



Decoding 2019 Energy Standards:

Comply With Me



*Let's Talk
Healthcare Facilities*



HELPING YOU PLAY YOUR CARDS RIGHT



Recording For Future Use

 **Decoding** * 2016 Energy Standards™

Let's Talk How to Navigate

 **Decoding** * 2016 Envelopes™

Let's Talk Res & Nonres High Performance Walls & Attics

 **Decoding** * 2016 Forms™

Let's Talk about the **New** NRCC-LTI-E

**This session is
being recorded.**



Last Decoding Talk...

 **Decoding** * 2019 Title 24, Part 6™

Let's Talk What's New

Comply With Me

Learn how to comply with California's building and appliance energy efficiency standards

www.EnergyCodeAce.com

offers **No-Cost**

Tools ♠ Training ♠ Resources
to help you decode Title 24, Part 6 and Title 20



This program is funded by California utility customers and administered by Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E®), Southern California Edison Company (SCE), and Southern California Gas Company (SoCalGas®) under the auspices of the California Public Utilities Commission.





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?



Ted Tiffany
Guttman & Blaevoet
Principal/
Director of Sustainability

Tiffany@gb-eng.com



Guest Speaker: Ted Tiffany

Ted leads Guttman & Blaevoet's building performance modeling group and is the Director of Sustainability for the company. Ted has 20 years of experience using various energy analysis tools modeling energy, comfort, and daylighting.

Ted is a Subject Matter Expert for Energy Code Ace, the State Investor Owned Utility's team for energy code education, development, and outreach.

He is currently focused on Zero Net Energy buildings and their interaction with the grid systems, co-generation, and active storage systems for energy management.



Decoding 2016 Standards



- ✦ Be aware of the format, code triggers and building features associated with the Energy Code;
- ✦ Understand the exceptions included in the Energy Code specific to a licensed healthcare facility;
- ✦ Tips on how to determine modeling healthcare facilities strategies;
- ✦ Documenting compliance for OSHPD submittal (Certificate of Compliance), during construction (Certificate of Installation) and for verification (Certificate of Acceptance) applicable to healthcare facilities.



Why?



HELPING YOU PLAY YOUR CARDS RIGHT



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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



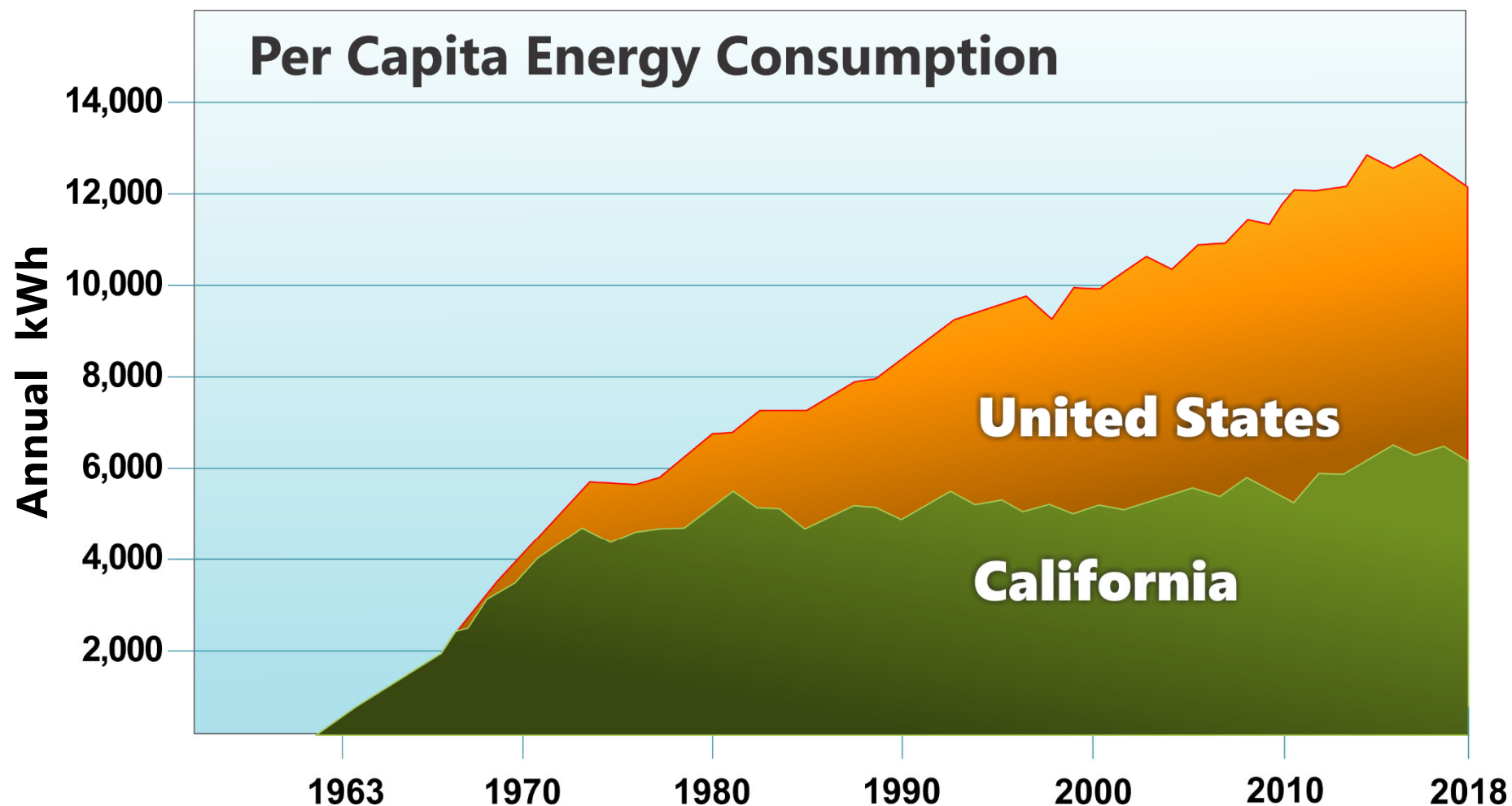
Incremental Steps toward “Carbon Neutral”



- ✦ Since 1978, California’s Building Energy Efficiency Code (Title 24, Part 6) has focused on:
 - ✧ Reducing uneconomic, inefficient or unnecessary consumption of energy
 - ✧ Enhancing outdoor and indoor environmental quality
- ✦ For 2019 and beyond, the Energy Code will focus on:
 - ✧ Continuing to increase building energy efficiency
 - ✧ Also addresses additional pressing needs of today:
 - Reducing carbon emissions
 - Encouraging grid harmonization



CA Energy Code Makes a Real Difference



Source: California Energy Commission publication, *Toward A Clean Energy Future, 2018 Integrated Energy Policy Report Update Volume I*, Adopted August 1, 2018; https://ww2.energy.ca.gov/2018_energy_policy/



Energy Commission Resources



CEC Hotline

Monday – Friday, 8 a.m. to noon, 1 p.m. to 4:30 p.m.
1-800-772-3300 (CA), (916) 654-5106 (Outside CA)
Email: Title24@energy.ca.gov

List Server & Newsletter

Main conduit for stakeholder communication:
www.energy.ca.gov/listservers/
(Subscribe to Building Standards & Blueprint Newsletter)

Download the Blueprint Newsletter:
www.energy.ca.gov/efficiency/blueprint

Other Useful Links

CEC Online Resource Center:
<https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/online-resource-center>
Approved Compliance Software:
www.energy.ca.gov/title24/2019standards/2019_computer_prog_list.html



Helps you navigate the Standards using key word search capabilities, hyperlinked tables and related sections

2019 BUILDING ENERGY EFFICIENCY STAN...
REFERENCE APPENDICES
RESIDENTIAL COMPLIANCE MANUAL

2019 Building Energy Efficiency Standards - Reference Ace v13

[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
CEC-400-2018-020-CHF
CALIFORNIA ENERGY COMMISSION
Edmund G. Brown Jr., Governor

2019

NONRESIDENTIAL ALTERNATIVE CALCULATION METHOD REFERENCE MANUAL

FOR THE 2019 BUILDING ENERGY EFFICIENCY STANDARDS

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

DECEMBER 2018
CEC-400-2018-020-CHF
CALIFORNIA ENERGY COMMISSION
Edmund G. Brown Jr., Governor

MAY 2019
CEC-400-2019-006-CHF
CALIFORNIA ENERGY COMMISSION
Gavin Newsom, Governor

Contents


Favorites

EnergyCodeAce.com/tools

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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	Licensed healthcare facilities	Licensed healthcare facility per CA Health & Safety Code §1250  NEW
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

★ Per California Health and Safety Code §1204 & 1250 for a **licensed healthcare facility**:

★ 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

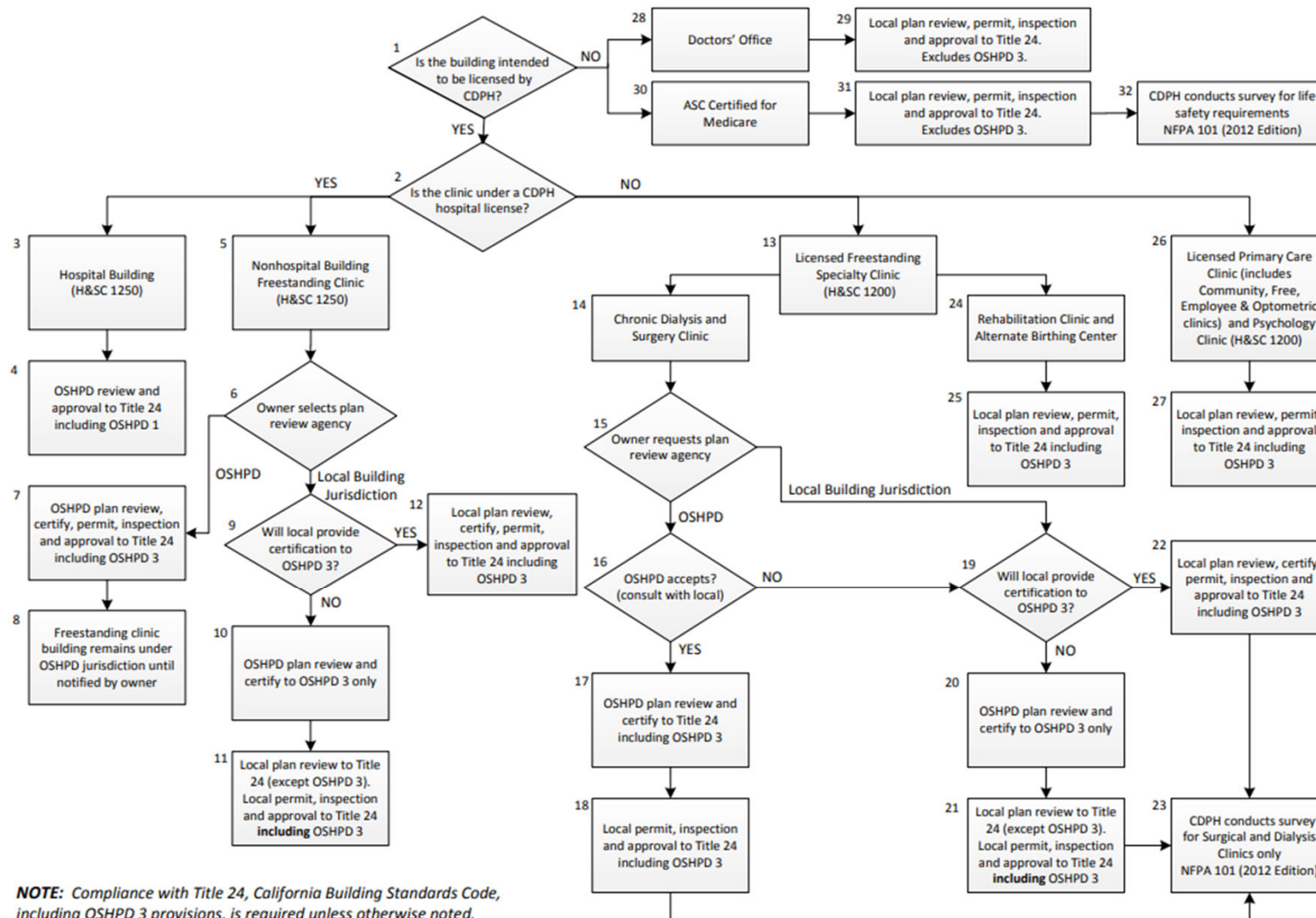
I-4 Exempt

- ✦ Adult and child daycare facilities



OSHHPD or Local Building Department

CALIFORNIA MEDICAL CLINIC GUIDELINES FOR PLAN REVIEW, APPROVAL, INSPECTION AND CERTIFICATION





OSHPD or Local Building Department

“Hospital building” is defined in H&SC Section 1250. OSHPD preempts the local building jurisdiction for enforcement of the Title 24, California Building Standards Code.

Freestanding clinic buildings under the hospital license are typically subject to the local building jurisdiction, although they are licensed under H&SC Section 1250.

- ❑ If the local building jurisdiction will not provide written certification to OSHPD 3 requirements, then plans shall be submitted to OSHPD for plan review and certification to OSHPD 3 requirements only. The local building jurisdiction shall review the plans for compliance to Title 24 excluding OSHPD 3.
- ❑ The application of OSHPD 3 requirements is independent of the determination of occupancy classification.
 - A Group B Occupancy doctor’s office is subject to OSHPD 3 requirements if the office is licensed as a clinic pursuant to H&SC Section 1200.
 - Conversely, a surgical clinic classified as a Group I-2.1 occupancy is not subject to OSHPD 3 requirements if it is not licensed pursuant to H&SC Section 1200 or 1250.

NOTE: Compliance with Title 24, California Building Standards Code, including OSHPD 3 provisions, is required unless otherwise noted.





Mandatory, Prescriptive, Performance



Mandatory Measures: *Cannot be traded via the Performance Approach.
Not typically documented within Certificate of Compliance (CF1R/NRCC)*



- Must always be met/installed
- Establish minimum level of energy efficiency and/or performance
- Apply to various building components
- Sometimes are superseded by more stringent prescriptive or performance requirements



Prescriptive Approach: *Each building feature to show compliance independently*



- Set of predefined efficiency requirements that must ALL be met or exceeded
- Applies to various building components
- Simplest approach, but less flexible
- Establishes baseline for Standard building/budget under Performance Approach

or

Performance Approach: *Proposed TDV equal or better than baseline TDV*



- Requires the use of Energy Commission approved software
- Most flexible approach, allows for trade-offs
- Proposed energy budget \leq Standard energy budget



Let's Talk



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Challenges



- ✦ Challenge A:
 - ✦ Navigating Title 24 Part 6



- ✦ Challenge B:
 - ✦ How Energy Code Applies to Healthcare



- ✦ Challenge C:
 - ✦ Determining Best Pathway to Compliance



- ✦ Challenge D:
 - ✦ Documenting Compliance



Challenge A

Challenge A

Navigating Title 24 Part 6



Road Map to Se

Subchapter

Section

- (a)(b)(c): *Code Category*
 - 1,2,3: *Building/Design Feature*
 - A,B,C: *Feature Specifics*
 - i,ii,iii: *Sub-category to specifics*
 - a,b,c: *Detailed information*

Exceptions: Exceptions
and/or Alternatives

Tables: Summary and/or
Alternative Summary

SECTION 140.3 – PRESCRIPTIVE REQUIREMENTS FOR BUILDING ENVELOPES Subchapter 5

A [building](#) complies with this section by being designed with and having constructed to meet all prescriptive requirements in Subsection (a) and the requirements of Subsection (c) where they apply.

