

City of San José Significant Changes in the 2019 California Codes

Friday, February 28, 2020

Presented by Building Division and
Bureau of Fire Prevention

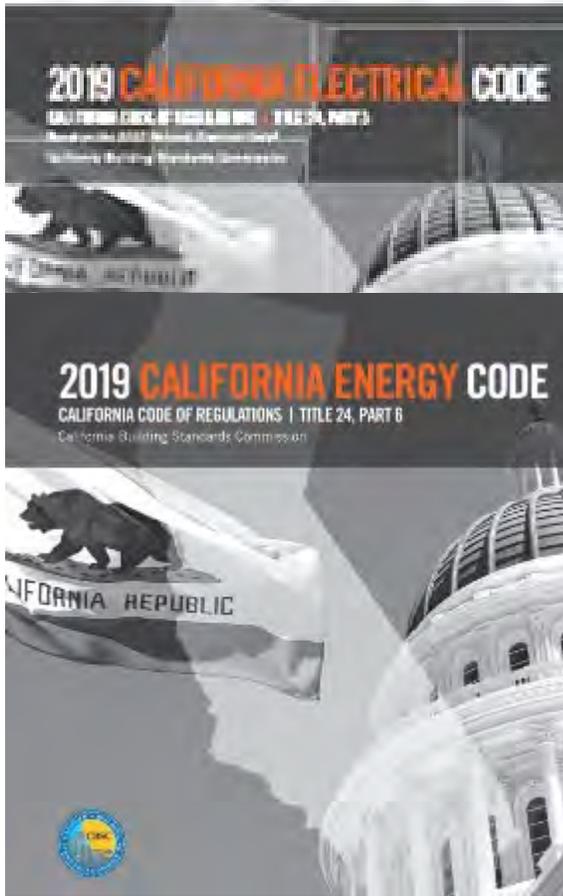


*Planning, Building and
Code Enforcement*

2019 California Electrical Code and Related Energy

Presented by: Bruce Campbell, Building Inspection
Manager

2019 CEC Adoption January 2019



5 new articles added:

- 425 Fixed Resistance and Electrode Industrial Process Heating Equipment
- 691 Large Scale Photovoltaic (PV) Electric Supply Stations
- 706 Energy Storage Systems
- 710 Stand Alone Systems
- Direct-Current Microgrids (DC Microgrids)

Code-wide changes:

- Continued Migration Throughout the NEC from the 600 Volt Threshold to 1000 Volts
- Documentation of Available Short-Circuit Current

2019 California Electrical Code Significant Changes

*There were 4,102 Proposals and 1,513 Public Comments for the 2017
NEC*



City of San Jose Building Department Interpretation

Chapter 1 General

- Definition: Field Evaluation Body (FEB) and Field Labeled.
- Definition: Receptacle allowance for non-traditional attachments.
- 110.3: Added Informational Notes and language to provide guidance for AHJ when inspecting listed, unlisted, modified or reconditioned electrical equipment.
- 110.26(A)(4): Broadens requirements for limited access working space. Access openings, 22" X 22" in T-Bar and 22" X 30" for crawlspaces, width 30" or width of equipment, depth per Table 110.26, doors open 90 degrees, height as required to install the equipment.
- 110.41: New requirement for pre-energization testing and reporting applicable to all equipment rated over 1000 volts.

Pre-energization testing and reporting applicable to all equipment rated over 1000 volts



NOTICE

READ INSTRUCTION BOOK BEFORE INSTALLING, OPERATING, OR MAINTAINING THIS DEVICE.

Charged

APPARATUS TESTING AND ENGINEERING, INC.
 Sacramento - (916) 953-0200
 S.F. Bay Area - (415) 454-1388

Type	270VCP-W25	Yr/Ser No	161001465
Style	4A35142G89	I.B.	IB131006EN
Weight	420 LBS.	Wiring Diag	691C386H54
Rtd Max Voltage	27 kV*	Motor Volts	125 VDC/AC
Impulse Voltage	125 KV PEAK	Close Current	15.5A
Rtd Cont Current	1200 A	Voltage Range	38 - 56VDC
Rtd Frequency	60 HZ	Trip - 1 Current	15.5A
Rtd S-C Current	25 KA	Voltage Range	28 - 56VDC
V Range Fac-K	1.0	Trip - 2 Current	N.A.
Rtd Inrpt Time	3 CYCLES	Voltage Range	N.A.
C&L Current	68 KA PEAK	UV Trip Volts	N.A.
Option	20110100010003000000	* Tested at 28.5kV rms	

Push to Close

Push to Open

BREAK LATCH

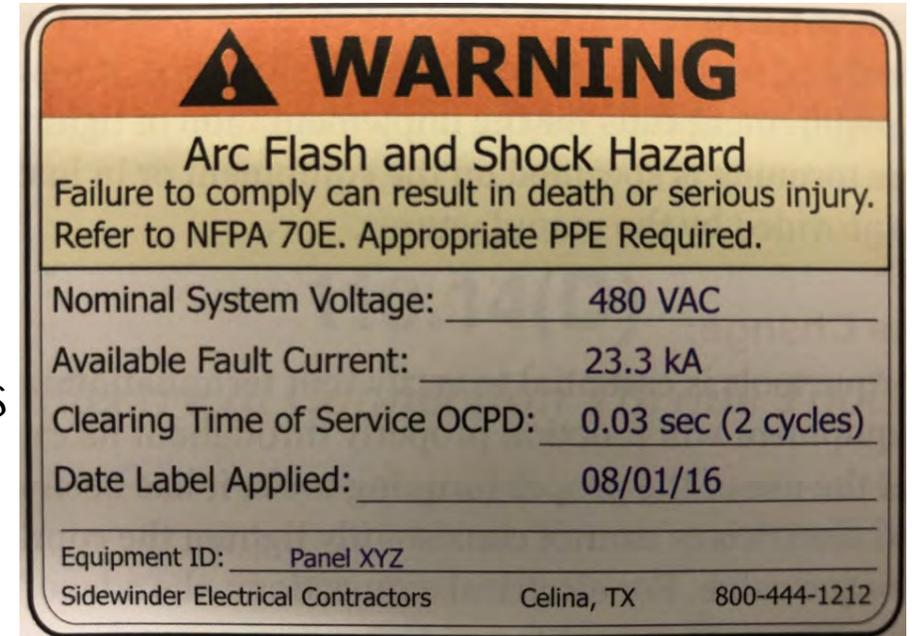
To Late Push B Until A

To Unla Lift & P To With Position

Arc-Flash Hazard Warning, Service Equipment

110.16(B): Provides additional requirements for labeling at service equipment rated 1200 amperes or more.

- (1) Nominal System Voltage
- (2) Available Fault Current
- (3) Clearing Time of Service Overcurrent Devices
- (4) Date the Label Was Applied



Chapter 2 Wiring & Protection

Article 210.8 Ground-Fault Circuit-Interrupter Protection for Personnel

- (A)(7): Measurement criteria clarified at dwelling unit sinks based upon appliance cord length and path.
- (B): At Other Than Dwelling Units, GFCI requirements expanded to all single-phase receptacles rated 150 volts to ground or less, 50 amps or less and three phase receptacles rated 150 volts to ground or less, 100 amps or less. Added crawl spaces and unfinished basements to required areas.
- (E): Expands GFCI requirements to crawl space lighting outlets not exceeding 120 volts.

Chapter 2 Wiring & Protection

- 210.11(C)(4): Requires dedicated 20 amp branch circuit to supply only garage receptacle outlets. *Exception: Readily accessible outdoor receptacles.*
- 210.12(B): Added AFCI protection for 120 volt 15/20 amp branch circuits supplying outlets and devices in dormitory bathrooms.
- 210.12(C): Added AFCI protection for 120 volt 15/20 amp branch circuits supplying outlets and devices in all guest suites/rooms of hotels and motels.
- 210.71: Added requirements for receptacle outlets in meeting rooms of not more than 1000 sq ft with spacing per 210.52(A)(1) through (A)(4). Floor receptacles based on room width (12 ft or more) and area (1 per 215 sq ft).
- 240.67: Fuses rated 1200 amps or more now require methods of arc energy reduction when fuse clearing time is less than .07 seconds.

