirements: Trigger is now lumens (not wattage): ≥ 6,200 initial lumens, and then all of the BUG requirements of Title 24, Part 11, Section 5.106.8 must be met. New EXCEPTION for luminaires attached to multifamily/hotel/motel building and controlled from <i>within</i> the dwelling unit/hotel room.
130.2(c)	Controls for Outdoor Lighting <ol style="list-style-type: none"> Daylight Availability: Minor Changes. Automatic Scheduling Controls: Must be able to reduce outdoor lighting power 50%-90%, turn the lighting off during unoccupied times and have at least two scheduling options for each luminaire independent from each other and with a 2-hour override function. Acceptance testing required. May be combined with other controls, if applicable. Motion Sensing Controls: Must be able to reduce outdoor lighting power 50%-90% and turn the lighting off during unoccupied times. Must have the ability to reduce power within 15 minutes of area being vacant and be able to come back on again when occupied 1,500 or less luminaire wattage controlled by a single sensor. Required for Building Façade, Ornamental Hardscape, Outdoor Dining, Outdoor Sales Frontage if using bilaterally symmetric luminaires) and within 24 feet of grade. EXCEPTION 1: If any outdoor luminaire (e.g., pole light, wall pack and linear lighting) has a max. rated wattage of ≤ 40W. EXCEPTION 2: No Change. EXCEPTION 3: Lighting subject to a health or life safety statute, ordinance, or regulation may have a minimum time-out period longer than 15 minutes or a minimum dimming level above 50% when necessary to comply with the applicable law.
Title 24, Part 6, Section 130.3 – SIGN LIGHTING CONTROLS	
	Demand response EMC moved to Section 110.12.
Title 24, Part 6, Section 130.4 – LIGHTING CONTROL ACCEPTANCE/ INSTALLATION CERTIFICATE	
130.4(a)	Lighting Control Acceptance Requirements: No Change.
130.4(b)	Lighting Control Installation Certificate Requirements: Track lighting no longer has special installation nor acceptance testing requirements.
Title 24, Part 6, Section 130.5 – ELECTRICAL POWER DISTRIBUTION SYSTEMS	
130.5(a)	Service Electrical Metering: No Change.
130.5(b)	Separation of Electrical Circuits for Electrical Energy Monitoring: No Change.
130.5(c)	Voltage Drop: No Change.
130.5(d)	Circuit Controls for 120-Volt Receptacles and Controlled Receptacles: No Change.
130.5(e)	Demand Responsive Controls and Equipment: Moved to Section 110.12.





T24 Section & Notes	 Prescriptive – Change Summaries
Title 24, Part 6, Section 140.0 – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES	
	No Change.
Title 24, Part 6, Section 140.2 – PRESCRIPTIVE APPROACH	
	Minor Changes.
Title 24, Part 6, Section 140.6 – INDOOR LIGHTING	
140.6(a) Revised Table 140.6-A	<p>Calculation of Adjusted Indoor Lighting Power: The EXCEPTION for 0.3W/ft² for large offices has been moved to a footnote allowance in Table 140.6-C.</p> <ol style="list-style-type: none"> Two Interlocked Lighting Systems: No Change. Reduction of Wattage Through Controls: A few new PAFs added for daylighting design features associated with Section 140.3(d). Lighting Wattage Excluded: Minor Changes. Luminaire Classification and Power Adjustment: Some new provisions for adjusting input power of small aperture tunable-white and dim-to-warm LED luminaires, including control requirements to make the power adjustment. There is also clarification on how the Tailored Method display mounting height adjustments apply.
140.6(b)	Calculation of Allowed Indoor Lighting Power – General Rules: No Change.
140.6(c) Tables revised with reduced wattage allowances and building/space type designations.	<p>Calculation of Allowed Indoor Lighting Power – Specific Methodologies: Clean-up to language regarding methodology of lighting methods and Complete Building, Area Category and Tailored Lighting (including mounting height adjustment factors) Methods lighting power density (LPD) allowances have been reduced to conform with LED technology (previous code cycles based on fluorescent technology) with all space types revised to align with ASHRAE 90.1.</p> <p>Table 140.6-B: Revised with reduced wattage allowances and new space-type names. Table 140.6-C: Revised with reduced wattage allowances and new space-type names. Tables 140.6-D-G: Revised with reduced wattage allowances and new space-type names.</p>
140.6(d)	<p>Automatic Daylighting Controls in Secondary Daylit Zones: Clean up of EXCEPTION 1 clearly indicating that if there are less than 120 watts of general lighting in the combined secondary daylit zones, luminaires in Secondary Sidelit Daylit Zone(s) are exempt. AND new language added allowing for exception to spaces in which the COMBINED general lighting power in primary and secondary, luminaires in Secondary Sidelit Daylit Zone(s) are less than 240 watts.</p> <p style="background-color: #f4cccc;">New EXCEPTION 3 in which the ratio of the projection of an overhang (no additional vertical window above the overhang) to the rise is > 1.5 for south, east and west orientations, and > 1 for north orientations.</p> <p style="background-color: #f4cccc;">New EXCEPTION 5 for retail merchandise sales and wholesale showroom areas sidelit daylit zones.</p>
Title 24, Part 6, Section 140.7 – OUTDOOR LIGHTING	
	<p>Revised wattage allowances in Tables 140.7-A and 140.7-B with clearer guidance on which wattage allowance applies to asphalt versus concrete parking lots.</p> <p>Table 140.7-A Table 140.7-B</p>
Title 24, Part 6, Section 140.8 – SIGNS	
	Minor Changes.