(a) Envelope Component Requirements



1. **Exterior roofs and ceilings.** Exterior roofs and ceilings shall comply with each of the applicable requirements in this subsection:
 - A. **Roofing Products.** Shall meet the requirements of [Section 110.8](#) and the applicable requirements of Subsections i through ii:
 - i. **Nonresidential buildings:**
 - a. Low-sloped roofs in [Climate Zones](#) 1 through 16 shall have:
 1. A minimum aged solar reflectance of 0.63 and a minimum thermal emittance of 0.75; or
 2. A minimum [Solar Reflectance Index \(SRI\)](#) of 75.
 - EXCEPTION 1 to Section 140.3(a)1Aia: Wood-framed roofs in Climate Zones 3 and 5 are exempt from the requirements of Section 140.3(a)1Aia if the roof assembly has a [U-factor](#) of 0.034 or lower.
 - EXCEPTION 2 to Section 140.3(a)1Aia: Roof constructions that have [thermal mass](#) with a weight of at least 25 lb./ft² over the roof membrane are exempt from the requirements of Section 140.3(a)1Aia.
 - EXCEPTION 3 to SECTION 140.3(a)1Aia: An aged solar reflectance less than 0.63 is allowed provided the maximum roof/ceiling U-factor in [TABLE 140.3](#) is not exceeded.
 - b. Steep-sloped roofs in Climate Zones 1 through 16 shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.75, or a minimum SRI of 16.
 - ii. High-rise residential buildings and hotels and motels:
 - a. Low-sloped roofs in Climate Zones 9, 10, 11, 13, 14 and 15 shall have a minimum aged solar reflectance of 0.55 and a minimum thermal emittance of 0.75, or a minimum SRI of 64.
- EXCEPTION to Section 140.3(a)1Aia: Roof constructions that have thermal mass with a weight of at least 25 lb./ft² over the roof membrane.
- b. Steep-sloped roofs in Climate Zones 2 through 15 shall have a minimum aged solar reflectance of 0.20 and a minimum thermal emittance of 0.75, or a minimum SRI of 16.

TABLE 140.3 Roof/Ceiling Insulation Tradeoff For Aged Solar Reflectance

Nonresidential			
Aged Solar Reflectance	Metal Building Climate Zone 1-16	Wood framed and Other Climate Zone 6 & 7	Wood Framed and Other All Other Climate Zones
	U-factor	U-factor	U-factor
0.62-0.58	0.038	0.045	0.032
0.55-0.48	0.035	0.042	0.030
0.45-0.38	0.033	0.039	0.029
0.35-0.25	0.031	0.037	0.028



Exceptions



Keep Reading

✦ Exceptions

- ✦ Typically found at the END of the applicable section and read through them ALL before deciding your course of action.

130.1(b) Multi-Level Lighting Controls.

The general lighting of any enclosed area 100 square feet or larger with a connected lighting load that exceeds 0.5 watts per square foot shall provide multi-level lighting controls that allow the level of lighting to be adjusted up and down. The multi-level controls shall provide the number of control steps and meet the uniformity requirements specified in TABLE 130.1-A.

EXCEPTION 1 to Section 130.1(b): An area enclosed by ceiling height partitions that has only one luminaire with no more than two lamps.

EXCEPTION 2 to Section 130.1(b): Restrooms.

EXCEPTION 3 to Section 130.1(b): Healthcare facilities.



What's Not Mentioned



Each Word Counts

✦ If it is not mentioned, it is not required

SECTION 120.8 – **NONRESIDENTIAL** BUILDING COMMISSIONING

Nonresidential buildings other than healthcare facilities with conditioned space of 10,000 square feet or more shall comply with the applicable requirements of Sections 120.8(a) through 120.8(i) in the building design and construction processes. All building systems and components covered by Sections 110.0, 120.0, 130.0, and 140.0 shall be included in the scope of the commissioning requirements in this Section, excluding those related solely to covered processes.

Nonresidential buildings other than healthcare facilities, with conditioned space of less than 10,000 square feet, shall comply with the design review requirements specified in Section 120.8(d) and shall include any measures or requirements necessary for completing this review in the construction documents in a manner consistent with Section 120.8(e).

Healthcare facilities shall instead comply with the applicable requirements of Chapter 7 of the California Administrative Code (Title 24, Part 1).

Not Hotel/motel^{TT1}
Not High-Rise Residential



Importance of Tables



Go To The End

- ★ The Tables are *typically* at the end of the subsection, are so important to understanding how code applies (when they are provided).

Type of Power Allowance	Lighting Zone 0 ³	Lighting Zone 1 ³	Lighting Zone 2 ³		Lighting Zone 3 ³		Lighting Zone 4 ³
	Asphalt/ Concrete	Asphalt/ Concrete	Asphalt	Concrete ²	Asphalt	Concrete ²	Asphalt/ Concrete
Area Wattage Allowance (AWA)	No allowance ¹	0.018 W/ft ²	0.023 W/ft ²	0.025 W/ft ²	0.025 W/ft ²	0.03 W/ft ²	0.03 W/ft ²
Linear Wattage Allowance (LWA)		0.15 W/lf	0.17 W/lf	0.4 W/lf	0.25 W/lf	0.4 W/lf	0.35 W/lf
Initial Wattage Allowance (IWA)		180 W	250W	250W	350W	350W	400W
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 shall meet the maximum zonal lumen limits as specified in Section 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.							



Title 24, Part 1



Article 1

- ✦ Administrative Code
 - ✦ Energy Commission version includes BOTH Title 24 Part 1 and 6
 - ✦ Building Standards Commission version includes Article 1 in Chapter 10



Road Map to Article 1

Article 1: Building Energy Regulations

Administrative Regulations, California Code of Regulations Title 24 Part 1

10-101	SCOPE
10-102	DEFINITIONS
10-103	PERMIT, CERTIFICATE, INFORMATIONAL, AND ENFORCEMENT REQUIREMENTS FOR DESIGNERS, INSTALLERS, BUILDERS, MANUFACTURERS, AND SUPPLIERS
10-104	EXCEPTIONAL DESIGNS
10-105	ENFORCEMENT BY THE COMMISSION
10-106	LOCALLY ADOPTED ENERGY STANDARDS TT2
10-107	INTERPRETATIONS
10-108	EXEMPTION
10-109	COMPLIANCE SOFTWARE, ALTERNATIVE COMPONENT PACKAGES, EXCEPTIONAL METHODS, DATA REGISTRIES AND RELATED DATA INPUT SOFTWARE, ALTERNATIVE RESIDENTIAL FIELD VERIFICATION PROTOCOLS, AND ELECTRONIC DOCUMENT REPOSITORIES
10-110	PROCEDURES FOR CONSIDERATION OF APPLICATIONS UNDER SECTIONS 10-104, 10-106, 10-108, 10-109
10-111	CERTIFICATION AND LABELING OF FENESTRATION PRODUCT U-FACTORS, SOLAR HEAT GAIN COEFFICIENTS, VISIBLE TRANSMITTANCE AND AIR LEAKAGE
10-112	CRITERIA FOR DEFAULT TABLES
10-113	CERTIFICATION AND LABELING OF ROOFING PRODUCT REFLECTANCE AND EMITTANCE
10-114	DETERMINATION OF OUTDOOR LIGHTING ZONES AND ADMINISTRATIVE RULES FOR USE



Title 24, Part 1: Article 1

Demographics

- Overview of how the Energy Code is to be documented, enforced, and the methods behind certification (i.e. NFRC, CRRC)

Tourist Traps

- This is not a place to find design requirements for buildings.

Hidden Gems

- 10-103: Understanding the documentation requirements for the Energy Code when submitting to OSHPD
- 10-106: How REACH codes come to be
- 10-111: What the NFRC certification requirements are for fenestration



Article 1: Example

Section 10-103

PERMIT, CERTIFICATE, INFORMATIONAL, AND ENFORCEMENT REQUIREMENTS FOR DESIGNERS, INSTALLERS, BUILDERS, MANUFACTURERS, AND SUPPLIERS



(a) Documentation

For all buildings other than healthcare facilities, the following documentation is required to demonstrate compliance with Part 6. This documentation shall meet the requirements of Section 10-103(a)1 or alternatives approved by the Executive Director. Healthcare facilities shall instead comply with the applicable provisions of Chapter 7.

1. Certificate of Compliance

- A. Format
- B. HERS registration
- C. Residential Alterations
- D. Nonresidential Data Registry (when approved)

2. Application for a building permit

3. Certificate of Installation

4. Certificate of Acceptance

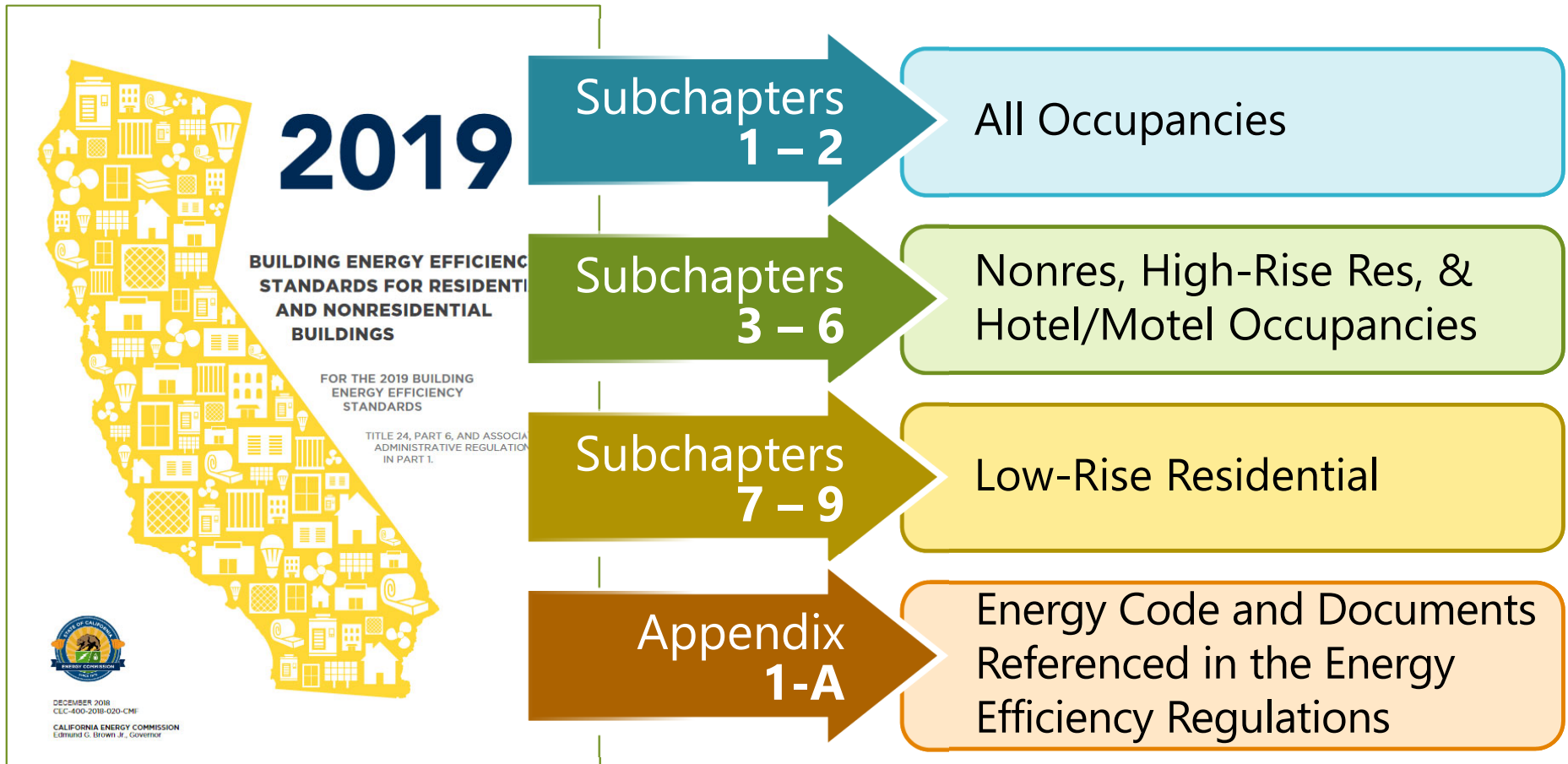
5. Certificate of Verification

(b)...

OSHDPD has adopted the NRCC, NRCI and applicable NRCA forms



Structure/Organization of the Energy Code





Road Map to Subchapter 1

SUBCHAPTER 1: ALL OCCUPANCIES



GENERAL PROVISIONS

100.0	SCOPE
100.1	DEFINITIONS AND RULES OF CONSTRUCTION
100.2	CALCULATION OF TIME DEPENDENT VALUATION (TDV) ENERGY



Subchapter 1: Example

Section 100.0

SCOPE



(a) Buildings Covered.

The provisions of Part 6 apply to all buildings:

1. That are of Occupancy Group A, B, E, F, H, **I**, M, R, S, or U; and
2. For which an application for a building permit or renewal of an existing permit is filed (or is required by law to be filed) on or after the effective date of the provisions, or which are constructed by a governmental agency; and
3. That are:
 - A. Unconditioned; or
 - B. Indirectly or directly conditioned or process spaces.

EXCEPTION 1 to Section 100.0(a)

EXCEPTION 2 to Section 100.0(a)

EXCEPTION 3 to Section 100.0(a): Buildings in Occupancy Group I-3 and I-4.



Road Map to Subchapter 2

SUBCHAPTER 2: ALL OCCUPANCIES



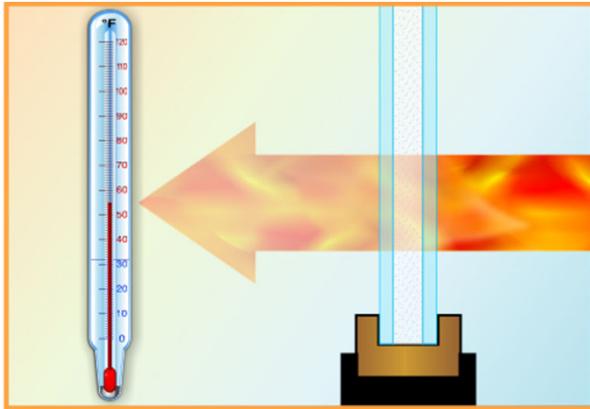
MANDATORY REQUIREMENTS FOR THE MANUFACTURE, CONSTRUCTION AND INSTALLATION OF SYSTEMS, EQUIPMENT AND BUILDING COMPONENTS

110.0	<i>SYSTEMS AND EQUIPMENT—GENERAL</i>
110.1	<i>MANDATORY REQUIREMENTS FOR APPLIANCES</i>
110.2	<i>MANDATORY REQUIREMENTS FOR SPACE-CONDITIONING EQUIPMENT</i>
110.3	<i>MANDATORY REQUIREMENTS FOR SERVICE WATER-HEATING SYSTEMS AND EQUIPMENT</i>
110.4	<i>MANDATORY REQUIREMENTS FOR POOL AND SPA SYSTEMS AND EQUIPMENT</i>
110.5	<i>NATURAL GAS CENTRAL FURNACES, COOKING EQUIPMENT, AND POOL AND SPA HEATERS: PILOT LIGHTS PROHIBITED</i>
110.6	<i>MANDATORY REQUIREMENTS FOR FENESTRATION PRODUCTS AND EXTERIOR DOORS</i>
110.7	<i>MANDATORY REQUIREMENTS TO LIMIT AIR LEAKAGE</i>
110.8	<i>MANDATORY REQUIREMENTS FOR INSULATION, ROOFING PRODUCTS AND RADIANT BARRIERS</i>
110.9	<i>MANDATORY REQUIREMENTS FOR LIGHTING CONTROL DEVICES AND SYSTEMS, BALLASTS, AND LUMINAIRES</i>
110.10	<i>MANDATORY REQUIREMENTS FOR SOLAR READY BUILDINGS</i>
110.11	<i>MANDATORY REQUIREMENTS FOR ELECTRICAL POWER DISTRIBUTION SYSTEM</i>



Fenestration U-factor and SHGC

§110.6(a)



NFRC rating or
Table 110.6-A
MUST be used if
building has
* **NEW $\geq 200 \text{ ft}^2$**
of new site-built
fenestration.