Chapter 3 Wiring Methods & Materials

- 300.15(B)(3)(c): Table was deleted and text added that requires temperature adder of 33 degrees C (60 deg F) only when a raceway or cable is installed less than 7/8 of an inch above the roof surface.
- 310.15(B)(7)(2): Single Phase dwelling unit feeders, rated 100 through 400 amperes, supplied by 120/208Y volt 3 phase systems are now allowed to have an ampacity not less than 83 percent of the feeder rating. No additional reduction in ampacity is allowed for the grounded (neutral) conductor.
- Listing requirements for nine cable wiring methods and associated fittings including AC, FC, MV, MC, MI, NM, TC, SE and UF. (.6 section of each article)

Conductors Above Rooftops



120/208Y volt single phase dwelling unit feeders



Chapter 3 Wiring Methods & Materials

- 336.10(9): Now allows Control Tray Cable, type TC-ER and marked "JP" (joist pull) to be installed in one and two-family dwelling units. Interior installations shall meet the requirements of Part II of Article 334 (NM Cable).
- 338.10(B)(4): Revised temperature rating of SE cable installed in thermal insulation. Ungrounded conductor sizes 10 AWG and smaller shall be in accordance with 60 degree C conductor temperature rating.
- 366.20 and 376.20: New requirement for paralleled sets to be grouped, by set, when installed in Auxiliary Gutters and Metal Wireways.

Chapter 4 Equipment For General Use

- 400.10: Now includes flexible cord sets and power supply cables under uses not permitted. Section (5) includes above suspended ceilings.
- 406.3(E): Controlled receptacle marking specifies “controlled” with symbol to be on face of the receptacle and visible after installation of trim.
- 406.3(F): Receptacles with USB chargers required to be listed and constructed such that the Class 2 circuitry is integral with the receptacle.
- 406.4(D)(4): Adds dormitories to AFCI requirements when replacing receptacles.

Chapter 4 Equipment For General Use

- 406.12: Expands tamper-resistant receptacle requirement for 15 and 20 amp, nonlocking type receptacles to include 250-volts and the following areas:
 1. Preschools and elementary education facilities
 2. Business offices, corridors, waiting rooms and the like in clinics, medical and dental offices and outpatient facilities
 3. Subset of assembly occupancies described in Article 518.2 to include places of waiting transportation, gymnasiums, skating rinks, and auditoriums.
 4. Dormitories

Chapter 4: Equipment For General Use

- 422.5: Consolidated appliances required to be GFCI protected into one location, changed Drinking Fountains to “Drinking Water Coolers”, raised threshold to 250 volts or less and 60 amps or less, single or 3-phase and provides for five readily accessible, listed (UL943) options to provide protection.
- 440.9: New requirement for a wire-type equipment grounding conductor to be installed in non-threaded metallic conduit systems, on rooftops, supplying HVAC equipment.
- 480.3: Storage batteries and battery management equipment is now required to be listed (UL 1642 and UL 1973).

Chapter 5: Special Occupancies

- 501.10(B)(1): Allows listed, threadless fittings within Class 1, Division 2 locations. Not allowed at the boundary sealing fitting.
- 514.8 Exp. 2: Added HDPE conduit as acceptable underground wiring method for motor fuel dispensing facilities under a minimum of 2 ft of cover.
- 517.2: Provides new definition for Medical Office (Dental Office) and refines definitions for patient care spaces.
- 590.4(B)(1) and(2): Added SE Cable as an acceptable wiring method for temporary installations and permitted to be installed in an underground raceway.

Chapter 6: Special Equipment

- 625.2: New Part IV provides requirements for EV charging wireless power transfer equipment including grounding, construction and installation of these systems.



Chapter 6: Special Equipment

- 645.18: Now requires surge protection for critical operations data systems.
- 680.12 and 680.14: Now include a definition for corrosive environments; “Air laden with acid, chlorine and bromine vapors” suitable wiring methods for pool equipment rooms now specified; rigid metal conduit, Intermediate metal conduit, rigid pvc, or rtrc.
- 680.28: Branch circuits supplying gas fired swimming pool and spa water heaters, operating above the low-voltage contact limit, now require GFCI protection for personnel.
- 680 Part VII: was added requiring electrically powered pool lifts to be Listed, Labeled, bonded and GFCI protected.

Chapter 6: Special Equipment

Corrosive Environment



Chapter 6: Special Equipment

- 680.74: Equipotential Bonding requirements in the area of hydromassage bathtubs are reformatted into a list form. Now include all metal-sheathed cables, metal raceways, metal piping, exposed metal surfaces, electrical devices and controls located within 5 feet of the inside walls of the tub. Bonding of metal parts requires a minimum #8 AWG solid copper bonding jumper. *Exception for small conductive surfaces not likely to become energized, and not connected to metal framing.*
- 690.2: New Definition; “Functionally Grounded PV System” is a PV system that has an electrical reference to ground that is not solidly grounded.
- 690.8(A)(1): Now allows for engineering supervision to be used when calculating source circuit maximum current. Allows systems larger than 100 KW to be calculated based upon actual design parameters. However, calculated current cannot be less than 70% of the standard calculation.

Chapter 6: Special Equipment

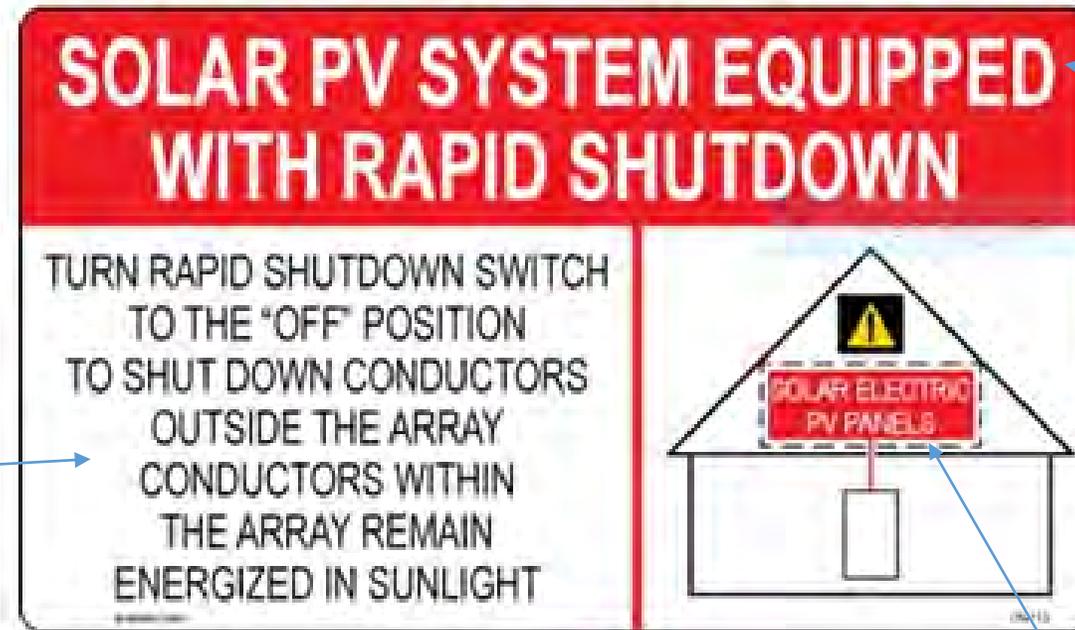
- 690.12: Rapid shutdown requirements to reduce shock hazards for emergency responders.



Chapter 6: Special Equipment

- The allowed length of uncontrolled PV circuit conductors leaving the array or entering the building has been reduced. Controlled conductors outside of the array boundary (defined as 1 foot from the array) and beyond 3 feet of penetrating the building must be limited to 30 volts within 30 seconds.
- Initiation devices for one and two-family dwellings are required to be outside the building, readily accessible and grouped when installing multiple PV systems. Equipment that performs rapid shutdown functions, other than initiating devices (such as circuit breakers or switches), is required to be listed for providing rapid shutdown protection.
- 690.56(C): Placarding for buildings with rapid shut down is now more specific. Section (1)(b) addresses requirements for PV systems that only shut down conductors leaving the array. This label shall be located on or no more than 3 feet from the service disconnecting means to which the PV systems are connected, and shall indicate the location of all identified rapid shutdown switches if not at the same location.