Title 24, Part 6, Section 141.0 – ADDITIONS, ALTERATIONS, AND REPAIRS

141.0(b)	<p>Alterations</p> <p>1. Mandatory Requirements: Minor Changes.</p>
<p>This section has been rewritten.</p> <p>New Table 141.0-F Control Requirements for Indoor Lighting Systems – Alterations</p>	<p>2. Prescriptive Approach</p> <p>I. Altered Indoor Lighting Systems: Alterations now include <i>all</i> lighting changes (specific terms such as “luminaire component modification” have been eliminated) and Energy Code requirements are triggered when:</p> <ul style="list-style-type: none"> • 10% or more of the number of luminaires in the space are altered (including ballast/driver AND lamp changes done at the same time). • Altering luminaires in a room that has more than one luminaire. • 51 luminaire replacements (one for one, i.e., retrofits) or more, in a year per floor (of a multi-floor building) or per tenant of a multi-tenant building. • Alteration will not disturb asbestos (unless asbestos is being removed at the same time the lighting alteration is happening). <p>Alterations must meet the requirements of i, ii or iii below:</p> <p>i. Lighting alterations must meet lighting power requirements of Section 140.6 and lighting control requirements of Table 141.0-F.</p> <p>ii. If the alteration does not exceed 80% of the area category allowance in Section 140.6, see Table 141.0-F for control requirements.</p> <p>iii. If a luminaire replacement project (one for one, i.e., retrofits) limited to a building or tenant space of ≤5,000 ft² reduces existing wattage by 40% with the altered luminaires, see Table 141.0-F for control requirements.</p>
	<p>EXCEPTION for acceptance testing remains the same (controls being added to 20 or less luminaires).</p> <p>L. Outdoor Lighting: No Change.</p> <p>M. Signs: No Change.</p> <p>P. Electrical Power Distribution Systems: No Change.</p>

MULTIFAMILY SPECIFIC

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Building Application	 Mandatory		 Prescriptive	 Performance	 Additions Alterations
	All Occupancy Subchapters 1-2, 4 (§§100.0-110.11)	Nonresidential Occupancy Subchapter 3 (§§120.0-120.9)	Subchapter 5 (§§140.0-140.9)	Subchapter 5 (§§140.0-140.1)	Subchapter 6 (§§141.0-141.1)
General (Solar Ready)	§110.10	§120.0	§§140, 140.2		
HVAC (conditioned)	§§110.2, 110.5	§§120.1, 120.2, 120.3, 120.4, 120.5, 120.8	§140.4	§§140.0, 140.1	§§141.0
Water Heating	§110.3	§§120.3, 120.8, 120.9	§140.5		