U-factors and SHGC can be used from the following three sources:

- 1. NFRC-rated** fenestration products or **NFRC label certificate**
 - ❑ CMA (Component Modeling Approach)
 - ❑ Developed by NFRC for nonresidential fenestration
- 2. Table 110.6-A:** Default Fenestration Product U-factors
- 3. Equation NA6-1:** Alternate Default U-factor Calculation from Nonresidential Appendix NA6
Converts a center-of-glass U-factor to an overall fenestration U-factor for site-built fenestration



Subchapter 2: Example

Section 110.6

MANDATORY REQUIREMENTS FOR FENESTRATION PRODUCTS AND EXTERIOR DOORS

TABLE 110.6-A DEFAULT FENESTRATION PRODUCT U-FACTORS

FRAME	PRODUCT TYPE	SINGLE PANE ^{3, 4} U-FACTOR	DOUBLE PANE ^{1, 3, 4} U-FACTOR	GLASS BLOCK ^{2, 3} U-FACTOR
Metal	Operable	1.28	0.79	0.87
	Fixed	1.19	0.71	0.72
	Greenhouse/garden window	2.26	1.40	N.A.
	Glazed Doors	1.25	0.77	N.A.
	Skylight	1.98	1.30	N.A.
Metal, Thermal Break	Operable	N.A.	0.66	N.A.
	Fixed	N.A.	0.55	N.A.
	Greenhouse/garden window	N.A.	1.12	N.A.
	Glazed Doors	N.A.	0.59	N.A.
	Skylight	N.A.	1.11	N.A.
Nonmetal	Operable	0.99	0.58	0.60
	Fixed	1.04	0.55	0.57
	Glazed Doors	0.99	0.53	N.A.
	Greenhouse/garden windows	1.94	1.06	N.A.
	Skylight	1.47	0.84	N.A.

1. For all dual-glazed fenestration products, adjust the listed U-factors as follows:
 - a. Add 0.05 for products with [dividers](#) between panes if spacer is less than 7/16 inch wide.
 - b. Add 0.05 to any product with true divided lite (dividers through the panes).
2. Translucent or transparent panels shall use glass block values when not rated by [NFRC 100](#).
3. [Visible Transmittance \(VT\)](#) shall be calculated by using [Reference Appendix NA6](#).
4. Windows with [window film](#) applied that is not rated by [NFRC 100](#) shall use the default values from this table.



NFRC CMAST Certificate Example



NATIONAL FENESTRATION RATING COUNCIL LABEL CERTIFICATE

PROJECT INFORMATION

LABEL CERTIFICATE ID: PJ-SVA-3080

Issuance Date: 6/12/2014

NFRC CERTIFIED PRODUCT RATING INFORMATION:*

This is to be completed by an NFRC Approved Calculation Entity (ACE), based on information provided by the Specifying Authority and calculated in accordance with NFRC procedures.

PROJECT LOCATION:

Address: 1751 Carroll Ave.
City: San Francisco State: CA Zip Code: 94124
Contact person: Jason Govette
Phone: 408-778-7786 Facsimile: 408-778-8203 Email: jgovette@siliconvalleyglass.com
Project name (optional): 1751 Carroll Ave

IDENTIFICATION OF SPECIFYING AUTHORITY:

Company name: Silicon Valley Glass ID: SVA
Address: 220 Vineyard Ct, Ste 200
City: Morgan Hill State: CA Zip Code: 95037
Contact person: David VFleming Title: Estimator
Phone: 408-778-7786 Facsimile: Email: dfleming@siliconvalleyglass.com

IDENTIFICATION NAME OF APPROVED CALCULATION ENTITY (ACE) ORGANIZATION:

Company name: WESTLab - California ID: WES
Address: 1721 Arroyo Drive
City: Auburn State: CA Zip Code: 95603
Contact person: Ken Nittler Title:
Phone: 530-885-9891 Facsimile: Email: ken@westlab.net

IDENTIFICATION NAME OF INSPECTION AGENCY (IA):

Company name: Not Required ID:
Address:
City: State: Zip Code:
Contact person: Title:
Phone: Facsimile: Email:

Number of individual products listed on this label certificate: 1



NATIONAL FENESTRATION RATING COUNCIL LABEL CERTIFICATE

PRODUCT LISTING

FOR CODE COMPLIANCE

LABEL CERTIFICATE ID: PJ-SVA-3080

Issuance Date: 6/12/2014

NFRC CERTIFIED PRODUCT RATING INFORMATION: *

This is to be completed by an NFRC Approved Calculation Entity (ACE), based on information provided by the Specifying Authority and calculated in accordance with NFRC procedures.

PRODUCT LISTING:

CPD ID	Product Name	Framing Ref	Glazing Ref	Spacer Ref	Total Area ft ²	CERTIFIED Performance Rating at NFRC Standard Size		
						U-factor** Btu/ hr·ft ² ·°F	SHGC**	VT**
	Metal - Curtain wall/				6600.44			
P-KAW-27290	Trifa Wlr 1/2" Air, 1/4" Clear, 0.946" OA			91	6600.44	0.42	0.36	0.62

FRAME, GLAZING and SPACER ASSEMBLIES

FRAMING LISTING:

Framing Ref	Supplier ID	Product Type	Frame Material	Description
FA-KAW-35456	KAW	Glazed Wall System	AT	Trifab VG 451 T TB Front Glazed - Window Wall

GLAZING LISTING:

Glazing Ref	Supplier ID	# Layers	Low-e	Gap Fill	Description
GA-PPG-9406	PPG	2	Y	Air	1/4" Solarban60, 1/2" Air, 1/4" Clear, 0.946" OA

SPACER LISTING:

Spacer Ref	Supplier ID	Sealant Config.	Spacer Material	Description
SA-NFC-2791	NFC	N/A	Not Applicable	Generic Aluminum, Group 1, Path I

Note: For NFRC-approved frame, glazing and spacer component performance information see the NFRC Approved Component Library Database <http://cmast.nfrc.org/ProjectCertificateFind.aspx>
* Certification information provided is for those fenestration systems listed and may not encompass all systems for the project.
** Each individual product certified performance rating is based on NFRC standard size in accordance with NFRC procedures.

FOR CODE COMPLIANCE

Title 20 Appliance Standards

The California
Statewide Codes
& Standards
Program

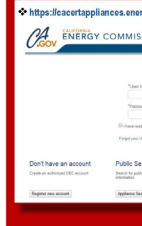
Here to help you
meet California's
Title 20 appliance
and equipment
certification
requirements.

We offer FREE
• Trainings
• Resources

All designed to
improve
compliance
with the state's
appliance and
building energy
codes and aimed
at locking
in long-term
energy savings.



2/26/17



Referenced Documents
Title 20 Appliance Efficiency
govt.westlaw.com/calregs/t
C25FA0&originationContext
CEC Title 20 Certification P
CEC Modernized Appliance
Title 20 Inquiries: appliance



Title 20 Appliance Efficiency Regulations Frequently Asked Questions

How do you determine whether or not a product is covered by Title 20 standards?

Refer to sections 1601 (scope) and 1602 (definitions) of the Title 20 Appliance Efficiency Regulations for information on covered products and their relevant definitions. If you are still unsure if a specific product is covered, you may contact the Energy Commission at appliances@energy.ca.gov.

What is the California Energy Commission's (CEC) Appliance Efficiency Database?

The CEC maintains a publicly-accessible database which includes lists of regulated appliances and equipment (including manufacturer, brand, and model identification) that have been certified by manufacturers and third-parties. A regulated product cannot be offered for sale in California if it is not listed in this database.
<https://cacertappliances.energy.ca.gov/Pages/ApplianceSearch.aspx>

If a product is listed in the CEC Appliance Efficiency Database, is it automatically in the Federal appliance database?

The Department of Energy (DOE) maintains its own publicly-accessible database for compliance certification of appliances and equipment regulated under DOE energy conservation standards called the Compliance Certification Management System (CCMS). Manufacturers and third-parties whose appliances/equipment are regulated under both Title 20 and federal standards must certify to both the CEC Appliance Efficiency Database and the DOE CCMS regulations.doe.gov/ccms

What does the compliance certification process involve?

Certifying to the Energy Commission involves testing the model and submitting certification forms according to specific procedures and requirements outlined in CEC certification packets categorized by product. Certification packets can be found here: energy.ca.gov/appliances/database/forms_instructions_cert

What are the consequences of not certifying to the Energy Commission?

Section 1609 of Title 20 contains information on Title 20 enforcement provisions. Parties found in violation of Title 20 may be subject to civil penalties of up to \$2,500 per unit found in violation and per violation type.

Does the Energy Commission have preference for third-party certifications over direct manufacturer certifications?

While CEC requires that certifiers follow the instructions depending on which certification process they choose, it does prefer that certification is submitted by the entity responsible for implementing the warranty of the device.

How do I know at which laboratories I can test my appliance or equipment? Does the Energy Commission have a preference?

CEC requires all testing to be conducted at CEC-approved laboratories, which differs from the DOE test laboratory requirement in that it restricts the testing to a list of pre-approved laboratories. This list of approved laboratories can be found in the MAEDBS company search:
<https://cacertappliances.energy.ca.gov/Pages/CompanyInfo/CompanyList.aspx>

How can my own test laboratory be approved by the CEC?

Laboratories must create a company account in MAEDBS in order to access the laboratory application. Once the account request is approved by the Energy Commission, the laboratory must submit the laboratory application in order to be listed in MAEDBS as an approved entity to test appliance data under specific test methods.

The MAEDBS portal is found here:
<https://cacertappliances.energy.ca.gov/Login.aspx>

How much time should we allow for the certification approval process?

Allow up to 30 days for a response from the Energy Commission. If the submittal contains errors, approval may take longer until issues are resolved.



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Road Map to Subchapter 3

SUBCHAPTER 3: Nonresidential Occupancies*

MANDATORY REQUIREMENTS



120.0	<i>GENERAL</i>
120.1	<i>REQUIREMENTS FOR VENTILATION</i>
120.2	<i>REQUIRED CONTROLS FOR SPACE-CONDITIONING SYSTEMS</i>
120.3	<i>REQUIREMENTS FOR PIPE INSULATION</i>
120.4	<i>REQUIREMENTS FOR AIR DISTRIBUTION SYSTEM DUCTS AND PLENUMS</i>
120.5	<i>REQUIRED NONRESIDENTIAL MECHANICAL SYSTEM ACCEPTANCE</i>
120.6	<i>MANDATORY REQUIREMENTS FOR COVERED PROCESSES</i>
120.7	<i>MANDATORY INSULATION REQUIREMENTS</i>
120.8	<i>NONRESIDENTIAL BUILDING COMMISSIONING</i>
120.9	<i>MANDATORY REQUIREMENTS FOR COMMERCIAL BOILERS</i>

*NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, HOTEL/MOTEL OCCUPANCIES, AND COVERED PROCESSES



Subchapter 3: Example

Section 120.7

MANDATORY INSULATION REQUIREMENTS

DEMISING PARTITION is a wall, fenestration, floor, or ceiling that separates conditioned space from enclosed unconditioned space.



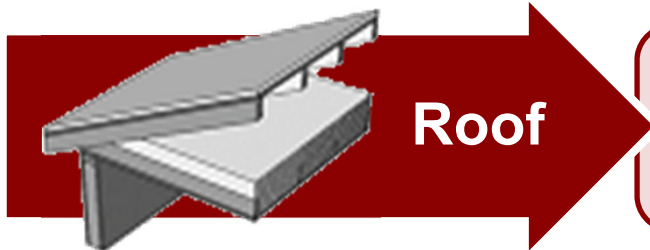
(b) Wall Insulation.

The opaque portions of walls that separate conditioned spaces from unconditioned spaces or ambient air shall meet the applicable requirements of Items 1 through 7 below:

1. **Metal Building-** The weighted average U-factor of the wall assembly shall not exceed 0.113.
2. **Metal Framed-** The weighted average U-factor of the wall assembly shall not exceed 0.151.
3. **Light Mass Walls-** A 6 inch or greater Hollow Core Concrete Masonry Unit shall have a U-factor not to exceed 0.440.
4. **Heavy Mass Walls-** An 8 inch or greater Hollow Core Concrete Masonry Unit shall have a U-factor not to exceed 0.690.
5. **Wood Framed and Others-** The weighted average U-factor of the wall assembly shall not exceed 0.110.
6. **Spandrel Panels and Curtain Wall-** The weighted average U-factor of the spandrel panels and curtain wall assembly shall not exceed 0.280.
7. **Demising Walls-** The opaque portions of framed demising walls shall meet the requirements of Item A or B below:
 - A. Wood framed walls shall be insulated to meet a U-factor not greater than 0.099.
 - B. Metal Framed walls shall be insulated to meet a U-factor not greater than 0.151.

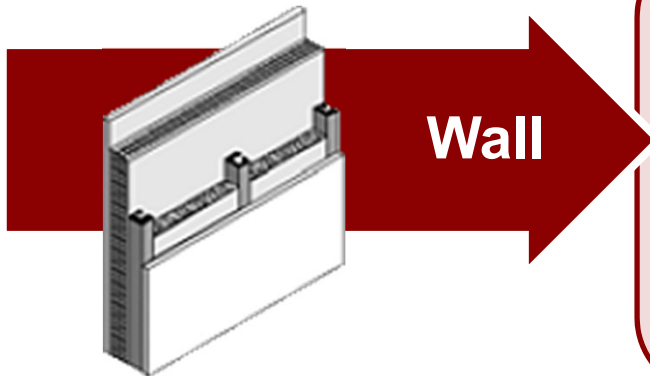


Envelope: New Construction



Roof

Metal building:	U-factor = 0.098 (standing seam \approx R-19)
Wood framed/other:	U-factor = 0.075 (metal framed \approx R-25)



Wall

Metal building:	U-factor = 0.113 (single layer \approx R-13)
Metal framed:	U-factor = 0.151 (6" wall \approx R-19+R-2)
Light mass:	U-factor = 0.440 (10" no insulation)
Heavy mass:	U-factor = 0.690 (6" w/4" mtl \approx R-0)
Wood framed/other:	U-factor = 0.110 (4" \approx R-11)
Spandrel/curtain wall:	U-factor = 0.280 (dual w/thermal brk)
Wood demising:	U-factor = 0.099 (4" 16 OC \approx R-15)
Metal demising:	U-factor = 0.151 (6" wall \approx R-19+R-2)



Floor

Raised mass:	U-factor = 0.269 (no insulation)
Other:	U-factor = 0.071 (wood 6" \approx R-11)
Heated slab:	Insulated per Table 110.8-A



Road Map to Subchapter 4

SUBCHAPTER 4: Nonresidential Occupancies*



MANDATORY REQUIREMENTS FOR LIGHTING SYSTEMS AND EQUIPMENT, AND ELECTRICAL POWER DISTRIBUTION SYSTEMS

130.0	<i>GENERAL</i>
130.1	<i>MANDATORY INDOOR LIGHTING CONTROLS</i>
130.2	<i>OUTDOOR LIGHTING CONTROLS AND EQUIPMENT</i>
130.3	<i>SIGN LIGHTING CONTROLS</i>
130.4	<i>LIGHTING CONTROL ACCEPTANCE AND INSTALLATION CERTIFICATE REQUIREMENTS</i>
130.5	<i>ELECTRICAL POWER DISTRIBUTION SYSTEMS</i>

*NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, HOTEL/MOTEL OCCUPANCIES, AND COVERED PROCESSES



Subchapter 4: Example

Section 130.2

OUTDOOR LIGHTING CONTROLS AND EQUIPMENT



...