Chapter 6: Special Equipment



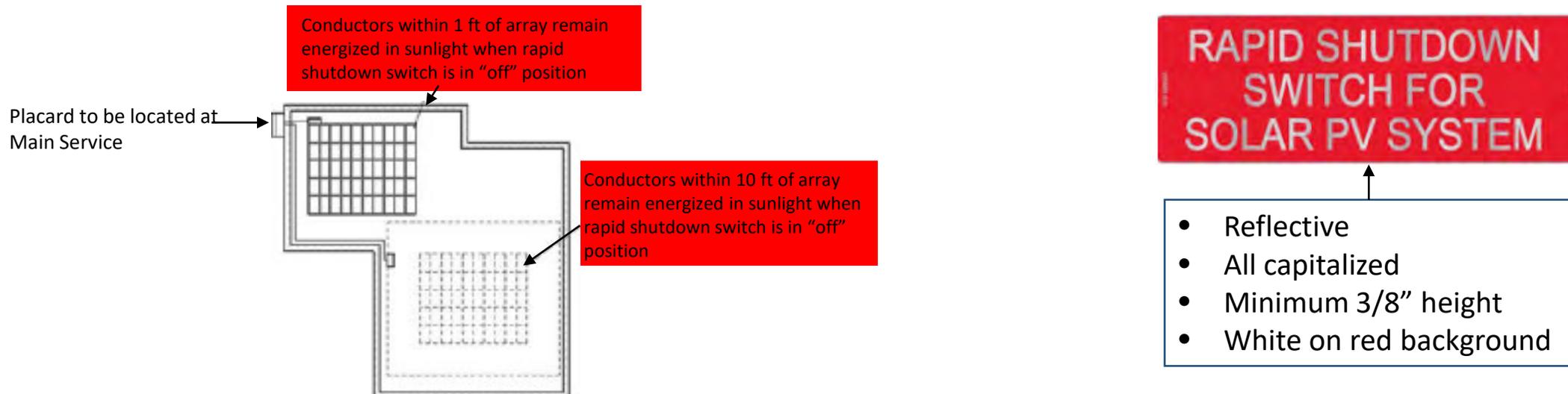
Minimum Height = 3/8"
All Capitalized
White on Red Background

Minimum Height = 3/16"
All Capitalized
Black on White Background

Simple Roof Diagram
Showing Sections of System
Not Shut Down in Red

Chapter 6: Special Equipment

- 690.56(C)(2): For buildings that have PV systems with different types of rapid shutdown, a detailed plan view of the roof shall be provided showing each system with a dotted line indicating the areas that remain energized after rapid shutdown initiation.
- 690.56(3): A rapid shutdown switch requires a label within 3 ft of the switch.



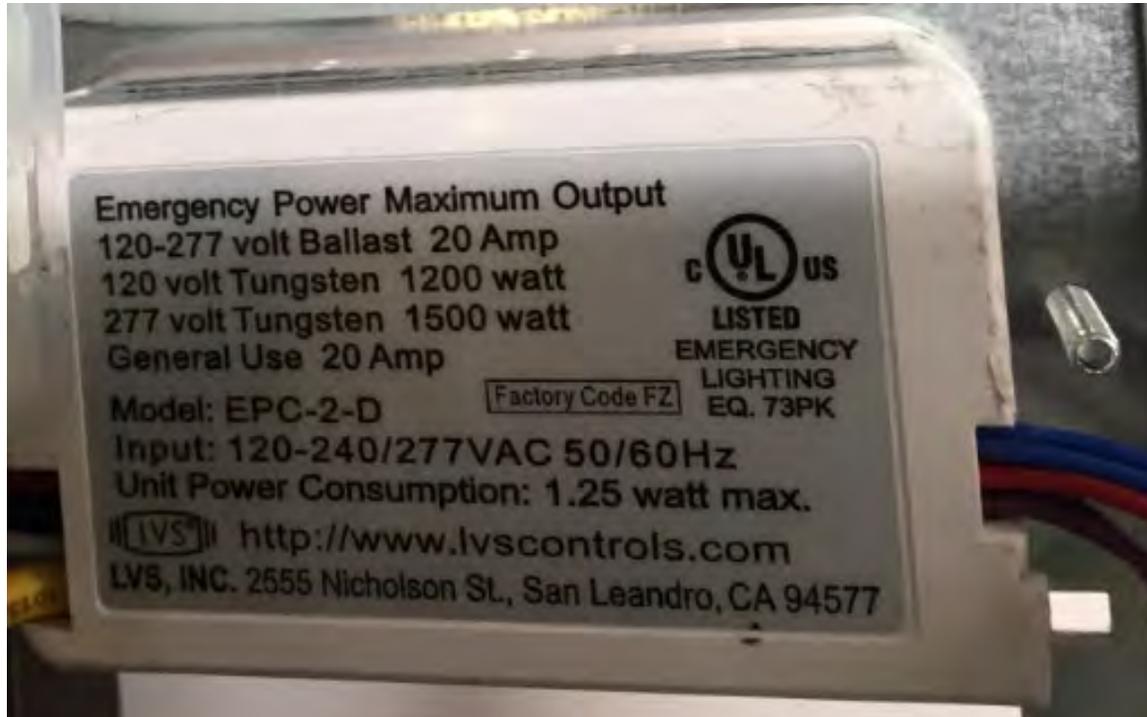
Chapter 6: Special Equipment

- Part VII, 690.59: Single reference to Article 705 for PV systems connected to other sources. Removed repetitive requirements.
- 690.71: Single Reference to new Article 706 for Energy Storage Systems (ESS) connected to PV systems.
- 695.6(G): Clarification; Ground Fault Protection for equipment is not permitted in any fire pump circuit.
- 695.15: New requirement for listed surge protection device to be installed in or on the fire pump controller.

Chapter 7 Special Conditions

- 700.2: Definition; Branch Circuit Emergency Lighting Transfer Switch (BCELTs), Device on the load side of a branch circuit overcurrent protective device that transfers only emergency lighting loads from the normal supply to an emergency supply.
- 700.25: Permits BCELTs to be used on maximum 20 amp emergency lighting branch circuits to transfer from normal to emergency power. The mechanically held requirement of 700.5(C) shall not apply to these devices (must be listed to UL 1008 for transfer switch equipment). Differentiated from Automatic Load Control Relays (ALCR) (listed to UL 924 for emergency lighting and power equipment), never intended for use as a transfer switch.

Chapter 7 Special Conditions



Automatic Load Control Relay



Branch Circuit Emergency Lighting Transfer Switch

Chapter 7 Special Conditions

- 700.3(F): New requirement to provide provisions for connecting a portable or temporary alternate source whenever a single alternate source of power for an emergency system is taken offline for maintenance or repair. This connection must be part of the permanent wiring system, requires transfer per 700.12 (10 seconds), connection must be marked with phase rotation and bonding requirements, provide mechanical or electrical interlock and annunciation for disconnection of permanent emergency source. There are some limited exceptions.
- 700.5(E): Requires documentation and field marking of Available Fault Current and Short Circuit Current Rating at emergency transfer equipment. Same requirement found in 701.5(D) (Legally Required), 702.5 (Optional) and 708.24(E) (COPS).

Chapter 7 Special Conditions

700.3(F) Methods



Interlocked Circuit Breakers

Chapter 7 Special Conditions

- 700.10(A): Where boxes or enclosures are not encountered, exposed cables or raceways of emergency systems are now required to be identified as a component of an emergency system.
- 700.10(D): Two additional occupancies are now included in the requirements of (D)(1) through (D)(3) for protecting emergency system feeders. Feeders must be installed in areas protected by automatic fire sprinklers, a 2 hr protective system or 2" of concrete encasement.
 - Health care occupancies where persons are not capable of self preservation.
 - Educational occupancies with more than 300 occupants.

Chapter 7 Special Conditions

- 702.12(C): New requirement that power inlets, rated 100 amps or more, for portable generators be load break rated or equipped with an interlocked disconnecting means intended to prevent disconnection under load.



Chapter 7 Special Conditions

- 706: New article consolidates requirements for all permanently installed energy storage systems (ESS), stand-alone or interactive, into one location. Note: California Residential Code Section 327.2 requires installed ESS to be listed and labeled (UL 9540) for residential use.
- 710: New article centralizes the requirements for power production sources operating in a stand-alone mode, often utilizing multiple methods of electricity generation, energy storage and regulation.

2019 California Energy Code

Nonresidential Lighting



2019 California Energy Code

Nonresidential Indoor Lighting

- 130.0(c)6.A.: Track Lighting now calculated at 30 watts per lineal ft. (from 45 watts) or the rated wattage of all luminaires included in the system.
- 130.1(b): Added 2 exceptions to multilevel lighting controls; Restrooms and Healthcare Facilities.
- Tables 140.6-B, 140.6-C and 140.6-D: Continued reductions for indoor lighting power density (approximately 29 to 37%) and added new function area types.

2019 California Energy Code

- 141.0(b)2I: Indoor lighting alteration requirements apply when 10% or more of luminaires in the space are altered. Three pathways for compliance:
 - i. Lighting power density per 140.6, controls per Table 141.0-F
 - ii. Altered lighting power density less than 80% as calculated per 140.6, controls per Table 141.0-F.
 - iii. Alteration of one-for-one @ luminaires within building or tenant space of 5000 sq ft or less and total wattage of altered luminaires at least 40% less than pre alteration, controls per Table 141.0-F

2019 California Energy Code

Table 141.0-F – Control Requirements for Indoor Lighting System Alterations

Control Specifications		Projects complying with Section 141.0(b)2Ii	Projects complying with Sections 141.0(b)2Iii and 141.0(b)2Iiii
Manual Area Controls	130.1(a)1	Required	Required
	130.1(a)2	Required	Required
	130.1(a)3	Only required for new or completely replaced circuits	Only required for new or completely replaced circuits
Multi-Level Controls	130.1(b)	Required	Not Required
Automatic Shut Off Controls	130.1(c)1	Required; 130.1(c)1D only required for new or completely replaced circuits	Required; 130.1(c)1D only required for new or completely replaced circuits
	130.1(c)2	Required	Required
	130.1(c)3	Required	Required
	130.1(c)4	Required	Required
	130.1(c)5	Required	Required
	130.1(c)6	Required	Required
	130.1(c)7	Required	Required
	130.1(c)8	Required	Required
Daylighting Controls	130.1(d)	Required	Not Required
Demand Responsive Controls	130.1(e)	Required	Not Required

2019 California Energy Code

Nonresidential Outdoor Lighting

130.2(c)3: Motion sensing controls required for all luminaires (including wall packs) mounted 24 ft or less above grade.