T24 Section & Notes  **Mandatory – Change Summaries**

Title 24, Part 6, Section 110.10 – SOLAR READY BUILDINGS

110.10(a)	High-Rise Multifamily, including Mixed-Use Occupancy Buildings: No Change.
110.10(b)	<p>Solar Zone: Solar zones areas cannot be less than:</p> <p>1. Minimum Solar Zone Area Roof Area ≤ 10,000 ft²: No Change. Roof Area > 10,000 ft²: No Change.</p> <p>B. High-Rise Multifamily: EXCEPTION 1: PV system being installed with DC power rating of 1W/ft² of roof area. EXCEPTION 2: Solar thermal system meeting Section 150.1(c)8Biii. EXCEPTION 3: Potential solar zone area can be 50% less using areas NOT shaded by obstructions associated with the home: <ul style="list-style-type: none"> • Low-sloped Roof: Roof area where annual solar access is ≥70% • Steep-sloped Roof: Roof area oriented 90°- 300° of true north in which the annual solar access is ≥70% EXCEPTION 4 (Multifamily only): No solar ready requirements will apply if all dwelling unit thermostats meet the demand response control requirements of Section 110.12(a) and are capable of receiving/responding prior to final occupancy permit, and meet EITHER Title 24, Part 11, Appendix A4.106.8.2 for EV charging spaces OR one of the following: <ul style="list-style-type: none"> i. ENERGY STAR® dishwasher and refrigerator OR <ul style="list-style-type: none"> • A whole house fan (using electronically commutated motor) OR ii. Demand response home automation system (per Section 110.12(a)) controlling appliances and lighting OR iii. CA Plumbing Code greywater system to be used for irrigation system OR iv. CA Plumbing Code rainwater catchment system using 65% of roof rainwater. EXCEPTION 5: Roof used for parking, automobile hardscape or heliport. (No Change.)</p> <p>2. Azimuth: All sections of the solar zone located on steep-sloped roofs must oriented 90°- 300° of true north.</p> <p>3. Shading: No Change.</p> <p>4. Structural Design Loads on Construction Documents: No Change.</p>
110.10(c)	<p>Interconnection Pathways</p> <p>1. Drawings to indicate “reserved” location for future inverters/metering equipment/pathway for conduit between solar zone and electrical service AND</p> <p>2. Central water-heating systems to have drawings indicate “reserved” pathway for plumbing between solar zone and water heater</p>
110.10(d)	Documentation: No Change.
110.10(e)	Main Electrical Service Panel: Min. busbar rating of 200 amps and “reserved” space for future double pole circuit breaker labeled “For Future Solar Electric.”

Title 24, Part 6, Section 120.1 – VENTILATION AND INDOOR AIR QUALITY

120.1(b)1

High-Rise Residential Buildings (see the Energy Code Ace fact sheet on What's Changed in 2019 for Low-Rise Residential for information on requirements for low-rise multifamily): When the dwelling units are attached to each other, the following requirements must be met:

Aligning with ASHRAE 62.2

1. **Air Filtration:**

- A. **Mechanical Systems:** Systems that use forced air ducts to supply air to an occupiable space through ductwork exceeding 10 ft (3 m) in length, supply-only ventilation systems and supply side of mechanical balanced ventilation systems, including heat/energy recovery ventilation systems that provide outside air to an occupiable space, must be provided with required air filters.
- B. **System Design and Installation:** Systems must be designed to accommodate the pressure drop associated with all recirculated air or outdoor air supplied to the occupiable space is filtered before passing through any system thermal conditioning components. Heat/energy recovery ventilator filters can be downstream of thermal conditioning component provided the system is equipped with ancillary filtration upstream. Air filters must be min. 2" min. or a min. 1" if the filter(s) are sized according to Equation 120.1-A, based on a maximum face velocity of 150 ft/minute. Filters must be accessible for regular service by the system owner and permanently labeled for min. requirements for replacement filter.
- C. **Air Filter Efficiency:** MERV 13, or use a particle size efficiency rating specified in the Energy Code.
- D. **Air Filter Pressure Drop:** All systems must be provided with air filter(s) that conform to the applicable maximum allowable clean-filter pressure drop for 2" min. OR a max. of 25 PA (0.1" water) for a 1" min. OR for supply-only or balanced system the maximum allowable clean filter pressure drop determined by the system design.
- E. **Air Filter Product Labeling:** Products must be labeled by the manufacturer to disclose the efficiency and pressure drop ratings that demonstrate conformance to these requirements.

EXCEPTION to Section 120.1(b)1: Evaporative coolers are not subject to the air filtration requirements of Section 120.1(b)1.