(b) Luminaire Cutoff Requirements.

All outdoor luminaires of 6,200 initial luminaire lumens or greater shall comply with Backlight, Uplight, and Glare (collectively referred to as "BUG" in accordance with IES TM-15-11, Addendum A) requirements as follows:

1. Maximum zonal lumens for Backlight, Uplight, and Glare shall be in accordance with Title 24, Part 11, Section 5.106.8.

EXCEPTION 1 to Section 130.2(b): Signs.

EXCEPTION 2 to Section 130.2(b): Lighting for building facades, public monuments, statues, and vertical surfaces of bridges.

EXCEPTION 3 to Section 130.2(b): Lighting not permitted by a health or life safety statute, ordinance, or regulation to be a cutoff luminaire.

EXCEPTION 4 to Section 130.2(b): Temporary outdoor lighting.

EXCEPTION 5 to Section 130.2(b): Replacement of existing pole mounted luminaires ...

EXCEPTION 6 to Section 130.2(b): Luminaires that illuminate the public right of way on publicly maintained roadways, sidewalks, and bikeways.

EXCEPTION 7 to Section 130.2(b): Outdoor lighting attached to a high-rise residential or hotel/motel building and separately controlled from the inside of a dwelling unit or guest room.



Road Map to Subchapter 5

SUBCHAPTER 5: Nonresidential Occupancies*



PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR ACHIEVING ENERGY EFFICIENCY

140.0	<i>PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES</i>
140.1	<i>PERFORMANCE APPROACH: ENERGY BUDGETS</i>
140.2	<i>PRESCRIPTIVE APPROACH</i>
140.3	<i>PRESCRIPTIVE REQUIREMENTS FOR BUILDING ENVELOPES</i>
140.4	<i>PRESCRIPTIVE REQUIREMENTS FOR SPACE CONDITIONING SYSTEMS</i>
140.5	<i>PRESCRIPTIVE REQUIREMENTS FOR SERVICE WATER HEATING SYSTEMS</i>
140.6	<i>PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING</i>
140.7	<i>REQUIREMENTS FOR OUTDOOR LIGHTING</i>
140.8	<i>REQUIREMENTS FOR SIGNS</i>
140.9	<i>PRESCRIPTIVE REQUIREMENTS FOR COVERED PROCESSES</i>

*NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, HOTEL/MOTEL OCCUPANCIES, AND COVERED PROCESSES



Subchapter 5: Example

TABLE 140.3-B – PRESCRIPTIVE ENVELOPE CRITERIA FOR NONRESIDENTIAL BUILDINGS (INCLUDING RELOCATABLE PUBLIC SCHOOL BUILDINGS WHERE MANUFACTURER CERTIFIES USE ONLY IN SPECIFIC CLIMATE ZONE; NOT INCLUDING HIGH-RISE RESIDENTIAL BUILDINGS AND GUEST ROOMS OF HOTEL/MOTEL BUILDINGS)

				Climate Zone																
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Envelope	Maximum U-factor	Roofs/ Ceilings	Metal Building	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	
			Wood Framed and Other	0.034	0.034	0.034	0.034	0.034	0.049	0.049	0.049	0.049	0.034	0.034	0.034	0.034	0.034	0.034	0.034	
		Walls	Metal Building	0.113	0.061	0.113	0.061	0.061	0.113	0.113	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.057	0.061
			Metal-framed	0.069	0.062	0.082	0.062	0.062	0.069	0.069	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062
			Mass Light1	0.196	0.170	0.278	0.227	0.440	0.440	0.440	0.440	0.440	0.170	0.170	0.170	0.170	0.170	0.170	0.170	
			Mass Heavy1	0.253	0.650	0.650	0.650	0.650	0.690	0.690	0.690	0.690	0.650	0.184	0.253	0.211	0.184	0.184	0.160	
			Wood-framed and Other	0.095	0.059	0.110	0.059	0.102	0.110	0.110	0.102	0.059	0.059	0.045	0.059	0.059	0.059	0.042	0.059	
		Floors/ Soffits	Raised Mass	0.092	0.092	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.092	0.092	0.092	0.092	0.092	0.092	0.058
			Other	0.048	0.039	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.039	0.071	0.071	0.039	0.039	0.039	
	Roofing Products	Low-sloped	Aged Solar Reflectance	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	
			Thermal Emittance	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
		Steep-Sloped	Aged Solar Reflectance	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
			Thermal Emittance	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
		Air Barrier				NR	NR	NR	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ
	Exterior Doors, Maximum U-factor			Non-Swing-ing	0.50	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	0.50
				Swinging	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70

CONTINUED: TABLE 140.3-B – PRESCRIPTIVE ENVELOPE CRITERIA FOR NONRESIDENTIAL BUILDINGS (INCLUDING RELOCATABLE PUBLIC SCHOOL BUILDINGS WHERE MANUFACTURER CERTIFIES USE ONLY IN SPECIFIC CLIMATE ZONE; NOT INCLUDING HIGH-RISE RESIDENTIAL BUILDINGS AND GUEST ROOMS OF HOTEL/MOTEL BUILDINGS)

Envelope	Fenestration			All Climate Zones				
					Fixed Window	Operable Window	Curtainwall or Storefront	Glazed Doors ²
		Vertical	Area-Weighted Performance Rating	Max U-factor	0.36	0.46	0.41	0.45
				Max RSHGC	0.25	0.22	0.26	0.23
			Area-Weighted Performance Rating	Min VT	0.42	0.32	0.46	0.17
		Maximum WWR%	40%					
		Skylights			Glass, Curb Mounted	Glass, Deck Mounted	Plastic, Curb Mounted	Tubular Daylighting Devices (TDDs)
			Area-Weighted Performance Rating	Max U-factor	0.58	0.46	0.88	0.88
				Max SHGC	0.25	0.25	NR	NR
			Area-Weighted Performance Rating	Min VT (Min VT _{annual} for TDDs)	0.49	0.49	0.64	0.38
Maximum SRR%	5%							



Roof: Assembly U-factor

		Climate Zone															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Roofs/ Ceilings	Metal Building	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041
	Wood Framed and Other	0.034	0.034	0.034	0.034	0.034	0.049	0.049	0.049	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034



✧ Span Deck Example of U-factor = 0.034

- 4" concrete \approx R-25
(5" R-5 polystyrene above roof deck)



Walls: Assembly U-factor

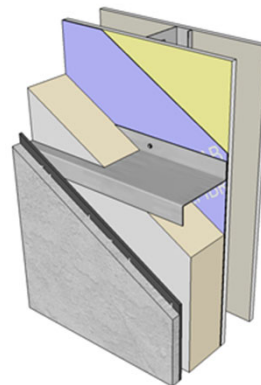
		Climate Zone															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walls	Metal Building	0.113	0.061	0.113	0.061	0.061	0.113	0.113	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.057	0.061
	Metal-framed	0.069	0.062	0.082	0.062	0.062	0.069	0.069	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062
	Mass Light ¹	0.196	0.170	0.278	0.227	0.440	0.440	0.440	0.440	0.440	0.170	0.170	0.170	0.170	0.170	0.170	0.170
	Mass Heavy ¹	0.253	0.650	0.650	0.650	0.650	0.690	0.690	0.690	0.690	0.650	0.184	0.253	0.211	0.184	0.184	0.160
	Wood-framed and Other	0.095	0.059	0.110	0.059	0.102	0.110	0.110	0.102	0.059	0.059	0.045	0.059	0.059	0.059	0.042	0.059



✧ Metal Framed Example of U-factor = 0.062

- 2 x 4 16" OC: R-13 + R-11 (2" cellular polyisocyanurate)
- 2 x 6 16" OC: R-19 + R-11 (2" cellular polyisocyanurate)
- 2 x 8 16" OC: R-25 + R-10 (2" extruded polystyrene)

Note: Z-clips will be considered framing if spaced 24" OC or less





Walls: Assembly U-factor

		Climate Zone															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walls	Metal Building	0.113	0.061	0.113	0.061	0.061	0.113	0.113	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.057	0.061
	Metal-framed	0.069	0.062	0.082	0.062	0.062	0.069	0.069	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062
	Mass Light ¹	0.196	0.170	0.278	0.227	0.440	0.440	0.440	0.440	0.440	0.170	0.170	0.170	0.170	0.170	0.170	0.170
	Mass Heavy ¹	0.253	0.650	0.650	0.650	0.650	0.690	0.690	0.690	0.690	0.650	0.184	0.253	0.211	0.184	0.184	0.160
	Wood-framed and Other	0.095	0.059	0.110	0.059	0.102	0.110	0.110	0.102	0.059	0.059	0.045	0.059	0.059	0.059	0.042	0.059



✧ Mass Example U-factor = 0.170

- 6" concrete: 6" metal framed wall R-19
- 6" concrete: 4" metal framed wall R-11+R-2.5 (1/2" extruded polystyrene)
- 6" concrete: R-5 (1" extruded polystyrene)



Road Map to Subchapter 6

SUBCHAPTER 6: Nonresidential Occupancies*



ADDITIONS, ALTERATIONS, AND REPAIRS

141.0	<i>ADDITIONS, ALTERATIONS, & REPAIRS TO EXISTING NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, & HOTEL/MOTEL BUILDINGS, AND TO EXISTING OUTDOOR LIGHTING, AND TO INTERNALLY AND EXTERNALLY ILLUMINATED SIGNS</i>
141.1	<i>REQUIREMENTS FOR COVERED PROCESSES IN ADDITIONS, ALTERATIONS TO EXISTING NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL BUILDINGS</i>

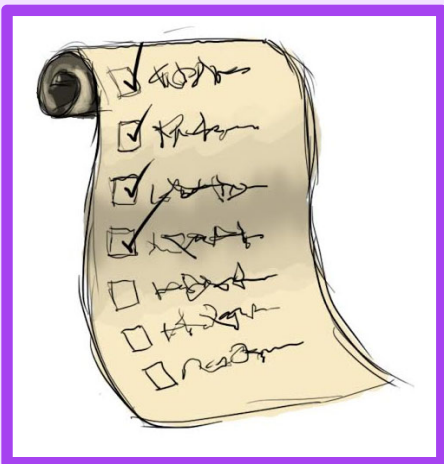
*NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, HOTEL/MOTEL OCCUPANCIES, AND COVERED PROCESSES



Subchapter 6: Example

Section 141.0

ALTERATIONS, & REPAIRS TO EXISTING NONRESIDENTIAL, HIGH- RISE RESIDENTIAL, & HOTEL/MOTEL BUILDINGS, AND TO EXISTING OUTDOOR LIGHTING, AND TO INTERNALLY AND EXTERNALLY ILLUMINATED SIGNS



Additions, alterations, and repairs to existing nonresidential, high-rise residential, and hotel/motel buildings, existing outdoor lighting for these occupancies, and internally and externally illuminated signs, shall meet the requirements specified in Sections 100.0 through 110.10, and 120.0 through 130.5 that are applicable to the building project, and either the performance compliance approach (energy budgets) in Section 141.0(a)2 (for additions) or 141.0(b)3 (for alterations), or the prescriptive compliance approach in Section 141.0(a)1 (for additions) or 141.0(b)2 (for alterations), for the Climate Zone in which the building is located. Climate zones are shown in FIGURE 100.1-A.

Covered process requirements for additions, alterations and repairs to existing nonresidential, high-rise residential, and hotel/motel buildings are specified in Section 141.1.

EXCEPTION to Section 141.0: Alterations to healthcare facilities are not required to comply with this Section.

NOTE: For alterations that change the occupancy classification of the building, the requirements specified in Section 141.0(b) apply to the occupancy after the alterations.

...







Challenge B

Challenge B

How Energy Code Applies to
Healthcare



Energy Code

HEALTHCARE ROAD MAP TO TITLE 24, PART 6 ¹							
ALL OCCUPANCIES:							
Article 1 of Title 24, Part 1 (10-101 through 10-114) including documentation requirements of 10-103 which have been adopted by OSHPD							
Building Occupancies	Building Application	 Mandatory			 Prescriptive	 Performance	 Additions Alterations
		All Occupancy Subchapter 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)
Nonresidential High-Rise Residential, and Hotels/Motels	General	100.0, 100.1-2, 110.0, 110.1 ²	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 (uncond, process spaces)		N.A.		140.3(c)		
	HVAC (conditioned)	110.2, 110.5	120.1, 120.2*, 120.3, 120.4, 120.5, 120.8	N.A.	140.4*		
	Water Heating	110.3*	120.3, 120.8, 120.9	N.A.	140.5		
	Indoor Lighting (conditioned, process spaces)	110.9, 110.12	120.8	130.0, 130.1*, 130.4	140.3(c), 140.6*	N.A.	
	Indoor Lighting (uncond. & parking garages)	110.9, 110.12	N.A.	130.0, 130.1, 130.4	140.3(c), 140.6*		
	Outdoor Lighting	110.9, 110.12	N.A.	130.0, 130.2, 130.4	140.7		
	Electrical Power Distribution	110.11, 110.12	N.A.	130.5*	N.A.		
	Pool and Spa Systems	110.4, 110.5	N.A.	N.A.	N.A.		
Solar Ready Buildings	110.10	N.A.	N.A.	N.A.	N.A.	141.0(a)	
Covered Processes ³	Refrigerated Warehouse Commercial Refrigeration Parking Garage Process Boilers Compressed Air Elevators Escalators/Moving Walkways Computer Room Commercial Kitchens Lab and Factory Exhaust Systems	110.2	120.6*	N.A.	140.9	140.1	140.9, 141.1
Signs	Indoor and Outdoor	110.9	N.A.	130.0, 130.3	140.8	N.A.	141.0, 141.0(b)2H



Title 24, Part 6: Subchapter 1 - Scope



Demographics

- 100.0: Occupancy types covered
- Table 100.0-A: What parts of the building are regulated by what section
- 100.2: What is TDV and how it is used for performance compliance

Hidden Gems

- 100.1: DEFINITIONS, this really is one of my favorites.
- Table 100.0-A, "map legend" to the standards



Title 24, Part 6: Subchapter 2 – All Buildings



Demographics

- Applies to all building types

Hidden Gems





- This defines how equipment and building features need to meet:
 - Title 20 Appliance Standards
 - Minimum HVAC efficiencies
 - Default fenestration values (can be used in performance but not prescriptive compliance documentation)
 - Demand response control requirements

Exceptions

- There are areas Healthcare Occupancies do not have to worry about:
 - Service Water Heating §110.3
 - ▶ 110.3(a) Certification By Manufacturers
 - Healthcare occupancies to meet ASHRAE or CA Plumbing Code
 - ▶ 110.3(c) Installation
 - **Outlet Temperature:** Controls to meet CA Plumbing Code Section 613.0
 - **Controls for hot water distribution systems:** Healthcare occupancies are exempt to these requirements
 - Solar Ready §110.10
 - Demand Management §110.12



Energy Code

HEALTHCARE ROAD MAP TO TITLE 24, PART 6 ¹								
ALL OCCUPANCIES:								
Article 1 of Title 24, Part 1 (10-101 through 10-114) including documentation requirements of 10-103 which have been adopted by OSHPD								
Building Occupancies	Building Application	 Mandatory			 Prescriptive	 Performance	 Additions Alterations	
		All Occupancy Subchapter 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)	
Nonresidential High-Rise Residential, and Hotels/Motels	General	100.0, 100.1-2, 110.0, 110.1 ²	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 (uncond, process spaces)		N.A.		140.3(c)			
	HVAC (conditioned)	110.2, 110.5	120.1, 120.2*, 120.3, 120.4, 120.5, 120.8	N.A.	140.4*			
	Water Heating	110.3*	120.3, 120.8, 120.9	N.A.	140.5			
	Indoor Lighting (conditioned, process spaces)	110.9, 110.12	120.8	130.0, 130.1*, 130.4	140.3(c), 140.6*	N.A.		
	Indoor Lighting (uncond. & parking garages)	110.9, 110.12	N.A.	130.0, 130.1, 130.4	140.3(c), 140.6*			
	Outdoor Lighting	110.9, 110.12	N.A.	130.0, 130.2, 130.4	140.7			
	Electrical Power Distribution	110.11, 110.12	N.A.	130.5*	N.A.			
	Pool and Spa Systems	110.4, 110.5	N.A.	N.A.	N.A.	N.A.		
	Solar Ready Buildings	110.10	N.A.	N.A.	N.A.	141.0(a)		
Covered Processes ³	Refrigerated Warehouse Commercial Refrigeration Parking Garage Process Boilers Compressed Air Elevators Escalators/Moving Walkways Computer Room Commercial Kitchens Lab and Factory Exhaust Systems	110.2	120.6*	N.A.	140.9	140.1	140.9, 141.1	
Signs	Indoor and Outdoor	110.9	N.A.	130.0, 130.3	140.8	N.A.	141.0, 141.0(b)2H	



Title 24, Part 6: Subchapter 3 - Mandatory



Demographics

- Applies to **just** nonresidential occupancies (mostly)
- Don't forget about Covered Processes requirements in §120.6

Hidden Gems

- Mandatory Note blocks should be developed using this information (or use Energy Code Ace Mandatory Note Block Resource)

Exceptions

- The following is exempt for Healthcare Occupancies:
 - Ventilation §120.1 to meet CA Mechanical Code
 - Thermostat deadband requirements and demand shed controls §120.2(b) are not required and all the HVAC shut-off and reset control requirements of §120.2(e)
 - All HVAC air distribution requirements of §120.4
 - OSHPD field testing requirements apply instead of acceptance testing of §120.5
 - Compressed air requirements of §120.6(e) and the elevator requirements of §120.6(f)
 - Cx per §120.8 to use Chapter 7 of the CA Administrative Code (Title 24, Part 1).