Exceptions:

1. *Building facade, ornamental hardscape, outdoor dining and sales frontage (except wall packs)*
2. *Luminaires 40 watts or less.*
 - Motion sensors must be capable of reducing lighting by 50 to 90% and off.
 - Must reduce or turn off lighting after 15 minutes of vacancy.

2019 California Energy Code

140.7: Continued reductions to outdoor lighting power density by 15 to 38%.

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
	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	250 W	250 W	350 W	350 W	400 W

¹Continuous 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).

²Where 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.

³Narrow 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.

2019 California Energy Code

Residential Lighting

- 150.0(k): Appendices applicable to 2019 JA8 high efficacy light sources have been updated. It is still acceptable to install 2016 JA8 light sources for compliance under 2019 code.
- 150.0(k)1E: Night/Step/Path Lights require vacancy sensor if greater than 5 watts and 150 lumens.
- 150.0(k)1I: Light sources internal to drawers, cabinets or linen closets require vacancy sensor if greater than 5 watts, greater than 150 lumens or not controlled to automatically turn lighting off when closed.

2019 California Energy Code

Residential Lighting

- 150.0(k)2I: Bathrooms, garages, laundry rooms and utility rooms require at least one luminaire to be controlled by vacancy sensor or occupancy sensor configured for manual-on.
- 150.0(k)2J: All JA8 compliant light sources require controls, dimmer, vacancy or occupancy sensor. *Exceptions: Closets less than 70 sq ft and hallways.*



2019 California Energy Code

Photovoltaic Requirements



2019 California Energy Code

Photovoltaic Requirements

- 110.10: Mandatory requirements essentially the same as 2016, solar zones, interconnection pathways, documentation on plans and minimum size of main electrical service panel.
- 150.1(c): Prescriptive requirements for PV systems on all newly constructed low-rise residential buildings. PV systems sized to displace the annual kWhs of a mixed fuel home. Some exceptions apply.
- Joint Appendix JA11: Qualification Requirements for Photovoltaic Systems.
 - Requires verification of number of panels, panel type, size, orientation/tilt, and shading
 - Requires remote monitoring capability, including mobile app

Questions?

Thank you!

2019 California Plumbing and Mechanical Codes and Related Energy

Presented by: Joseph Clarke, Building Inspector Supervisor
P/M

2019 California Plumbing Code Updates



Chapter 2 - Definitions

205-Combustible Material. A material that, in the form in which it is used and under the conditions anticipated, will ignite and burn; a material that does not meet the definition of noncombustible. [NFPA 54:3.3.64.1]

212-Joint, Press-Connect. A permanent mechanical joint incorporating an elastomeric seal or an elastomeric seal and corrosion resistant grip ring. The joint is made with a pressing tool and jaw or ring that complies with the manufacturer's installation instructions.

Chapter 2 - Definitions

222-Toilet Facility. A room or space containing not less than one lavatory and one water closet.

223-Urinal, Hybrid. A urinal that conveys waste into the drainage system without the use of water for flushing and automatically performs a drain-cleansing action after a predetermined amount of time.

Chapter 3 – General Regulations

309.4 Installation Practices Plumbing systems shall be installed in a workmanlike manner which is in accordance with this code, applicable standards, and the manufacturer's installation instructions. All materials shall be installed so as not to adversely affect the systems and equipment or the structure of the building, and in compliance with all laws and other provisions of this code. All plumbing systems shall be in accordance with construction documents approved by the Authority Having Jurisdiction.

Chapter 3 – General Regulations

309.5 Sound Transmission

Plumbing piping systems shall be designed and installed in conformance with sound limitations as required in the *California Building Code*.

Chapter 3 – General Regulations

Table 313.3 Hangers and Supports
CPVC-AL-CPVC added to Table 313.3

CPVC-AL-CPVC	Solvent Cemented	$\frac{1}{2}$ inch, 5 feet; $\frac{3}{4}$ inch, 65 inches; 1 inch, 6 feet	Base and each floor; provide mid-story guide
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Chapter 4 – Plumbing Fixtures and Fixture Fittings

401.3 Water-Conserving Fixtures and Fittings

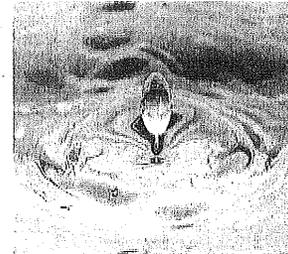
[HCD-1] All noncompliant plumbing fixtures in any residential real property shall be replaced with water-conserving plumbing fixtures. Plumbing fixture replacement is required prior to issuance of a certificate of final completion, certificate of occupancy, or final permit approval by the local building department. See Civil Code [Section 1101.1](#), et seq., for the definition of a noncompliant plumbing fixture, types of residential buildings affected and other important enactment dates.



2013 Green Building Standards Code
Non-Compliant Plumbing Fixture Replacement Requirements
Effective January 1, 2014

SB407 (2009)/Civil Code Section 1101.3 (c)

- (1) Any toilet manufactured to use more than 1.6 gallons of water per flush.
- (2) Any urinal manufactured to use more than one gallon of water per flush.
- (3) Any showerhead manufactured to have a flow capacity of more than 2.5 gallons of water per minute.
- (4) Any interior faucet that emits more than 2.2 gallons of water per minute.



Bathroom Faucets: _____ qty

Shower / Bathtub: _____ qty

Toilets / Urinals: _____ qty

Kitchen & all Other Faucets: _____ qty

I hereby certify that I have replaced or tested, or have had an individual under my direction replace or test all plumbing fixtures, covered by Civil Code Section 1101.3(c) for the address and permit number listed below:

Address: _____

Permit Number: _____

Property Owner's or Contractor's Name _____

Date _____

Signature Owner or Contractor _____

Date _____

200 E. Santa Clara Street, 1st Floor, San Jose, CA 95113 tel (408)535-3555

Chapter 4 – Plumbing Fixtures and Fixture Fittings

402.4 Wall-Hung Fixtures Wall-hung fixtures shall be rigidly supported by metal supporting members so that no strain is transmitted to the connections. Floor-affixed supports for off-the-floor plumbing fixtures for public use shall comply with ASME A112.6.1M. Framing-affixed supports for off the floor water closets with concealed tanks shall comply with ASME A112.6.2. Flush tanks and similar appurtenances shall be secured by approved non-corrosive screws or bolts.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

402.9 Design and Installation of Plumbing Fixtures Plumbing fixtures shall be installed in accordance with the manufacturer's installation instructions. The means of backflow prevention shall not be compromised by the designated fixture fitting mounting surface.

403.3 Exposed Pipes and Surfaces Water supply and drain pipes under accessible lavatories and sinks shall be insulated or otherwise be configured to protect against contact. Protectors, insulators, or both shall comply with ASME A112.18.9 or ASTM C1822. *[HCD 1-AC] Specific requirements regarding accommodations for persons with disabilities are contained in Chapter 11A of the California Building Code.*

Chapter 4 – Plumbing Fixtures and Fixture Fittings

407.2 Water Consumption

The maximum water flow rate of faucets shall comply with Sections [407.2.1](#) through [407.2.4](#).

407.2.1 Public Lavatory Faucets

The maximum flow rate for public lavatory faucets shall not exceed 0.5 gpm at 60 psi (1.9 L/m at 414 kPa).

407.2.2 Residential Lavatory Faucets

[HCD 1] The maximum flow rate of residential lavatory faucets shall not exceed 1.2 gallons (4.54 L) per minute at 60 psi. The minimum flow rate of residential lavatory faucets shall not be less than 0.8 gallons (3.03 L) per minute at 20 psi.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

407.2.3 Lavatory Faucets in Common and Public Use Areas

[HCD 1 & HCD 2] The maximum flow rate of lavatory faucets, installed in common and public use areas (outside of dwellings or sleeping units) in residential buildings, shall not exceed 0.5 gallons (1.89 L) per minute at 60 psi.

407.2.4 Metering Faucets

Metered faucets shall deliver a maximum of 0.2 gallons (0.76 L) per metering cycle.