2. **Attached Dwelling Units:** Must meet the requirements of ASHRAE Standard 62.2, with the following changes:

- A. Amendments to ASHRAE 62.2 requirements.
 - i. **Window operation** is no longer a method allowed to meet these ventilation requirements.
 - ii. **Continuous operation** of central forced air system air handlers used in central fan integrated ventilation systems is not a permissible method of providing the dwelling unit ventilation airflow.
 - iii. **Air filtration** 6.7 (Min. Filtration) and 6.7.1 (Filter Pressure Drop) shall not be required.
 - iv. **Mechanical ventilation airflow** must be provided at rates determined in accordance with Equation 120.1-B AND must have a balanced ventilation system OR if using a continuously operating system (supply or exhaust ventilation systems) THEN envelope leakage must be verified per Title 24, Part 6, Reference Nonresidential Appendix NA7.18.2 as being $\leq 0.3 \text{ ft}^3/\text{minute}$ at 50 PA (0.2" of water)
 - v. **Central ventilation systems** that serve multiple dwelling-units must be balanced to provide ventilation airflow to each dwelling unit per Equation 120.1-B, limited to 20% above the specified rate using, for example, constant air regulation devices, orifice plates and variable speed central fans.
 - vi. **Kitchen range hoods** must be rated for sound per ASHRAE 62.2 Section 7.2.
 - vii. **Space Conditioning System Ducts:** ASHRAE 62.2 Section 6.5.2 is not required.
 - viii. **Control and Operation:** Manual switches associated with dwelling-unit ventilation systems must have a label clearly displaying the following or equivalent text: "This switch controls the indoor air quality ventilation for the home. Leave it on unless the outdoor air quality is very poor."
- B. **High-Rise Residential Dwelling Unit Acceptance:** NRCA forms must be registered through HERS provider.
 - i. **Airflow Performance:** Ventilation airflow must be verified per Title 24, Part 6, Reference Nonresidential Appendix NA7.18.1.
 - ii. **Kitchen Range Hoods:** Must be verified per Title 24, Part 6, Reference Nonresidential Appendix NA7.18.1 to confirm the model is rated by HVI to comply with the following requirements:
 - a) The minimum ventilation airflow rate as specified in ASHRAE 62.2 Section 5.
 - b) The maximum sound rating of 3 sones at one or more airflow settings 100 CFM or greater.

EQUATION 120.1-A

$$A_{\text{face}} = Q_{\text{filter}} / V_{\text{face}}$$


EQUATION 120.1-B

$$Q_{\text{tot}} = 0.03A_{\text{floor}} + 7.5(N_{\text{br}} + 1)$$

Kitchen Hood Requirements: 2016 ASHRAE 62.2, Tables 5.1 and 5.2

Ventilation Control Type	Application	Airflow
Demand-Controlled Local Ventilation Exhaust Airflow Rates	Enclosed Kitchen: permanent openings to interior adjacent spaces do not exceed a total of 60 ft ²	<ul style="list-style-type: none"> • Vented range hood (including appliance-range hood combinations): 100 CFM (50 L/s) • Other kitchen exhaust fans, including downdraft: 300 CFM (150 L/s) or a capacity of 5 ach
	Non-enclosed Kitchen	<ul style="list-style-type: none"> • Vented range hood (including appliance-range hood combinations): 100 CFM (50 L/s) • Other kitchen exhaust fans, including downdraft: 300 CFM (150 L/s)
Continuous Local Ventilation Exhaust Airflow Rates	Enclosed Kitchen	5 air changes per hour, based on kitchen volume