Note Blocks Tools





★ What they do:

- ✧ **Dynamic pdf file** helps to **quickly identify** Mandatory Measures for Nonresidential projects
- ✧ Keeps track of Mandatory Measures and acceptance testing, exceptions, code references, and user notes **in one place**
- ✧ Creates a **printable custom list** of measures for each project in just minutes





Energy Code

HEALTHCARE ROAD MAP TO TITLE 24, PART 6 ¹							
ALL OCCUPANCIES:							
Article 1 of Title 24, Part 1 (10-101 through 10-114) including documentation requirements of 10-103 which have been adopted by OSHPD							
Building Occupancies	Building Application	 Mandatory			 Prescriptive	 Performance	 Additions Alterations
		All Occupancy Subchapter 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)
Nonresidential High-Rise Residential, and Hotels/Motels	General	100.0, 100.1-2, 110.0, 110.1 ²	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 (uncond, process spaces)	N.A.			140.3(c)		
	HVAC (conditioned)	110.2, 110.5	120.1, 120.2*, 120.3, 120.4, 120.5, 120.8	N.A.	140.4*		
	Water Heating	110.3*	120.3, 120.8, 120.9	N.A.	140.5		
	Indoor Lighting (conditioned, process spaces)	110.9, 110.12	120.8	130.0, 130.1*, 130.4	140.3(c), 140.6*	N.A.	
	Indoor Lighting (uncond. & parking garages)	110.9, 110.12	N.A.	130.0, 130.1, 130.4	140.3(c), 140.6*		
	Outdoor Lighting	110.9, 110.12	N.A.	130.0, 130.2, 130.4	140.7		
	Electrical Power Distribution	110.11, 110.12	N.A.	130.5*	N.A.		
	Pool and Spa Systems	110.4, 110.5	N.A.	N.A.	N.A.	N.A.	
	Solar Ready Buildings	110.10	N.A.	N.A.	N.A.		141.0(a)
Covered Processes ³	Refrigerated Warehouse Commercial Refrigeration Parking Garage Process Boilers Compressed Air Elevators Escalators/Moving Walkways Computer Room Commercial Kitchens Lab and Factory Exhaust Systems	110.2	120.6*	N.A.	140.9	140.1	140.9, 141.1
Signs	Indoor and Outdoor	110.9	N.A.	130.0, 130.3	140.8	N.A.	141.0, 141.0(b)2H



Title 24, Part 6: Subchapter 4 - Electrical



Demographics

- Lighting AND Electrical requirements for nonresidential occupancies

Hidden Gems





- Lighting Controls
 - Indoor
 - Outdoor
 - Signs
- Electrical power distribution requirements

Exceptions

- The following is exempt for Healthcare Occupancies:
 - Indoor lighting:
 - ▶ Manual area controls of §130.1(a)2 do not have to be located within the room if risk to health & safety
 - ▶ Multi-level controls of §130.1(b)
 - ▶ Shut-OFF controls of §130.1(c)
 - Sign control requirements of §130.3(a)
 - OSHPD field testing requirements apply instead of §120.5
 - Electrical distribution metering, separation of load to meet CA Electrical Code; voltage drop permitted by CA Electrical Code §647.4/695.6/695.7; Circuit controls for 120-Volt outlets of §130.5(d)



Energy Code

HEALTHCARE ROAD MAP TO TITLE 24, PART 6 ¹							
ALL OCCUPANCIES:							
Article 1 of Title 24, Part 1 (10-101 through 10-114) including documentation requirements of 10-103 which have been adopted by OSHPD							
Building Occupancies	Building Application	 Mandatory			 Prescriptive	 Performance	 Additions Alterations
		All Occupancy Subchapter 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)
Nonresidential High-Rise Residential, and Hotels/Motels	General	100.0, 100.1-2, 110.0, 110.1 ²	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 (uncond, process spaces)	N.A.			140.3(c)		
	HVAC (conditioned)	110.2, 110.5	120.1, 120.2*, 120.3, 120.4, 120.5, 120.8	N.A.	140.4*		
	Water Heating	110.3*	120.3, 120.8, 120.9	N.A.	140.5		
	Indoor Lighting (conditioned, process spaces)	110.9, 110.12	120.8	130.0, 130.1*, 130.4	140.3(c), 140.6*	N.A.	
	Indoor Lighting (uncond. & parking garages)	110.9, 110.12	N.A.	130.0, 130.1, 130.4	140.3(c), 140.6*		
	Outdoor Lighting	110.9, 110.12	N.A.	130.0, 130.2, 130.4	140.7		
	Electrical Power Distribution	110.11, 110.12	N.A.	130.5*	N.A.		
	Pool and Spa Systems	110.4, 110.5	N.A.	N.A.	N.A.		
	Solar Ready Buildings	110.10	N.A.	N.A.	N.A.	N.A.	141.0(a)
Covered Processes ³	Refrigerated Warehouse Commercial Refrigeration Parking Garage Process Boilers Compressed Air Elevators Escalators/Moving Walkways Computer Room Commercial Kitchens Lab and Factory Exhaust Systems	110.2	120.6*	N.A.	140.9	140.1	140.9, 141.1
Signs	Indoor and Outdoor	110.9	N.A.	130.0, 130.3	140.8	N.A.	141.0, 141.0(b)2H



Title 24, Part 6: Subchapter 5 – Envelope §140.3

Demographics

- Prescriptive requirements and the performance options for nonresidential buildings

Hidden Gems

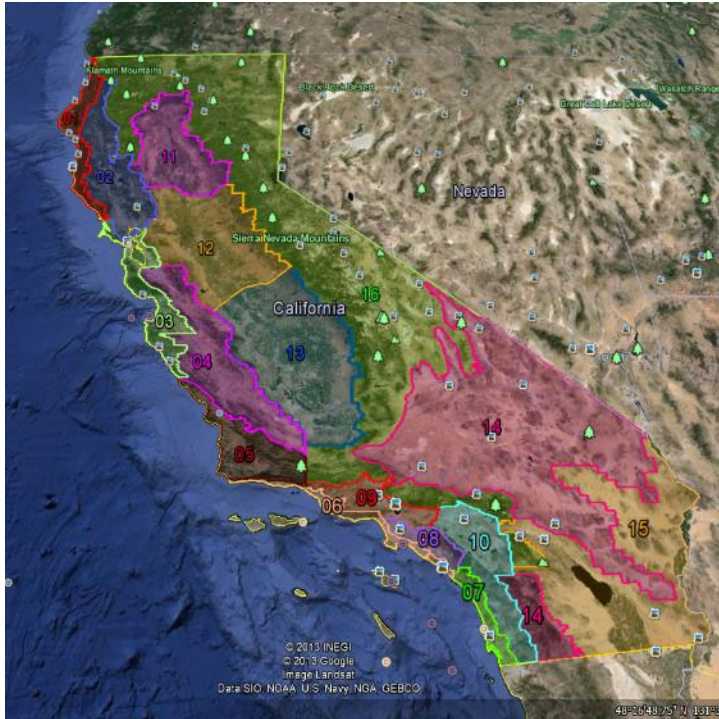
- Be aware of WHAT you can trade using the performance approach
 - *Example: Understand that when designing a wall, it must meet prescriptive U-factors, or take a "penalty" for this in a performance calculation.*

Exceptions

- The following is exempt for Healthcare Occupancies:
 - Nothing is exempt when considering envelope requirements



Importance of Climate Zones



What is the difference between the Climate Zones?

- ✦ Climate conditions determine the "zone" a location is assigned to and considers all of the following:
 - ✦ Humidity
 - ✦ Elevation
 - ✦ Temperature
 - ✦ Weather patterns

Humidity	Elevation	Temperature	Weather
Coastal	At Sea Level	Cold	Foggy
Inland	Above Sea Level	Mild	Cloudy
Desert	Mountain	Hot	Sunny



Title 24, Part 6: Subchapter 5 – HVAC §140.4

Exceptions

- The following is exempt for Healthcare Occupancies:

- HVAC §140.4

- ▶ Sizing calculations and equipment selection of §140.4(b) not required and to use CA Mechanical Code calculation requirements instead
- ▶ Fan system requirements of §140.4(c)
- ▶ Space-conditioning zone controls of §140.4(d)
- ▶ Supply air temperature reset control requirements of §140.4(f)
- ▶ 300 ton air cooled chiller limitation per §140.4(j)
- ▶ Chilled/hot water temperature reset controls of §140.4(k)
- ▶ HERS duct leakage verification per §140.4(l)
- ▶ Variable fan airflow control requirements of §140.4(m)
- ▶ Operable window/door interlock controls of §140.4(n)
- ▶ Exhaust system supply flow limitations of §140.4(o)

- The following is NOT exempt for Healthcare Occupancies:

- HVAC

- ▶ Load sizing calculations and equipment selection (CA Mechanical Code)
- ▶ Economizers per §140.4(e)
- ▶ Limitation of electric resistance heating systems per §140.4(g)
- ▶ Heat rejection system requirements of §140.4(h)
- ▶ Minimum chiller efficiency requirements of §140.4(i)
- ▶ All other hydronic system requirements (not including temperature reset controls) of §140.4(k)



Title 24, Part 6: Subchapter 5 - Lighting §140.6

Demographics

- Description of methods used to determine allowed lighting power (watts per square foot)

Hidden Gems

- Table 140.6-C – Area Category Method – Lighting power Density Values
 - These space types are used by the compliance software to “define” space types (i.e. lobby, office, exam/treatment room)

Exceptions

- The following is exempt for Healthcare Occupancies:
 - Indoor lighting §140.6
 - ▶ Wattage associated with office buildings with medical and clinical areas and healthcare facilities that are:
 - Examination and surgical lights,
 - Low-ambient night-lights, and
 - Lighting integral to medical equipment

Provided that these lighting systems are additions to and separately switched from a general lighting system.

 - Sign Lighting controls are exempt per §130.3, but the wattage requirements will be required.



Area Types Define Modeling Regime

Aging Eye/Low-vision ¹¹	Main Entry Lobby	Electrical, Mechanical, Telephone Rooms	> 250 square feet
	Stairwell		
	Corridor Area		
	Lounge/Waiting Area		
	Multipurpose Room		
	Religious Worship Area		
	Dining		
All other	Restroom	Exercise/Fitness Center and Gymnasium Area	≤ 250 square feet
Audience Seating Area		Financial Transaction Area	Open plan office
Auditorium Area		General/Commercial & Industrial Work Area	Parking Zone
Auto Repair / Maintenance Area		Low Bay	Dedicated Ramps
Beauty Salon Area		High Bay	Daylight Adaptation Zones ²
Civic Meeting Place Area		Precision	Parking Garage Area
Classroom, Lecture, Training, Vocational Area		Exam/Treatment Room	Pharmacy Area
Commercial/Industrial Storage		Imaging Room	Religious Worship Area
Warehouse		Medical Supply Room	Restrooms
Shipping & Handling		Nursery	Retail Sales Area
Concourse and Atria Area		Nurse's Station	Grocery Sales
Convention, Conference, Multipurpose and Meeting Area		Operating Room	Retail Merchandise Sales
Copy Room		Patient Room	Fitting Room
Corridor Area		Physical Therapy Room	Scientific Laboratory Area
Dining Area		Recovery Room	Class I Facility ¹³
Bar/Lounge and Fine Dining		Hotel Function Area	Class II Facility ¹³
Cafeteria/Fast Food		Kitchen/Food Preparation Area	Class III Facility ¹³
Family and Leisure		Laundry Area	Class IV Facility ¹³
		Library	Stairwell
		Reading Area	Theater Area
		Stacks Area	Motion picture Performance
		Locker Room	Baggage Area
		Lounge, Breakroom, or Waiting Area	Ticketing Area
		Main Entry Lobby	Videoconferencing Studio
		Museum Area	
		Exhibition/Display	
		Restoration Room	



Title 24, Part 6: Subchapter 5 – Process §140.9

Demographics

- These are requirements that are typically considered process loads (not supporting comfort HVAC loads), and have Energy Code requirements

Hidden Gems





- Nothing in this subchapter applies to Healthcare occupancies

Exceptions

- The following is exempt for Healthcare Occupancies:
 - Computer rooms per §140.9(a)
 - Kitchen hoods per §140.9(b)
 - Lab and factory exhaust and fume hood systems per §140.9(c)



Energy Code

HEALTHCARE ROAD MAP TO TITLE 24, PART 6 ¹							
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Nonresidential High-Rise Residential, and Hotels/Motels	General	100.0, 100.1-2, 110.0, 110.1 ²	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 (uncond, process spaces)	N.A.			140.3(c)		
	HVAC (conditioned)	110.2, 110.5	120.1, 120.2*, 120.3, 120.4, 120.5, 120.8	N.A.	140.4*		
	Water Heating	110.3*	120.3, 120.8, 120.9	N.A.	140.5		
	Indoor Lighting (conditioned, process spaces)	110.9, 110.12	120.8	130.0, 130.1*, 130.4	140.3(c), 140.6*	N.A.	
	Indoor Lighting (uncond. & parking garages)	110.9, 110.12	N.A.	130.0, 130.1, 130.4	140.3(c), 140.6*		
	Outdoor Lighting	110.9, 110.12	N.A.	130.0, 130.2, 130.4	140.7		
	Electrical Power Distribution	110.11, 110.12	N.A.	130.5*	N.A.		
	Pool and Spa Systems	110.4, 110.5	N.A.	N.A.	N.A.	N.A.	
	Solar Ready Buildings	110.10	N.A.	N.A.	N.A.	141.0(a)	
Covered Processes ³	Refrigerated Warehouse Commercial Refrigeration Parking Garage Process Boilers Compressed Air Elevators Escalators/Moving Walkways Computer Room Commercial Kitchens Lab and Factory Exhaust Systems	110.2	120.6*	N.A.	140.9	140.1	140.9, 141.1
Signs	Indoor and Outdoor	110.9	N.A.	130.0, 130.3	140.8	N.A.	141.0, 141.0(b)(2)(A)



Title 24, Part 6: Subchapter 6

Demographics

- What's different when existing construction is involved?