407.2.4.1 Metering Faucets

[BSC-CG, DSA-SS & DSA-SS/CC] Metering Faucets shall not deliver more than 0.20 gallons (0.76 L) per cycle in compliance with [Chapter 5](#), Division 5.3 of the California Green Building Standards Code (CALGreen).

Chapter 4 – Plumbing Fixtures and Fixture Fittings

407.3 Limitation of Hot Water Temperature for Public Lavatories

Hot water delivered from public-use lavatories shall be limited to a maximum temperature of 120°F (49°C) by a device that complies with ASSE 1070/ASME A112.1070/CSA B125.70. The water heater thermostat shall not be considered a control for meeting this provision.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

408.0 Showers

408.1 Application

Manufactured shower receptors and shower bases shall comply with ASME A112.19.1/CSA B45.2, ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4, CSA B45.12/IAPMO 2402, or CSA B45.5/IAPMO Z124.

408.2 Water Consumption

Showerheads shall have a maximum flow rate of not more than 1.8 gpm at 80 psi (6.81 L/m at 552 kPa). **[HCD 1]** Residential showerheads shall comply with Division 4.3 of the California Green Building Standards Code (CALGreen).

Chapter 4 – Plumbing Fixtures and Fixture Fittings

408.2.1 Single Showerhead [BSC-CG, DSA-SS & DSA-SS/CC] *Showerheads shall have a maximum flow rate of not more than 1.8 gallons (6.81 L) per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads in compliance with [Chapter 5, Division 5.3.](#) of the California Green Building Standards Code (CAL Green).*

Chapter 4 – Plumbing Fixtures and Fixture Fittings

408.2.2 Multiple Showerheads Serving One Shower [BSC-CG, DSA-SS & DSA-SS/CC] *When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 1.8 gallons (6.81 L) per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time in compliance with [Chapter 5](#), Division 5.3 of the California Green Building Standards Code (CALGreen).*

Note: *A hand-held shower shall be considered a showerhead.*

Chapter 4 – Plumbing Fixtures and Fixture Fittings

408.3 Individual Shower and Tub-Shower Combination Control

Valves Showers and tub-shower combinations shall be provided with individual control valves of the pressure balance, thermostatic, or combination pressure balance/thermostatic mixing valve type that provide scald and thermal shock protection for the rated flow rate of the installed showerhead. These valves shall be installed at the point of use and comply with ASSE 1016/ASME A112.1016/CSA B125.16 or ASME A112.18.1/CSA B125.1.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

(408.3 Individual Shower and Tub-Shower Combination Control Valves Continued)

Gang showers, where supplied with a single temperature-controlled water supply pipe, shall be controlled by a mixing valve that complies with ASSE 1069. Handle position stops shall be provided on such valves and shall be adjusted per the manufacturer's instructions to deliver maximum mixed water setting of 120°F (49°C). Water heater thermostats shall not be considered a suitable control for meeting this provision.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

408.5 Finished Curb or Threshold

Where a shower receptor has a finished dam, curb, or threshold, it shall be not less than 1 inch (25.4 mm) lower than the sides and back of such receptor. In no case, shall a dam or threshold be less than 2 inches (51 mm) or exceeding 9 inches (229 mm) in depth where measured from the top of the dam or threshold to the top of the drain. Each such receptor shall be provided with an integral nailing flange to be located where the receptor meets the vertical surface of the finished interior of the shower compartment. The flange shall be watertight and extend vertically not less than 1 inch (25.4 mm) above the top of the sides of the receptor. The finished floor of the receptor shall slope uniformly from the sides towards the drain not less than $\frac{1}{8}$ inch per foot (10.4 mm/m), nor more than $\frac{1}{2}$ inch per foot (41.6 mm/m).

Chapter 4 – Plumbing Fixtures and Fixture Fittings

Thresholds shall be of sufficient width to accommodate a minimum 22 inch (559 mm) door. Shower doors shall open so as to maintain not less than a 22 inch (559 mm) unobstructed opening for egress. The immediate adjoining space to showers without thresholds shall be considered a wet location and shall comply with the requirements of the *California Building Code*, *California Residential Code*, and *California Electrical Code*.

Exceptions:

Showers in accordance with [Section 403.2](#).

A cast-iron shower receptor flange shall be not less than 0.3 of an inch (7.62 mm) in height.

For flanges not used as a means of securing, the sealing flange shall be not less than 0.3 of an inch (7.62 mm) in height.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

409.4 Limitation of Hot Water in Bathtubs and Whirlpool Bathtubs The maximum hot water temperature discharging from the bathtub and whirlpool bathtub filler shall be limited to 120°F (49°C) by a device that complies with ASSE 1070/ASME A112.1070/CSA B125.70. The water heater thermostat shall not be considered a control for meeting this provision.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

410.3 Limitation of Water Temperature in Bidets The maximum hot water temperature discharging from a bidet shall be limited to 110°F (43°C) by a device that complies with ASSE 1070/ASME A112.1070/CSA B125.70. The water heater thermostat shall not be considered a control for meeting this provision.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

411.4 Personal Hygiene Devices Water closets with integral personal hygiene devices shall comply with ASME A112.4.2/CSA B45.16.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

411.0 Water Closets

411.1 Application

Water closets shall comply with ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4, or CSA B45.5/IAPMO Z124. Water closet bowls for public use shall be of the elongated type. In nurseries, schools, and other similar places where plumbing fixtures are provided for the use of children less than 6 years of age, water closets shall be of a size and height suitable for children's use.

411.2 Water Consumption

The effective flush volume of all water closets shall not exceed 1.28 gallons (4.8 L) per flush when tested in accordance with ASME A112.19.2/CSA B45.1.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

411.2.1 Dual Flush Water Closets

Dual flush water closets shall comply with ASME A112.19.14. The effective flush volume for dual flush water closets shall be defined as the composite, average flush volume of two reduced flushes and one full flush.

411.2.2 Flushometer Valve Activated Water Closets

Flushometer valve activated water closets shall have a maximum flush volume of 1.28 gallons (4.8 Lpf) of water per flush.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

411.2.2.1 Flushometer Valve Activated Water Closets

[BSC-CG, DSA-SS & DSA-SS/CC] Flushometer valve activated water closets shall have a maximum flush volume of 1.28 gallons (4.8 L) per flush in accordance with ASME A112.19.2/CSA B45.1.

411.2.3 Performance

[HCD 1 & HCD 2] Water closets installed in residential occupancies shall meet or exceed the minimum performance criteria developed for certification of high-efficiency toilets under the WaterSense program sponsored by the U.S. Environmental Protection Agency (EPA).

Chapter 4 – Plumbing Fixtures and Fixture Fittings

412.1.3 Nonwater Urinals

Nonwater urinals shall have a liquid barrier sealant to maintain a trap seal. Nonwater urinals shall permit the uninhibited flow of waste through the urinal to the sanitary drainage system. Nonwater urinals shall be cleaned and maintained in accordance with the manufacturer's instructions after installation.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

Where nonwater urinals are installed, not less than one water supplied fixture rated at not less than 1 water supply fixture unit (WSFU) shall be installed upstream on the same drain line to facilitate drain line flow and rinsing. Where nonwater urinals are installed, they shall have a water distribution line rough-in to each individual urinal location to allow for the installation of an approved backflow prevention device in the event of a retrofit. *For additional information, see Health and Safety Code Section 17921.4.*

Chapter 4 – Plumbing Fixtures and Fixture Fittings

414.3 Drainage Connection

Domestic dishwashing machines shall discharge indirectly through an air gap fitting in accordance with [Section 807.3](#) into a waste receptor, a wye branch fitting on the tailpiece of a kitchen sink, or dishwasher connection of a food waste disposer. Commercial dishwashing machines shall discharge indirectly through an air break or direct connection. The indirect discharge for commercial dishwashing machines shall be in accordance with [Section 807.1](#), and the direct discharge shall be in accordance with [Section 704.3](#).

Chapter 4 – Plumbing Fixtures and Fixture Fittings

415.0 Drinking Fountains

415.1 Application

Drinking fountains shall be self-closing and comply with ASME A112.19.1/CSA B45.2, ASME A112.19.2/CSA B45.1, or ASME A112.19.3/CSA B45.4. Drinking fountains shall also comply with NSF 61. Permanently installed electric water coolers shall also comply with UL 399. **[HCD 1]** *Drinking fountains shall be installed and so regulated that a jet of water extending at least 2 inches (51 mm) in height from the water orifice shall be constantly available. The orifice shall not be accessible to the mouth of the drinker nor subject to immersion.*

Chapter 4 – Plumbing Fixtures and Fixture Fittings

416.0 Emergency Eyewash and Shower Equipment

416.1 Application

Emergency eyewash and shower equipment shall comply with ISEA Z358.1.