Title 24, Part 6, Section 140.5 – SERVICE WATER HEATING SYSTEMS


140.5(b)	High-Rise Residential and Hotel/Motel Occupancies: See Section 150.1(c)8
T24 Section & Notes	 Prescriptive – Change Summaries
150.1(c)8	A. For systems serving individual units, use ONE of the following (i, ii, iii, iv OR v):
	i. One or more gas/propane instantaneous water heater input of 200,000 BTUH or less with NO storage tank
	ii. One gas/propane 55 gal. or less storage water heater of 75,000 BTUH or less AND
	fenestration weighted U-factor = 0.24 or less AND
	<ul style="list-style-type: none"> • HERS-verified compact hot water distribution system OR • HERS-verified drain water heat recovery system
	iii. One gas/propane more than 55 gal. storage water heater of 75,000 BTUH or less
	iv. One heat pump water heater located in garage or conditioned space AND
	<ul style="list-style-type: none"> • HERS-verified compact hot water distribution system AND HERS-verified drain water heat recovery system OR • CZ 2-15: PV system sized 0.3 kWdc larger than required in Section 150.1(c)14 OR • CZ 1 and 16: PV system sized 1.1 kWdc larger than required in Section 150.1(c)14
	v. One NEEA Tier 3 or higher heat pump water heater located in garage or conditioned space. CZ 1 and 16 will ALSO need:
	<ul style="list-style-type: none"> • PV system sized 0.3 kWdc larger than required in Section 150.1(c)14 OR • HERS-verified compact hot water distribution system
	B. For systems serving multiple dwelling units:
	i. Minor Changes.
	ii. Minor Changes.
	iii. Solar thermal water heating system per RA4 with min. solar fraction:
	a. CZ 1-9 = 0.20 solar fraction; CZ10-16 = 0.35 solar fraction OR
	b. HERS-verified drain water heat recovery system can reduce solar fraction in CZ 1-9 = 0.15; CZ 10-16 = 0.30

EXCEPTIONS FOR HEALTHCARE FACILITIES

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T24 Section & Notes		 Mandatory – Change Summaries	
Title 24, Part 1, Section 10-103 – PERMIT, CERTIFICATE, INFORMATIONAL, AND ENFORCEMENT REQUIREMENTS FOR DESIGNERS, INSTALLERS, BUILDERS, MANUFACTURERS, AND SUPPLIERS			
10-103(a)	Documentation: Healthcare Facilities must meet documentation requirements of Title 24, Part 1, Chapter 7 – Safety Standards for Health Facilities.		
Title 24, Part 6, Section 100.0 – SCOPE			
100.0(a) New Occupancy!	Occupancy I (Institutional) does NOT include I-3 (prisons) and I-4 (day care facilities), but does include: <ul style="list-style-type: none"> I-1 (assisted living facilities) I-2 (hospitals and nursing homes) 		
100.0(h)	HEALTHCARE FACILITY is any building or portion thereof licensed pursuant to California Health and Safety Code Division 2, Chapter 1, Section 1204 or Chapter 2, Section 1250.		
Mechanical			
T24 Section & Notes		 Mandatory – Change Summaries	
Title 24, Part 6, Section 110.3 – SERVICE WATER-HEATING SYSTEMS AND EQUIPMENT			
110.3(a)	Certification by Manufacturers: Temperature controls: Healthcare Facilities have option to use CA Plumbing Code Table 613.1.		
110.3(c)1	Outlet Temperature Controls: Systems covered by CA Plumbing Code Section 613.0 for outlet temperature controls must meet those requirements instead of Title 24, Part 6 requirements.		
Title 24, Part 6, Section 120.1 – VENTILATION AND INDOOR AIR QUALITY			
120.1(a)	General Requirements <ol style="list-style-type: none"> 1. Healthcare Facilities must be ventilated in accordance with Chapter 4 of the California Mechanical Code and are NOT required to meet the ventilations requirements of Title 24, Part 6. 		
Title 24, Part 6, Section 120.2 – CONTROLS FOR SPACE-CONDITIONING SYSTEMS			
120.2(b)	Criteria for Zonal Thermostatic Controls: Thermostatic deadband, setback capabilities and automatic demand shed controls requirements are exempt for Healthcare Facilities. Otherwise no major changes.		
120.2(e)	3. Occupancy Sensing Zone Controls: Healthcare Facilities ARE exempt.		
Title 24, Part 6, Section 120.4 – AIR DISTRIBUTION SYSTEM DUCTS AND PLENUMS			
Healthcare Facilities must comply with CA Mechanical Code.			
Title 24, Part 6, Section 120.5 – MECHANICAL SYSTEM ACCEPTANCE			
Healthcare Facilities ARE exempt.			
T24 Section & Notes		 Prescriptive – Change Summaries	
140.4(b)	Calculations: Healthcare Facilities must comply with CA Mechanical Code as regulated by OSHPD, including references for indoor/outdoor conditions.		
140.4(c)	Fan Systems: Each fan system used for space conditioning and having a total fan system motor nameplate horsepower exceeding 5 hp must meet the requirements of Items 1, 2 and 3. <ol style="list-style-type: none"> 3. Fractional HVAC Motors for Fans: There are two new EXCEPTIONS including process load fan system power and systems serving Healthcare Facilities. 		
140.4(d)	Space-conditioning Zone Controls: New EXCEPTION for systems serving Healthcare Facilities.		
140.4(f)	Supply Air Temperature Reset Controls: New EXCEPTION for Healthcare Facilities.		
140.4(j)	Limitation of Air-Cooled Chillers: New EXCEPTION for Healthcare Facilities.		
140.4(k)	Hydronic System Measures: New EXCEPTION for Healthcare Facilities.		
140.4(l)	Air Distribution System Duct Leakage Sealing: New EXCEPTION for Healthcare Facilities which will must comply with the CA Mechanical Code.		
140.4(m)	Fan Control: New EXCEPTION for Healthcare Facilities.		
140.4(n)	Mechanical System Shut-off: New EXCEPTION for Healthcare Facilities.		
140.4(o)	Exhaust System Transfer Air: New EXCEPTION for Healthcare Facilities.		