Hidden Gems

- Understanding that the requirements for additions may differ from what is required for a new building.
 - Existing equipment serving addition do not need to meet current code

Exceptions

- The following is exempt for Healthcare Occupancies:
 - Alterations per §141.0(b)



Challenge C

Challenge C

 Determining Best Pathway to Compliance

Prescriptive vs Performance

Nonresidential Standards: §140

Mandatory Measures (MM)

Must be met, always — **may** be exceeded



Option #1



Prescriptive Approach

- ★ **Simple but inflexible** — “all or nothing” approach to compliance
- ★ Offers list of requirements for each building feature.
- ★ List of requirements based on climate zone.

OR

Option #2



Performance Approach

- ★ **Allows flexibility** and building customization
- ★ Software verifies whether “Proposed Design” is as good as, or better than, “Standard Design” (the baseline for Prescriptive)

Project Compliance Documentation



Prescriptive vs Performance: Envelope Example

1

Prescriptive

- ★ Standards §140.3(a) — Tables 140.3-B, C, D
- ★ Envelope components treated separately
- ★ Each envelope component must meet specific requirements



2

Performance

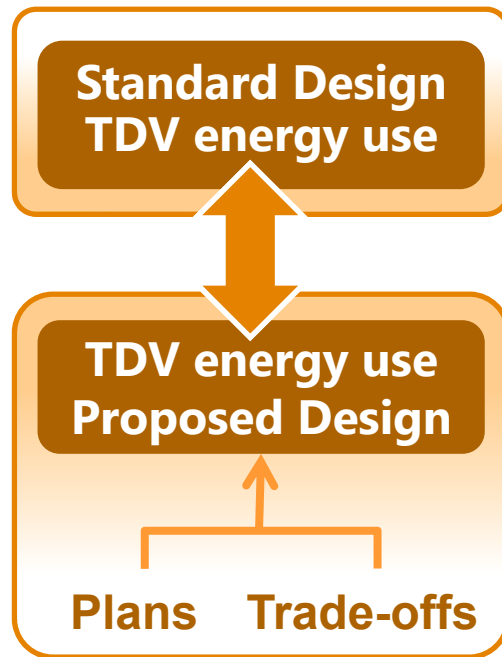
- ★ Envelope components only
OR
- ★ Envelope plus lighting and/or mechanical, **if permitted at the same time**
- ★ If envelope components only, tradeoffs allowed among all envelope components
- ★ If envelope is combined with other parts of the building for energy compliance, then more trade-offs can be made — for example:
Increasing envelope efficiency in order to allow more lighting power or a less efficient mechanical system





Performance Approach

§140.1



- ★ Performance Approach used the most because it allows a custom description of building features for many trade-off opportunities.
- ★ Baseline based on Prescriptive requirements.
- ★ Proposed building complies if **TDV energy use of Proposed Design \leq the Standard Design**.
- ★ Approved Performance software for 2019 Energy Code (Nonresidential Buildings):*
 - ✧ CBECC-Com
 - ✧ EnergyPro
 - ✧ IES-VE

Different compliance software may limit the definition of certain features, such as overhang shading or other compliance credits.

*** NOTE: The list of approved software changes over time. Please check the CEC site for the latest information:**

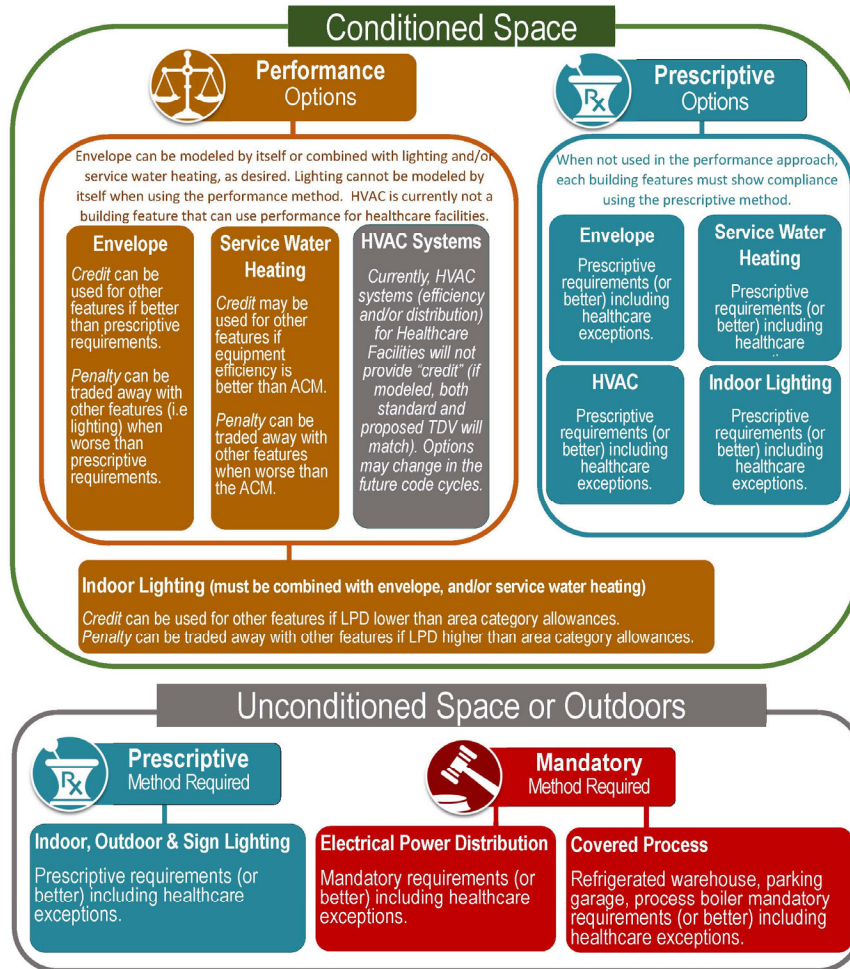
https://www2.energy.ca.gov/title24/2019standards/2019_computer_prog_list.html



Which Compliance Method?

 **Decoding** 2019 Title 24, Part 6™
Let's Talk Healthcare Facilities

MODELING HEALTHCARE FOR COMPLIANCE



How will the building comply with the Energy Code:

★ Prescriptive?

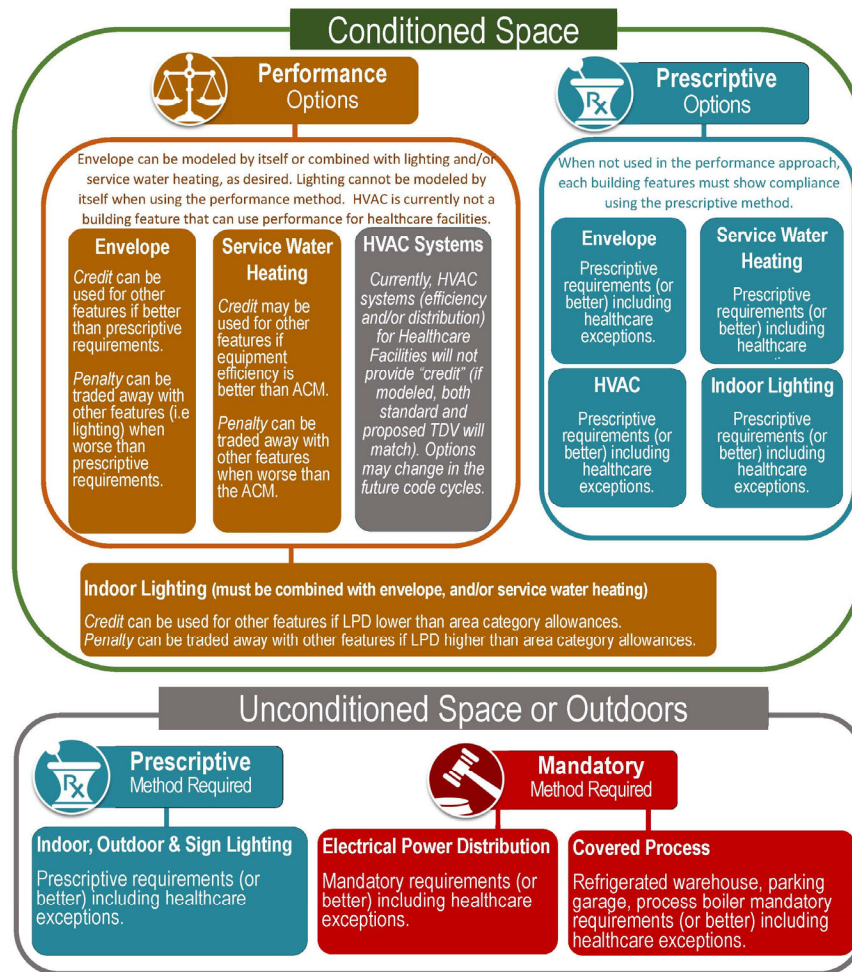
- ✧ Can be envelope and/or indoor lighting of conditioned space;
- ✧ Currently it would be best to use for HVAC;
- ✧ Must be used for indoor lighting in unconditioned space, outdoor and sign lighting.



Which Compliance Method?

 **Decoding** 2019 Title 24, Part 6™
Let's Talk Healthcare Facilities

MODELING HEALTHCARE FOR COMPLIANCE

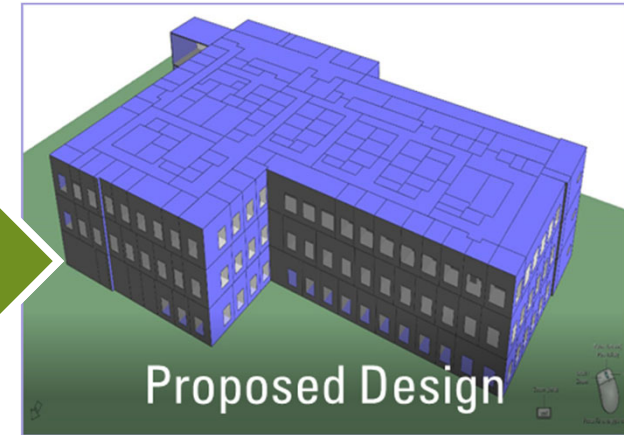
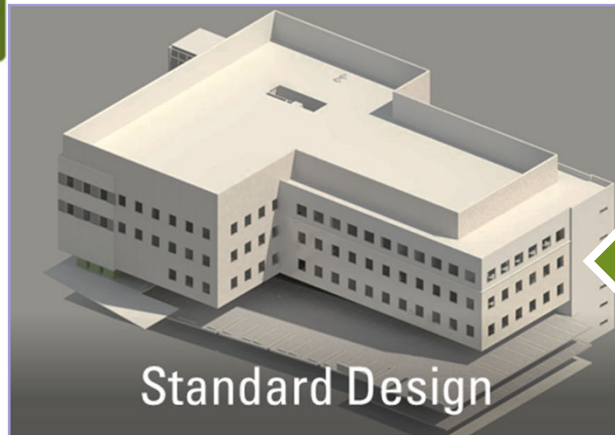


How will the building comply with the Energy Code:

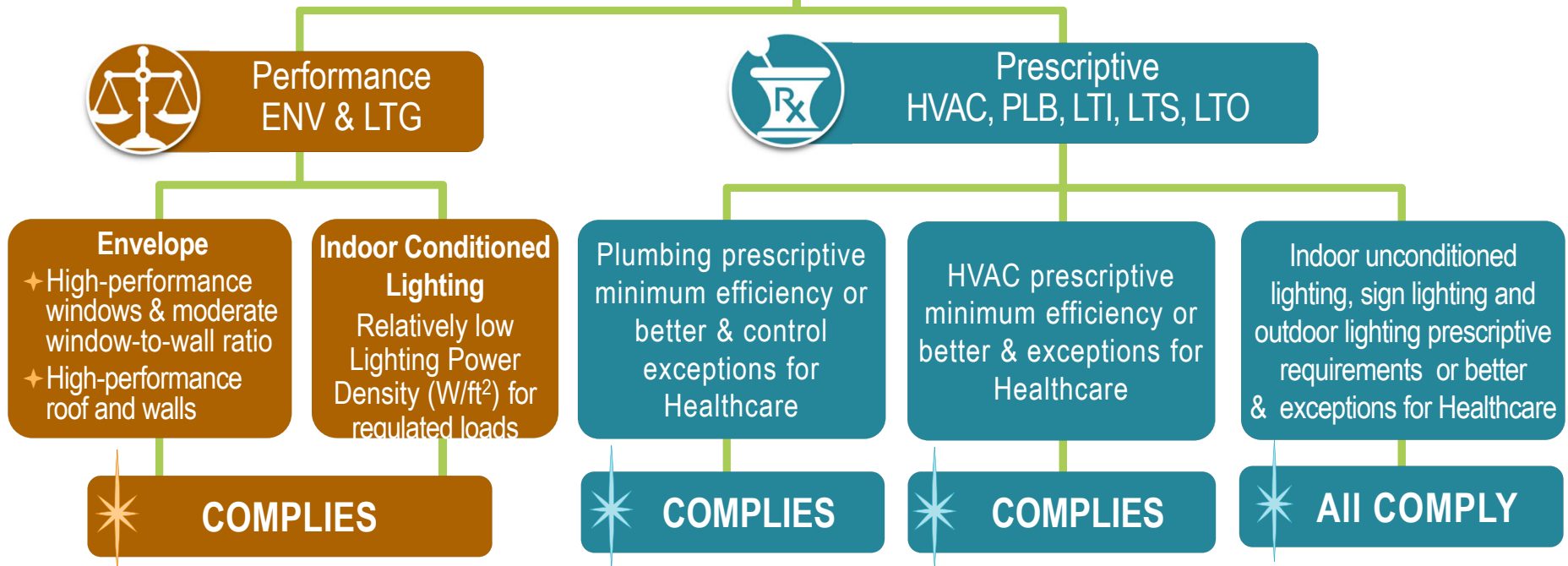
- ✦ Performance? Can be...
 - ✦ A mix of the envelope of the conditioned space and the indoor lighting in conditioned spaces;
 - ✦ Just the envelope;
 - ✦ Cannot be just the lighting;
 - ✦ Currently there are no benefits to using HVAC?



How to model a hospital? Here's one approach that works...



Modeling Healthcare Compliance





“Real world” example: Large Acute Care Tower (Highland)
construction completed 2017



What needs to be improved to show compliance?



250,000 ft², 9 Stories, Patient Rooms, Surgery Suites, Imaging

- ★ 25% Window-to-Wall Ratio (WWR)
 - ★ Compared to 25% WWR
- ★ Window Performance: 0.51 U-Factor, 0.27–0.29 SHGC
 - ★ Compared to U-factor = 0.41 / SHGC = 0.26 / VT = 0.46
- ★ R-30 Total Thermal Performance Roof: U-factor = 0.031
 - ★ Compared to U-factor = 0.034
- ★ R-16 Total Thermal Performance Walls: U-factor = 0.106
 - ★ Compared to U-factor = 0.082

or ★ 0.65 Watts/ft² of regulated lighting load

- ★ Compared to a little less than 0.65 W/ft²

Exempt Lighting Loads:

- ✧ Surgical Lighting
- ✧ Exam Lighting
- ✧ Low Ambient Night-Lights
- ✧ Lighting Integral to Medical Equipment



Another example: Small hospital modeled with ENV and LTG

What needs to be improved to show compliance?