416.2 Water Supply Emergency eyewash and shower equipment shall not be limited in the water supply flow rates. Where hot and cold water is supplied to an emergency shower or eyewash station, the temperature of the water supply shall be controlled by a temperature actuated mixing valve complying with ASSE 1071. The flow rate, discharge pattern, and temperature of flushing fluids shall be provided in accordance with ISEA Z358.1.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

417.3 Handheld Showers Handheld showers shall comply with ASME A112.18.1/CSA B125.1. Handheld showers with integral backflow protection shall comply with ASME A112.18.1/CSA B125.1 or shall have a backflow prevention device that complies with ASME A112.18.3 or ASSE 1014.

Chapter 4 – Plumbing Fixtures and Fixture Fittings

420.2 Water Consumption

Sink faucets shall have a maximum flow rate of not more than 2.2 gpm at 60 psi (8.3 L/m at 414 kPa).

Exceptions:

Clinical sinks

Laundry trays

Service sinks

Chapter 4 – Plumbing Fixtures and Fixture Fittings

420.2.1 Kitchen Faucets [BSC-CG, DSA-SS & DSA-SS/CC] *Kitchen faucets shall have a maximum flow rate of not more than 1.8 gallons (6.81 L) per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons (8.3 L) per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons (6.81 L) per minute at 60 psi in compliance with [Chapter 5](#), Division 5.3 of the California Green Building Standards Code (CALGreen).*

Chapter 4 – Plumbing Fixtures and Fixture Fittings

420.2.2 Kitchen Faucets [HCD 1] *The maximum flow rate of kitchen faucets shall not exceed 1.8 gallons (6.81 L) per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons (8.32 L) per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons (6.81 L) per minute at 60 psi in compliance with [Chapter 4](#), Division 4.3 or [Chapter 5](#), Division 5.3 of the California Green Building Standards Code (CALGreen), as applicable.*

Note: *Where faucets meeting the maximum flow rate of 1.8 gpm (6.81 L) are unavailable, aerators or other means may be used to achieve reduction.*

Chapter 5 – Water Heaters

**TABLE 501.1(1)
WATER HEATERS**

TYPE	STANDARD
Electric, Household	UL 174
Oil-Fired Storage Tank	UL 732
Gas, 75000 Btu/h or less	CSA Z21.10.1
Gas, Above 75000 Btu/h	CSA Z21.10.3
Electric, Commercial	UL 1453
Solid Fuel	UL 2523

For SI Units: 1 000 British thermal units per hour = 0.293 kW

**TABLE 501.1(2)
FIRST HOUR RATING¹**

Number of Bathrooms	1 to 1.5			2 to 2.5				3 to 3.5			
	1	2	3	2	3	4	5	3	4	5	6
First Hour Rating, ² Gallons	38	49	49	49	62	62	74	62	74	74	74

For SI Units: 1 gallon = 3.785 L

Notes:

¹ The first-hour rating is found on the "Energy Guide" label.

² Solar water heaters shall be sized to meet the appropriate first-hour rating as shown in the table.

Chapter 5 – Water Heaters

509.4.1 Plastic Piping Where plastic piping is used to vent an appliance, the appliance shall be listed for use with such venting materials and the appliance manufacturer's installation instruction shall identify the specific plastic piping material. [NFPA 54:12.5.2]

Chapter 6 – Water Supply and Distribution

601.2.1 Submeters

[HCD 1] Each water purveyor that sells, leases, rents, furnishes, or delivers water service to a newly constructed multiunit residential structure or residential portion of newly constructed mixed-use residential and commercial structure for which an application for a water connection(s) is submitted after January 1, 2018, shall require a measurement of the quantity of water supplied to each individual residential dwelling unit as a condition of new water service. The measurement may be by individual water meters or submeters. See California Water Code Section 517 for definitions of "multiunit residential structure," "mixed-use residential and commercial structure," and "submeter," and Section 537 et seq. for additional details and a list of exempted structures. See also the California Civil Code, Title 5, Part 4, Division 4, Chapter 2.5 (commencing with Section 1954.201).

Chapter 6 – Water Supply and Distribution

603.5.21 Chemical Dispensers

The water supply to chemical dispensers shall be protected against backflow. The chemical dispenser shall comply with ASSE 1055 or the water supply shall be protected by one of the following methods:

- Air gap
- Atmospheric vacuum breaker (AVB)
- Pressure vacuum breaker backflow prevention assembly (PVB)
- Spill-resistant pressure vacuum breaker (SVB)
- Reduced-pressure principle backflow prevention assembly (RP)

Chapter 6 – Water Supply and Distribution

604.10.1 Tracer Wire Plastic materials for building supply piping outside underground shall have an electrically continuous corrosion-resistant blue insulated copper tracer wire, or other approved conductor installed adjacent to the piping. Access shall be provided to the tracer wire, or the tracer wire shall terminate aboveground at each end of the nonmetallic piping. The tracer wire size shall be not less than 14 AWG, and the insulation type shall be suitable for direct burial.

Chapter 6 – Water Supply and Distribution

605.12 PVC Plastic Pipe and Joints

PVC plastic pipe and fitting joining methods shall be installed in accordance with the manufacturer's installation instructions and shall comply with [Section 605.12.1](#) through [Section 605.12.3](#).

PVC piping shall not be exposed to direct sunlight unless the piping does not exceed 24 inches (610 mm) and is wrapped with not less than 0.04 of an inch (1.02 mm) thick tape or otherwise protected from UV degradation.

Chapter 6 – Water Supply and Distribution

609.4 Testing

Upon completion of a section or of the entire hot and cold water supply system, the system shall be tested with water or air. The potable water test pressure shall be greater than or equal to the working pressure under which the system is to be used. The air pressure shall be a minimum of 50 psi (345 kPa). Plastic pipe shall not be tested with air. The piping system shall withstand the test pressure without showing evidence of leakage for a period of not less than 15 minutes.

Exception: PEX, PP or PE-RT tube shall be permitted to be tested with air where permitted by the manufacturer's instructions.

Hot Water Piping Insulation Requirements

Hot Water Piping Insulation Requirements for the City of San Jose

Goal: to be consistent and less confusing regarding the insulation of hot water piping in all building types.

Solution: Use the 2019 California Energy Code Table 120.3-A for all hot water piping insulation applications.

Hot Water Piping Insulation Requirements

2019 California Energy Code

FLUID TEMPERATURE RANGE (°F)	CONDUCTIVITY RANGE (in Btu-inch per hour per square foot per °F)	INSULATION MEAN RATING TEMPERATURE (°F)	NOMINAL PIPE DIAMETER (in inches)				
			< 1	1 to <1.5	1.5 to < 4	4 to 8	> 8 and larger
			INSULATION THICKNESS REQUIRED (in inches)				
Space heating, Hot Water systems (steam, steam condensate and hot water) and Service Water Heating Systems (recirculating sections, all piping in electric trace tape systems, and the first 8 feet of piping from the storage tank for nonrecirculating systems)							
Above 350	0.32-0.34	250	4.5	5.0	5.0	5.0	5.0
251-350	0.29-0.31	200	3.0	4.0	4.5	4.5	4.5
201-250	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141-200	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140	0.22-0.28	100	1.0	1.5	1.5	1.5	1.5
Space cooling systems (chilled water, refrigerant and brine)							
40-60	0.21-0.27	75	Nonres 0.5	Res 0.75	Nonres 0.5	Res 0.75	1.0 1.0
Below 40	0.20-0.26	50	1.0	1.5	1.5	1.5	1.5

Chapter 7 – Sanitary Drainage

705.5 Polyethylene (PE) Sewer Pipe

Polyethylene (PE) sewer pipe or tubing and fitting joining methods shall be installed in accordance with the manufacturer's installation instructions and shall comply with [Section 705.5.1](#) through [Section 705.5.1.3](#).

705.5.1 Heat-Fusion Joints

705.5.1.1 Butt-Fusion Joints

705.5.1.2 Electro-Fusion Joints

705.5.1.3 Socket-Fusion Joints

Chapter 7 – Sanitary Drainage

707.9 Clearance Each cleanout in piping 2 inches (50 mm) or less in size shall be so installed that there is a clearance of not less than 18 inches (457 mm) by 18 inches (457 mm) in front of the cleanout. Cleanouts in piping exceeding 2 inches (50 mm) shall have a clearance of not less than 24 inches (610 mm) by 24 inches (610 mm) in front of the cleanout. Cleanouts in under-floor piping shall be extended to or above the finished floor or shall be extended outside the building where there is less than 18 inches (457 mm) vertical overall, allowing for obstructions such as ducts, beams, and piping, and 30 inches (762 mm) horizontal clearance from the means of access to such cleanout. No under-floor cleanout shall be located exceeding 5 feet (1524 mm) from an access door, trap door, or crawl hole.