Covered Process	
T24 Section & Notes	 Mandatory – Change Summaries
120.6(e)	Compressed Air Systems: Healthcare Facilities are exempt from these requirements.
120.6(f)	Elevators: Healthcare Facilities are exempt from these requirements.
T24 Section & Notes	 Prescriptive – Change Summaries
Title 24, Part 6, Section 140.9 – COVERED PROCESSES	
140.9(a)	Computer Rooms: New EXCEPTION for Healthcare Facilities.
140.9(b)	Commercial Kitchens: New EXCEPTION for Healthcare Facilities.
140.9(c)	Laboratory and Factory Exhaust Systems: New EXCEPTION for Healthcare Facilities.
Envelope	
T24 Section & Notes	 Mandatory – Change Summaries
Title 24, Part 6, Section 110.10 – SOLAR READY BUILDINGS	
110.10(a)4	Healthcare Facilities are exempt from these requirements.
Commissioning	
T24 Section & Notes	 Mandatory – Change Summaries
Title 24, Part 6, Section 120.8 – BUILDING COMMISSIONING	
	Healthcare Facilities must comply with Chapter 7 of the CA Administrative Code (Title 24, Part 1) instead of Title 24, Part 6.
Lighting	
T24 Section & Notes	 Mandatory – Change Summaries
Title 24, Part 6, Section 130.1 – INDOOR LIGHTING CONTROLS	
130.1(a)	Manual Area Controls 2. Located in the Enclosed Areas: New exception for Healthcare Facilities in rooms in which the control in the room would pose health and safety hazard (such as psychiatric and secure areas, and single occupant restroom/bathing rooms).
130.1(b)	Multi-Level Lighting Controls: Healthcare Facilities are exempt from these requirements.
130.1(c)	Shut-OFF Controls: Healthcare Facilities exempt from these requirements.
Title 24, Part 6, Section 130.3 – SIGN LIGHTING CONTROLS	
	Healthcare Facilities are exempt from these requirements.
Title 24, Part 6, Section 130.4 – LIGHTING CONTROL ACCEPTANCE/ INSTALLATION CERTIFICATE	
	Healthcare Facilities must comply with OSHPD requirements, not Title 24, Part 6.

Electrical Distribution	
T24 Section & Notes	 Mandatory – Change Summaries
Title 24, Part 6, Section 130.5 – ELECTRICAL POWER DISTRIBUTION SYSTEMS	
130.5(a)	Service Electrical Metering: New EXCEPTION for systems subject to CA Electrical Code Article 517 (Healthcare Facilities).
130.5(b)	Separation of Electrical Circuits for Electrical Energy Monitoring: New EXCEPTION for systems subject to CA Electrical Code Article 517 (Healthcare Facilities).
130.5(d)	Circuit Controls for 120-Volt Receptacles and Controlled Receptacles: New EXCEPTION for Healthcare Facilities.
Additions & Alterations	
Title 24, Part 6, Section 141.0 – ADDITIONS, ALTERATIONS, AND REPAIRS	
	Healthcare Facilities are EXEMPT from the requirements for all alterations (additions are NOT exempt).



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