76,000 ft², two stories over parking garage

★ 47.3% Window-to-Wall Ratio

★ Compared to 40% WWR

TT5

★ Window Performance: U-factor = 0.41 / SHGC = 0.26 / VT = 0.46
(Prescriptive Minimum)

★ Compared to the same

★ Roof and walls at Prescriptive Minimum

★ Compared to the same

or

★ Prescriptive Minimum Lighting Power Density for regulated lighting load

★ Compared to the same

Exempt Lighting Loads :

- ✧ Surgical Lighting
- ✧ Exam Lighting
- ✧ Low Ambient Night-Lights
- ✧ Lighting Integral to Medical Equipment



Utilizing Lighting Power in Performance

AREA NAMES USED FOR PERFORMANCE MODELING

TABLE 140.6-A FROM TITLE 24 PART 6

Aging Eye/Low-vision ¹¹	Main Entry Lobby Stairwell Corridor Area Lounge/Waiting Area Multipurpose Room Religious Worship Area Dining Restroom	Electrical, Mechanical, Telephone Rooms Exercise/Fitness Center and Gymnasium Area Financial Transaction Area General/Commercial & Industrial Work Area	Low Bay High Bay Precision	Office Area	> 250 square feet ≤ 250 square feet Open plan office
All other		Exam/Treatment Room Imaging Room Medical Supply Room Nursery Nurse's Station Operating Room Patient Room Physical Therapy Room Recovery Room		Parking Garage Area	Parking Zone Dedicated Ramps Daylight Adaptation Zones ²
Audience Seating Area		Healthcare Facility and Hospitals		Pharmacy Area	
Auditorium Area				Religious Worship Area	
Auto Repair / Maintenance Area				Restrooms	Grocery Sales Retail Merchandise Sales Fitting Room
Beauty Salon Area				Retail Sales Area	
Civic Meeting Place Area				Scientific Laboratory Area	Class I Facility ¹³ Class II Facility ¹³ Class III Facility ¹³ Class IV Facility ¹³
Classroom, Lecture, Training, Vocational Area				Sports Arena – Playing Area	
Commercial/Industrial Storage	Warehouse Shipping & Handling			Stairwell	Motion picture Performance Baggage Area Ticketing Area Videoconferencing Studio
Concourse and Atria Area		Hotel Function Area		Theater Area	
Convention, Conference, Multipurpose and Meeting Area		Kitchen/Food Preparation Area Laundry Area		Transportation Function	
Copy Room		Library	Reading Area Stacks Area	Videoconferencing Studio	
Corridor Area		Locker Room Lounge, Breakroom, or Waiting Area Main Entry Lobby			
Dining Area	Bar/Lounge and Fine Dining Cafeteria/Fast Food Family and Leisure	Museum Area	Exhibition/Display Restoration Room		

Breaking Down the Spaces

✦ Selecting the correct space type will set the correct LPD allowance you are compared against at the building level:

- ✦ Corridors = 0.6 W/ft^2
- ✦ Lobby = 0.85 W/ft^2
- ✦ Exam/Treatment Rm = 1.15 W/ft^2

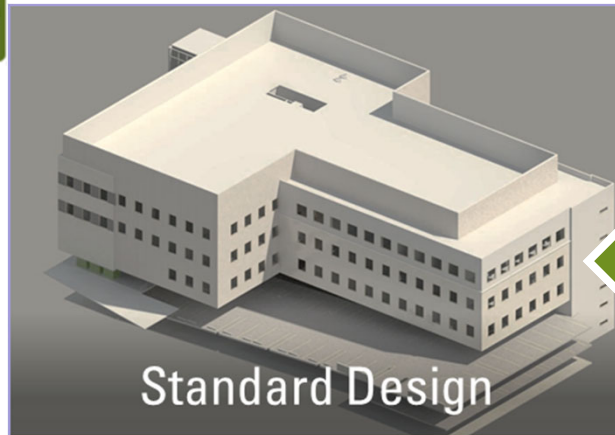
$$\begin{aligned} &\text{Corridors @ } 1,000 \text{ ft}^2 \times 0.6 \text{ W/ft}^2 = 600 \text{ W} \\ &\quad + \\ &\quad \text{Lobby @ } 500 \text{ ft}^2 \times 0.85 \text{ W/ft}^2 = 425 \text{ W} \\ &\quad + \\ &\quad \text{Exam @ } 5,000 \text{ ft}^2 \times 1.15 \text{ W/ft}^2 = 5,750 \text{ W} \end{aligned}$$

6,775 watts allowed

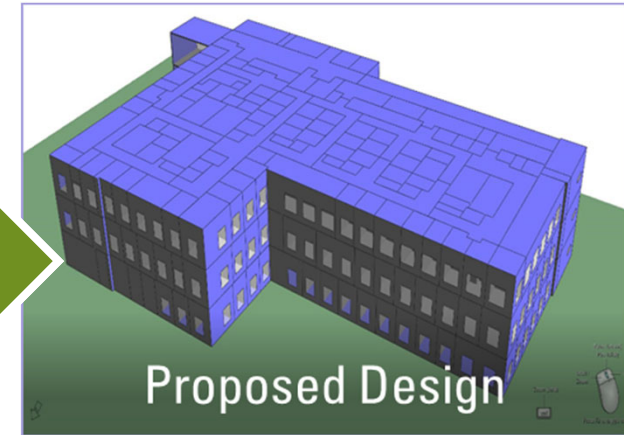
- ✦ Credit for anything less than
- ✦ Penalty for anything more than



How to model a hospital? Here's another..



Standard Design



Proposed Design

Modeling Healthcare Compliance



Performance
ENV

Envelope

- ✦ High-performance windows & moderate window-to-wall ratio
- ✦ High-performance roof and walls

✦ COMPLIES



Prescriptive
HVAC, PLB, LTI, LTS, LTO

Indoor conditioned lighting prescriptive minimum efficiency or better & controls exceptions for Healthcare

✦ COMPLIES

Plumbing prescriptive minimum efficiency or better & controls exceptions for Healthcare

✦ COMPLIES

HVAC Prescriptive Minimum efficiency or better & exceptions for Healthcare

✦ COMPLIES

Indoor unconditioned lighting, sign lighting and outdoor lighting prescriptive requirements or better & exceptions for Healthcare

✦ COMPLIES



How about not using modeling software?

Prescriptive Approach

- ✦ **Simple but inflexible** — “all or nothing” approach to compliance
- ✦ Offers list of requirements for each building feature.
- ✦ List of requirements based on climate zone.



Modeling Healthcare Compliance



Prescriptive
ENV, HVAC, PLB, LTI, LTS, LTO

Envelope
prescriptive
minimum
prescriptive
requirements or
better

✦ COMPLIES

Indoor lighting
prescriptive
minimum efficiency
or better &
controls exceptions
for Healthcare

✦ COMPLIES

Plumbing
prescriptive
minimum efficiency
or better &
controls exceptions
for Healthcare

✦ COMPLIES

HVAC prescriptive
minimum efficiency
or better &
exceptions for
Healthcare

✦ COMPLIES

Indoor unconditioned lighting,
sign lighting and outdoor lighting
prescriptive requirements or
better & exceptions for
Healthcare

✦ COMPLIES



Challenge D

Challenge D

Documenting Compliance



Who, what, where for the forms?

Decoding 2019 Title 24, Part 6™
Let's Talk Healthcare Facilities

DOCUMENTATION SPECIFIC TO THE ENERGY CODE					
Building Occupancies	Building Application	NRCC Forms			NRCA Forms
		Performance	Prescriptive	Mandatory	
		Under the purview of the designer to demonstrate how the applicable building features are meeting the requirements of the Energy Code and submitted to OSHPD for plan review.			Under the purview of the installing contractor to document what was installed to meet the requirements documented in the NRCC forms approved for plan review.
		Under the purview of the installing contractor to document what was installed to meet the requirements documented in the NRCC forms approved for plan review.			Under the purview of the installing contractor to document what was installed is tested and meets the acceptance testing requirements. Many of these are exempt for healthcare facilities and field verification methods used by OSHPD take precedence.
Nonresidential	General	N/A			
	Envelope (conditioned)	NRCC-PRF-01-E	NRCC-ENV-E	Note block	NRCA-ENV-02-F NRCA-ENV-03-F
	HVAC (conditioned)	NRCC-PRF-01-E	NRCC-MCH-E	Note block	NRCA-MCH-02 through-19-A
	Water Heating	NRCC-PRF-01-E	NRCC-PLB-E	Note block	N/A
	Indoor Lighting (conditioned, process spaces)	NRCC-PRF-01-E	NRCC-LTI-E	Note block	NRCA-LTI-02 through 05-A
	Indoor Lighting (uncond. & parking garages)	N/A	NRCC-LTI-E	Note block	NRCA-LTI-02 through 05-A
	Outdoor Lighting	N/A	NRCC-LTO-E	Note block	NRCA-LTO-02-A
	Electrical Power Distribution (voltage drop requirements only)	N/A	N/A	NRCC-ELC-E	N/A
	Commissioning	N/A	N/A	NRCC-CXR-E	N/A
	Pool and Spa Systems	N/A	N/A	Note block	N/A
Covered Processes ³	Solar Ready Buildings	N/A	N/A	NRCC-SRA-E	NRCI-SPV-or-STH-01-E
	Refrigerated Warehouse* ≥3,000 ft ²	N/A	N/A	NRCC-PRC-E	NRCA-PRC-04 through 08-F
	Commercial (Retail) Refrigeration*	N/A	N/A	NRCC-PRC-E	N/A
	Parking Garage	N/A	N/A	NRCC-PRC-E	NRCA-PRC-03-E
	Process Boilers ≥2.5 MMBtu/h	N/A	N/A	NRCC-PRC-E	N/A
	Compressed Air	NRCC-PRF-01-E	NRCC-PRC-E	Note block	NRCA-PRC-01-F
	Elevators	NRCC-PRF-01-E	NRCC-PRC-E	Note block	NRCA-PRC-12-F
	Escalators and moving walkways (airport, hotel and transportation areas only)	NRCC-PRF-01-E	NRCC-PRC-E	Note block	NRCA-PRC-13-F
	Computer Rooms	NRCC-PRF-01-E	NRCC-PRC-E	Note block	N/A
	Commercial Kitchens	NRCC-PRF-01-E	NRCC-PRC-E	Note block	NRCA-PRC-02-F
Signs	Lab and Factory Exhaust Systems	NRCC-PRF-01-E	NRCC-PRC-E	Note block	NRCA-PRC-14/15-F NRCA-PRC-16-A
	Indoor and Outdoor	N/A	NRCC-LTS-E	Note block	N/A

Legend

Grey text and crossed: Not required for licensed healthcare facilities

* Not a typical application for Healthcare Facilities

Page 4 of 6

Why 3 Forms?

- ★ Certificate of Compliance (NRCC):
 - ✧ Under the purview of the **designer** to demonstrate *how the applicable building features* are meeting the requirements of the Energy Code.
- ★ Certificate of Installation (NRCI):
 - ✧ Under the purview of the **installing contractor** to document *what was installed* to meet the requirements documented in the NRCC forms approved for plan review.
- ★ Certificate of Acceptance (NRCA):
 - ✧ Under the purview of the **installing contractor** to document *what was installed is tested and meets the acceptance testing requirements*.



2019 NRCC (Nonresidential Certificates of Compliance)

Indoor Lighting

Envelope

Mechanical

Plumbing

Performance

Process

Sign Lighting

Outdoor Lighting

Electrical

Solar Ready

Commissioning

- ★ You'll **always** see this form
- ✗ You'll **never** see this form; it does not apply to Healthcare projects
- ★ You'll likely see this form a lot
- ★ You might see this form for some projects depending on method used, and applicable PRC features



2019 NRCI and NRCA "Field Forms"

Installation

Completed in the field by the installer & given to the building inspector. Each trade with an NRCC scope will need to complete one (i.e. not FFA finish trades)

https://www.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/NRCI/

Acceptance

NRCA-ENV-02-F to be completed in the field by the window Field Technician & given to the building inspector. None of the other NRCA forms are required for healthcare facilities.

https://www.energy.ca.gov/title24/2019standards/2019_compliance_documents/Nonresidential_Documents/NRCA/



Next Steps



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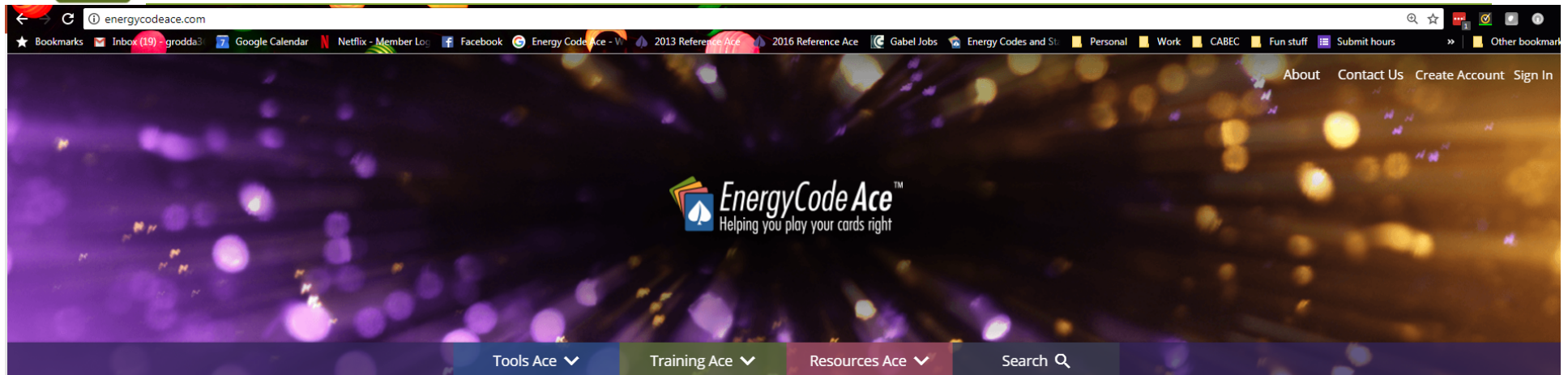
Email address:

You will receive an email requesting that you confirm your subscription.

www.energy.ca.gov/efficiency/blueprint/



Other ECA Resources



Quick reference component-by-component summaries of sections of Title 24, Part 6 "triggered" based on project scope.



Quick reference summaries of key requirements, forms, definitions and resources for implementing Title 24, Part 6 and Title 20



Step-by-step guidance for plans checks and field inspections



Short manuals including compliance requirements and recommendations for implementing Title 24, Part 6 in new construction, addition and renovation projects.