Chapter 7 – Sanitary Drainage

715.3 Existing Sewers Replacement of existing building sewer and building storm sewers using trenchless methodology and materials shall be installed in accordance with ASTM F1216. Cast-iron soil pipes and fittings shall not be repaired or replaced by using this method aboveground or belowground. Replacement using cured-in-place pipe liners shall not be used on collapsed piping or when the existing piping is compromised.

Chapter 7 – Sanitary Drainage

Is Pipe Bursting allowed in the City of San Jose?

See Installation Standard for Trenchless Insertion of Polyethylene (PE) Pipe for Sewer Laterals

IAPMO IS 26-2006

Chapter 9 – Vents

906.1 Roof Termination Each vent pipe or stack shall extend through its flashing and shall terminate vertically not less than 6 inches (152 mm) above the roof nor less than 1 foot (305 mm) from a vertical surface. ABS and PVC piping exposed to sunlight shall be protected by water based synthetic latex paints.

Chapter 10 – Traps and Interceptors

1007.2 Trap Seal Primers Potable water supply trap seal primer valves shall comply with ASSE 1018. Drainage and electronic design type trap seal primer devices shall comply with ASSE 1044.

Chapter 11 – Storm Drainage

1106.0 Engineered Storm Drainage System

1106.1 General

The design and sizing of a storm drainage system shall be permitted to be determined by accepted engineering practices. The system shall be designed by a registered design professional and approved in accordance with [Section 301.5](#).

1106.2 Siphonic Roof Drainage Systems

The design of a siphonic roof drainage system shall comply with ASPE 45.

1106.3 Siphonic Roof Drains Siphonic roof drains shall comply with ASME A112.6.9.

Chapter 12 – Fuel Gas Piping

1208.6.5 Plastic Pipe, Tubing, and Fittings Polyethylene plastic pipe, tubing, and fittings used to supply fuel gas shall conform to ASTM D2513. Pipe to be used shall be marked "gas" and "ASTM D2513." Polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) plastic pipe, tubing, and fittings shall not be used to supply fuel gas. [NFPA 54.5.6.4.1.1 — 5.6.4.1.3]

Chapter 12 – Fuel Gas Piping

1210.1.3 Protection Against Corrosion

Steel pipe and steel tubing installed underground shall be installed in accordance with [Section 1210.1.3.1](#) through [Section 1210.1.3.9](#). [NFPA54:7.1.3]

1210.1.3.1 Zinc Coating

1210.1.3.2 Underground Piping

1210.1.3.3 Cathodic Protection

1210.1.3.4 Sacrificial Anodes

1210.1.3.5 System Failing Tests

1210.1.3.6 Impressed Current Cathodic Protection

1210.1.3.7 Documentation

1210.1.3.8 Dissimilar Metals

1210.1.3.9 Steel Risers

Chapter 12 – Fuel Gas Piping

1210.1.7.2 Tracer

An electrically continuous corrosion-resistant tracer shall be buried with the plastic pipe to facilitate locating. The tracer shall be one of the following:

- 1) A product specifically designed for that purpose.
- 2) Insulated copper conductor not less than 14 AWG.

Where tracer wire is used, access shall be provided from aboveground, or one end of the tracer wire or tape shall be brought aboveground at a building wall or riser. [NFPA 54:7.1.7.3 — 7.1.7.3.2]

Chapter 12 – Fuel Gas Piping

1211.2 Bonding of CSST Gas Piping CSST gas piping systems, and gas piping systems containing one or more segments of CSST, shall be bonded to the electrical service grounding electrode system or, where provided, lightning protection grounding electrode system. [NFPA 54:7.13.2]

1211.2.1 Bonding Jumper Connection The bonding jumper shall connect to a metallic pipe, pipe fitting, or CSST fitting. [NFPA 54:7.13.2.1]

1211.2.2 Bonding Jumper Size The bonding jumper shall not be smaller than 6 AWG copper wire or equivalent. [NFPA 54:7.13.2.2]

Chapter 12 – Fuel Gas Piping

1211.2.3 Bonding Jumper Length The length of the jumper between the connection to the gas piping system and the grounding electrode system shall not exceed 75 feet (22 875 mm). Any additional electrodes shall be bonded to the electrical service grounding electrode system or, where provided, lightning protection grounding electrode system. [NFPA 54:7.13.2.3]

1211.2.4 Bonding Connections Bonding connections shall be in accordance with NFPA 70. [NFPA 54:7.13.2.4]

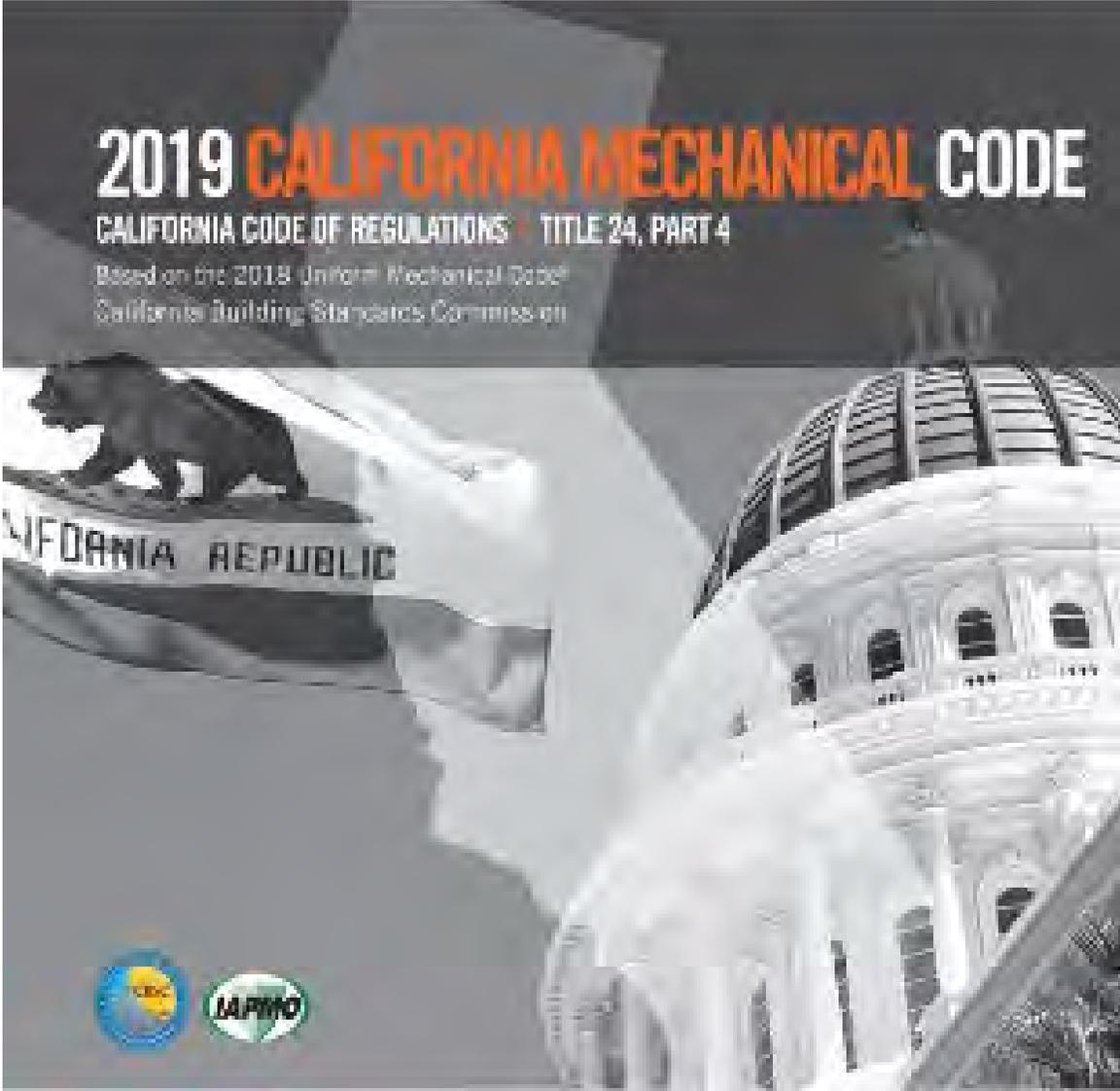
1211.2.5 Devices Used for Bonding Devices used for the bonding connection shall be listed for the application in accordance with UL 467. [NFPA 54:7.13.2.5]

Appendix M – Peak Water Demand Calculator

M101.0 General

M101.1 Applicability This appendix provides a method for estimating the demand load for the building water supply and principal branches for single- and multi-family dwellings with water-conserving plumbing fixtures, fixture fittings, and appliances.

2019 California Mechanical Code Updates



Chapter 2 - Definitions

Air Dispersion Systems. Materials intended for use in air handling systems in exposed locations operating under positive pressure.