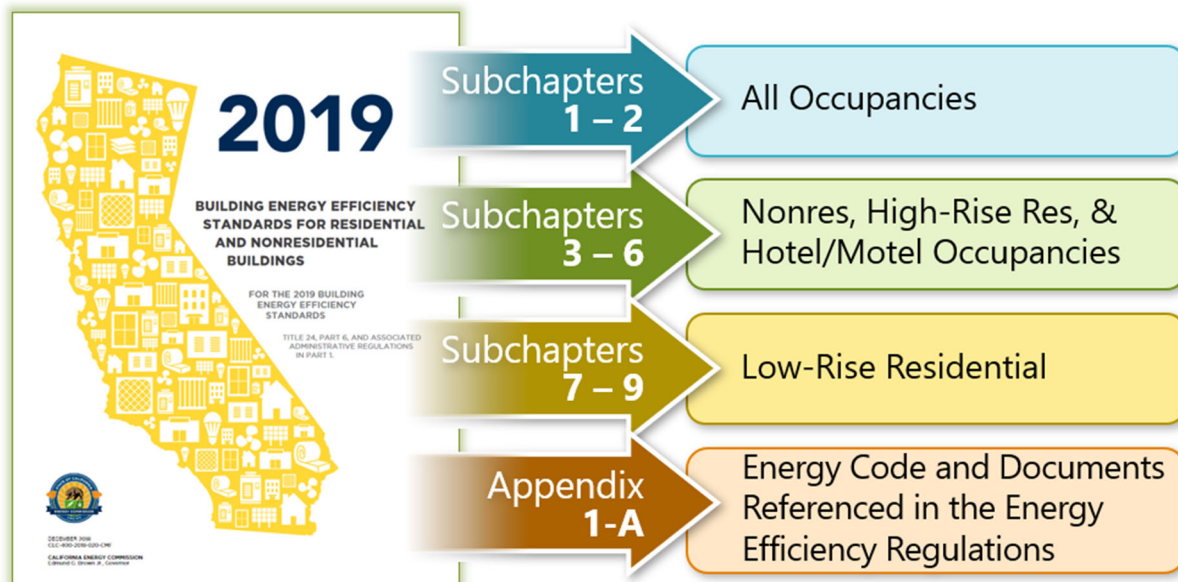
WELCOMING HEALTHCARE FACILITIES TO TITLE 24 PART 6, THE ENERGY CODE



Highland Hospital, Oakland CA (picture courtesy of Ted Tiffany, Guttman & Blaevoet Consulting Engineers)

Beginning **January 1, 2020**, Institutional (Group I) buildings will need to comply with the California Building Efficiency Standards, known as the Energy Code (California Code of Regulations (CCR), Title 24, Part 6). Facilities subject to OSHPD licensing (per Health and Safety Code (HSC) §1204 or §1250, defined as “Healthcare Facilities” in the Energy Code), will be eligible for a number of exceptions from the Energy Code. Non-licensed institutional buildings will have to comply with all applicable sections of the Energy Code and are not eligible for the healthcare facility exceptions.





The Energy Code applies to three types of construction: new construction, additions, and alterations. Both new construction and additions in healthcare facilities will be required to comply with the Energy Code, but alterations within existing healthcare facilities will be exempt.



HEALTHCARE ROAD MAP TO TITLE 24, PART 6¹

ALL OCCUPANCIES:

Article 1 of Title 24, Part 1 (10-101 through 10-114) including documentation requirements of 10-103 which have been adopted by OSHPD

Building Occupancies	Building Application	 Mandatory			 Prescriptive	 Performance	 Additions Alterations
		All Occupancy Subchapter 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)
Nonresidential High-Rise Residential, and Hotels/Motels	General	100.0, 100.1-2, 110.0, 110.1 ²	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 (uncond, process spaces)	N.A.			140.3(c)		
	HVAC (conditioned)	110.2, 110.5	120.1, 120.2*, 120.3, 120.4, 120.5, 120.8	N.A.	140.4*		
	Water Heating	110.3*	120.3, 120.8, 120.9	N.A.	140.5	N.A.	
	Indoor Lighting (conditioned, process spaces)	110.9, 110.12	120.8	130.0, 130.1*, 130.4	140.3(c), 140.6*		
	Indoor Lighting (uncond. & parking garages)	110.9, 110.12	N.A.	130.0, 130.1, 130.4	140.3(c), 140.6*		
	Outdoor Lighting	110.9, 110.12	N.A.	130.0, 130.2, 130.4	140.7		
	Electrical Power Distribution	110.11, 110.12	N.A.	130.5*	N.A.		
	Pool and Spa Systems	110.4, 110.5	N.A.	N.A.	N.A.	N.A.	
	Solar Ready Buildings	110.10	N.A.	N.A.	N.A.		
Covered Processes ³	Refrigerated Warehouse Commercial Refrigeration Parking Garage Process Boilers Compressed Air Elevators Escalators/Moving Walkways Computer Room Commercial Kitchens Lab and Factory Exhaust Systems	110.2	120.6*	N.A.	140.9	140.1	140.9, 141.1
Signs	Indoor and Outdoor	110.9	N.A.	130.0, 130.3	140.8	N.A.	141.0, 141.0(b)2H

¹ This table is based on Table 100.0-A

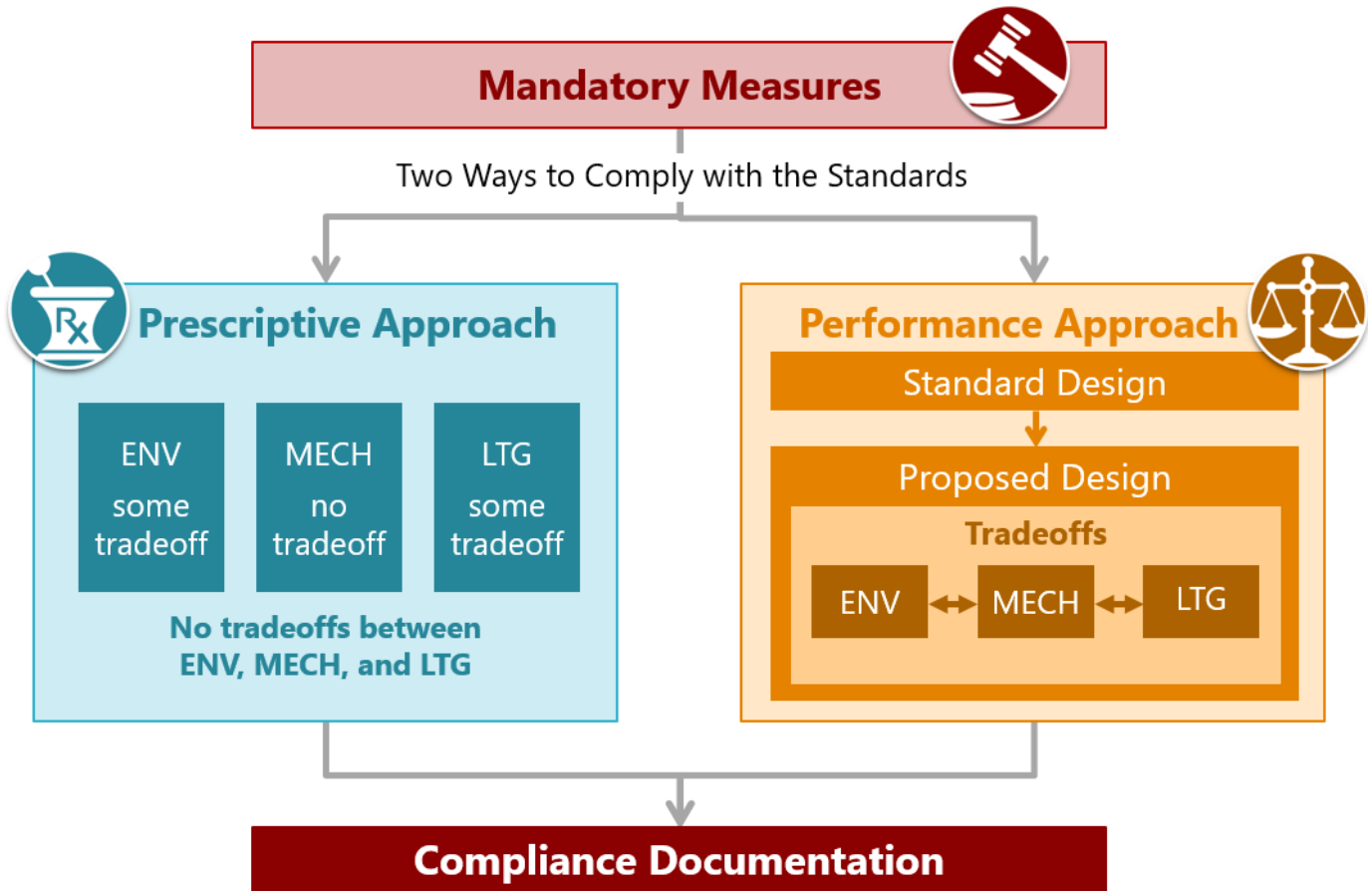
² Section 110.1 refers to Title 20




³ Nonresidential, high-rise and hotel/motel buildings containing applicable covered processes

Legend


Crossed-out and highlighted: Entire subchapter is exempt for licensed healthcare facilities

Highlighted and *: Only portions of the subchapter are exempt for licensed healthcare facilities



	<p>Mandatory Measures: <i>All nonresidential buildings that are regulated occupancies must be designed and built to comply with the mandatory measures of the Energy Standards. Cannot be traded via the Performance Approach.</i></p>	<ul style="list-style-type: none"> ▪ Must always be met/installed ▪ Establish minimum level of energy efficiency and/or performance ▪ Apply to various building components ▪ Sometimes are superseded by more stringent prescriptive or performance requirements
	<p>Prescriptive Approach: <i>It is a set of prescribed performance levels for various building components, where each component must meet the required minimum efficiency.</i></p>	<ul style="list-style-type: none"> ▪ Set of predefined efficiency requirements that must <u>ALL</u> be met or exceeded ▪ Applies to various building components ▪ Simplest approach, but less flexible ▪ Establishes baseline for Standard building/budget under Performance Approach
	<p>Performance Approach: <i>Proposed TDV equal or better than baseline TDV¹ (Time Dependent Value is how energy efficiency is measured for the Energy Code).</i></p>	<ul style="list-style-type: none"> ▪ Requires the use of Energy Commission approved software ▪ Most flexible approach, allows for trade-offs ▪ Proposed energy budget ≤ Standard energy budget
<p>¹ TDV consists of large data sets that convert electricity, gas or propane to TDV energy. The rate of conversion varies for each hour of the year, for each climate zone and for each energy type (electricity, natural gas or propane). The conversion factors also vary by building type: low-rise residential and other building types, including nonresidential, hotel/motel and high-rise residential. There is a total of 144 hourly data sets (16 climate zones x 3 fuel types x 3 building types) where the 2 nonresidential building types are based on 15 year and then 30 year.</p>		

DOCUMENTATION SPECIFIC TO THE ENERGY CODE

Building Occupancies	Building Application	NRCC Forms			NRCI Forms	NRCA Forms
		Under the purview of the designer to demonstrate how the applicable building features are meeting the requirements of the Energy Code and submitted to OSHPD for plan review.			Under the purview of the installing contractor to document what was installed to meet the requirements documented in the NRCC forms approved for plan review.	Under the purview of the installing contractor to document what was installed is tested and meets the acceptance testing requirements. Many of these are exempt for healthcare facilities and field verification methods used by OSHPD take precedence.
		Performance 	Prescriptive 	Mandatory 		
Nonresidential	General	N/A				
	Envelope (conditioned)	NRCC-PRF-01-E	NRCC-ENV-E	Note block	NRCI-ENV-01-E	NRCA-ENV-02-F NRCA-ENV-03-F
	HVAC (conditioned)	NRCC-PRF-01-E	NRCC-MCH-E	Note block	NRCI-MCH-01-E	NRCA-MCH-02 through 19-A
	Water Heating	NRCC-PRF-01-E	NRCC-PLB-E	Note block	NRCI-PLB-01-E	N/A
	Indoor Lighting (conditioned, process spaces)	NRCC-PRF-01-E	NRCC-LTI-E	Note block	NRCI-LTI-01 through 06-E	NRCA-LTI-02 through 05-A
	Indoor Lighting (uncond. & parking garages)	N/A	NRCC-LTI-E	Note block	NRCI-LTI-01/02/05-E	NRCA-LTI-02 through 05-A
	Outdoor Lighting	N/A	NRCC-LTO-E	Note block	NRCI-LTO-01/02-E	NRCA-LTO-02-A
	Electrical Power Distribution (voltage drop requirements only)	N/A	N/A	NRCC-ELC-E	NRCI-ELC-01-E	N/A
	Commissioning	N/A	N/A	NRCC-CXR-E	N/A	N/A
	Pool and Spa Systems	N/A	N/A	Note block	N/A	N/A
	Solar Ready Buildings	N/A	N/A	NRCC-SRA-E	NRCI-SPV or STH-01-E	N/A
Covered Processes ³	Refrigerated Warehouse* ≥3,000 ft²	N/A	N/A	NRCC-PRC-E	NRCI-PRC-01-E	NRCA-PRC-04 through 08-F
	Commercial (Retail) Refrigeration*	N/A	N/A	NRCC-PRC-E	NRCI-PRC-01-E	N/A
	Parking Garage	N/A	N/A	NRCC-PRC-E	NRCI-PRC-01-E	NRCA-PRC-03-E
	Process Boilers ≥2.5 MMBtu/h	N/A	N/A	NRCC-PRC-E	NRCI-PRC-01-E	N/A
	Compressed Air	NRCC-PRF-01-E	NRCC-PRC-E	Note block	NRCI-PRC-01-E	NRCA-PRC-01-F
	Elevators	NRCC-PRF-01-E	NRCC-PRC-E	Note block	NRCI-PRC-01-E	NRCA-PRC-12-F
	Escalators and moving walkways (airport, hotel and transportation areas only)	NRCC-PRF-01-E	NRCC-PRC-E	Note block	NRCI-PRC-01-E	NRCA-PRC-13-F
	Computer Rooms	NRCC-PRF-01-E	NRCC-PRC-E	Note block	NRCI-PRC-01-E	N/A
	Commercial Kitchens	NRCC-PRF-01-E	NRCC-PRC-E	Note block	NRCI-PRC-01-E	NRCA-PRC-02-F
	Lab and Factory Exhaust Systems	NRCC-PRF-01-E	NRCC-PRC-E	Note block	NRCI-PRC-01-E	NRCA-PRC-14/15-F NRCA-PRC-16-A
Signs	Indoor and Outdoor	N/A	NRCC-LTS-E	Note block	NRCI-LTS-01-E	N/A

Legend

Grey text and crossed: Not required for licensed healthcare facilities

* Not a typical application for Healthcare Facilities

MODELING HEALTHCARE FOR COMPLIANCE

Conditioned Space



Performance Options

Envelope can be modeled by itself or combined with lighting and/or service water heating, as desired. Lighting cannot be modeled by itself when using the performance method. HVAC is currently not a building feature that can use performance for healthcare facilities.

Envelope

Credit can be used for other features if better than prescriptive requirements.

Penalty can be traded away with other features (i.e. lighting) when worse than prescriptive requirements.

Service Water Heating

Credit may be used for other features if equipment efficiency is better than ACM.

Penalty can be traded away with other features when worse than the ACM.

HVAC Systems

Currently, HVAC systems (efficiency and/or distribution) for Healthcare Facilities will not provide "credit" (if modeled, both standard and proposed TDV will match). Options may change in the future code cycles.



Prescriptive Options

When not used in the performance approach, each building features must show compliance using the prescriptive method.

Envelope

Prescriptive requirements (or better) including healthcare exceptions.

Service Water Heating

Prescriptive requirements (or better) including healthcare exceptions.

HVAC

Prescriptive requirements (or better) including healthcare exceptions.

Indoor Lighting

Prescriptive requirements (or better) including healthcare exceptions.

Indoor Lighting (must be combined with envelope, and/or service water heating)

Credit can be used for other features if LPD lower than area category allowances.

Penalty can be traded away with other features if LPD higher than area category allowances.

Unconditioned Space or Outdoors



Prescriptive Method Required

Indoor, Outdoor & Sign Lighting

Prescriptive requirements (or better) including healthcare exceptions.



Mandatory Method Required

Electrical Power Distribution

Mandatory requirements (or better) including healthcare exceptions.

Covered Process

Refrigerated warehouse, parking garage, process boiler mandatory requirements (or better) including healthcare exceptions.

Online Resource Center

CEC Hotline

Monday – Friday, 8 a.m. to noon, 1 p.m. to 4:30 p.m.

1-800-772-3300 (CA), (916) 654-5106 (Outside CA)

Email: Title24@energy.ca.gov

List Server & Newsletter

Main conduit for stakeholder communication: www.energy.ca.gov/listservers/
(Subscribe to Building Standards & Blueprint Newsletter)

Download the Blueprint Newsletter: www.energy.ca.gov/efficiency/blueprint

Other Useful Links

CEC Online Resource Center:

www.energy.ca.gov/title24/orc

Approved Compliance Software: www.energy.ca.gov/title24/2019standards/2019_computer_prog_list.html



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