Appliance. A device that utilizes an energy source to produce light, heat, power, refrigeration, air conditioning, or compressed fuel gas. This definition also shall include a vented decorative appliance.

Combustible Material. A material that, in the form in which it is used and under the conditions anticipated, will ignite and burn; a material that does not meet the definition of noncombustible.

[NFPA 54:3.3.64.1]

Chapter 2 - Definitions

Lineset. A set of two refrigerant pipes that extends from the condenser to the evaporator (cooling coil) in direct systems, consisting of a suction line and a liquid line.

Refrigerant Designation. The unique identifying alphanumeric value assigned to an individual refrigerant.

Chapter 3 – General Regulations

303.10 Clearances

303.10.1 Clearance Reduction

303.10.1.1 Type I hood Exhaust System

303.10.1.2 Product Conveying Ducts

303.10.1.3 Solid-Fuel Burning Appliances

Chapter 3 – General Regulations

303.13 Pit Location

Where excavation is necessary to install an appliance, it shall extend to a depth of 6 inches (152 mm) below and 12 inches (305 mm) on all sides of the appliance, except on the service side, which shall have 30 inches (762 mm). Where the depth of the excavation for either the appliance or passageway exceeds 12 inches (305 mm), walls shall be lined with concrete or masonry 4 inches (102 mm) above the adjoining ground level.

Exception: *[HCD 1 & HCD 2] Liquefied petroleum gas (LP-Gas) appliances as described in [Section 303.7.1](#).*

Chapter 3 – General Regulations

305.1 Installation in Garages Appliances in residential garages and in adjacent spaces that open to the garage and are not part of the living space of a dwelling unit shall be installed so that all burners and burner-ignition devices are located not less than 18 inches (457 mm) above the floor unless listed as flammable vapor ignition resistant.
[NFPA 54:9.1.10.1]

Gas Dryers in a Residential Garage?

Chapter 5 – Exhaust System

504.4 Clothes Dryers ...

Transition ducts used to connect the dryer to the exhaust duct shall be listed and labeled in accordance with UL 2158A, or installed in accordance with the clothes dryer manufacturer's installation instructions.

504.4.2.3 Exhaust Duct Power Ventilators Dryer exhaust duct power ventilators for single residential clothes dryers shall be listed and labeled in accordance with UL 705 and installed in accordance with the manufacturer's installation instructions.

Chapter 5 – Exhaust System

505.0 Product-Conveying Systems

505.3 Flammability Limit

505.3.2 Ovens and Furnaces

505.3.3 Deflagration

505.4 Air-Moving Devices

505.5 Generating Flames, Sparks, or Hot Materials

505.6 Fire Dampers

505.6.1 (Fire Dampers) Prohibited

505.7 Fire Detection and Alarm Systems

505.7.1 Automatic Extinguishing Systems

505.7.2 Shut Down Permitted

Chapter 5 – Exhaust System

506.0 Product-Conveying Ducts

506.3 Penetrations

506.3.1 Fire Barriers

506.3.2 Protection

506.4 Condensate

506.4.1 Drainage

506.10 Duct Clearances

506.11 Clearance Reduction Method

Table 506.11

Chapter 5 – Exhaust System

TABLE 506.11
REDUCTION OF DUCT CLEARANCE WITH SPECIFIED FORMS OF PROTECTION
[NFPA 91: TABLE 4.7.4]

FORM OF PROTECTION*	MAXIMUM ALLOWABLE REDUCTION IN CLEARANCE (percent)	
	AS WALL PROTECTOR OR VERTICAL SURFACE	AS CEILING PROTECTOR OR HORIZONTAL SURFACE
3 1/2 inch thick masonry wall without ventilated air space	33	None
1/2 inch thick noncombustible insulation board over 1 inch glass fiber or mineral wool batts without ventilated air space.	50	33
0.024 inch (24 gauge) sheet metal over 1 inch glass fiber or mineral wool batts reinforced with wire, or equivalent on rear face with at least a 1 inch air gap	66	66
3 1/2 inch (90 mm) thick masonry wall with at least a 1 inch air gap	66	None
0.024 inch (24 gauge) sheet metal with at least a 1 inch air gap	66	50
1/2 inch thick noncombustible insulation board with at least a 1 inch air gap	66	50
0.024 inch (24 gauge) sheet metal with ventilated air space over at least 0.024 inch (24 gauge) sheet metal with at least a 1 inch air gap	66	50
1 inch glass fiber or mineral wool batts sandwiched between two sheets of 0.024 inch (24 gauge) sheet metal with at least a 1 inch air gap	66	50

For SI units: 1 inch = 25.4 mm

* Clearance reduction applied to and covering all combustible surfaces within the distance specified as required clearance with

Chapter 5 – Exhaust System

511.2.2.2 Capture and Containment Test The permit holder shall verify the capture and containment performance of Type I hoods. A field test shall be conducted with all appliances under the hood at operating temperatures, all the hoods operating at design airflows, and with all sources of replacement air operating at design airflows for the restaurant. Capture and containment shall be verified visually by observing smoke or steam produced by actual cooking operation or by simulating cooking using devices such as smoke candles or smoke puffers. Smoke bombs shall not be used. [ASHRAE 154:4.7.2]

Chapter 5 – Exhaust System

519.0 Type II Hood Exhaust System Requirements

519.1 Where Required

519.2 Construction of Type II Hoods

519.3 Dishwashing Appliances

519.4 Type II Exhaust Duct Systems

519.5 Termination of Type II Hood Exhaust System

519.6 Makeup Air

Chapter 6 – Duct Systems

602.4 Phenolic Ducts, plenums, or fittings of phenolic shall be constructed in accordance with SMACNA Phenolic Duct Construction Standards.

602.5 Gypsum Where gypsum products are exposed in ducts or plenums, the air temperature shall be restricted to a range from 50°F (10°C) to 125°F (52°C), and moisture content shall be controlled so that the material is not adversely affected. All gypsum products shall have a mold or mildew resistant surface. For the purpose of this section, gypsum products shall not be exposed in supply ducts.

Chapter 6 – Duct Systems

602.5 Gypsum Where gypsum products are exposed in ducts or plenums, the air temperature shall be restricted to a range from 50°F (10°C) to 125°F (52°C), and moisture content shall be controlled so that the material is not adversely affected. All gypsum products shall have a mold or mildew resistant surface. For the purpose of this section, gypsum products shall not be exposed in supply ducts.

2019 CA Energy Code 150.0(m)(1)(E)

E. Building cavities, support platforms for air handlers and plenums designed or constructed with materials other than sealed sheet metal, duct board or flexible duct shall not be used for conveying conditioned air. Building cavities and support platforms may contain ducts. Ducts installed in cavities and support platforms shall not be compressed to cause reductions in the cross-sectional area of the ducts.

Chapter 6 – Duct Systems

603.5 Flexible Air Ducts Flexible air ducts shall comply with UL 181, and shall be installed in accordance with the manufacturer's installation instructions and SMACNA HVAC Duct Construction Standards-Metal and Flexible.

Flexible air duct installations shall comply with the following:

1. Ducts shall be installed using the minimum required length to make the connection.
2. Horizontal duct runs shall be supported at not more than 4 feet (1219 mm) intervals.
3. Vertical risers shall be supported at not more than 6 feet (1829 mm) intervals.
4. Sag between support hangers shall not exceed $1/2$ inch (12.7 mm) per foot (305 mm) of support spacing.

Chapter 6 – Duct Systems

5. Supports shall be rigid and shall be not less than 1 1/2 inches (38 mm) wide at point of contact with the duct surface.
6. Duct bends shall be not less than one duct diameter bend radius.
7. Screws shall not penetrate the inner liner of non-metallic flexible ducts unless permitted in accordance with the manufacturer's installation instructions.
8. Fittings for attaching non-metallic ducts shall be beaded and have a collar length of not less than 2 inches (51 mm) for attaching the duct.

Exception: A bead shall not be required where metal worm-gear clamps are used or where attaching metallic ducts using screws in accordance with the manufacturer's installation instructions.

Chapter 6 – Duct Systems

9. Duct inner liner shall be installed at not less than 1 inch (25.4 mm) on the collar and past the bead prior to the application of the tape and mechanical fastener. Where mastic is used instead of tape, the mastic shall be applied in accordance the mastic manufacturer's instructions.
10. Duct outer vapor barriers shall be secured using two wraps of approved tape. A mechanical fastener shall be permitted to be used in place of, or in combination with, the tape.
11. Flexible air ducts shall not penetrate a fire-resistance-rated assembly or construction.
12. The temperature of the air to be conveyed in a flexible air duct shall not exceed 250°F (121 °C).
13. Flexible Air ducts shall be sealed in accordance with Section 603.10.

Chapter 6 – Duct Systems

603.10 Joints and Seams of Ducts

Closure systems for sealing factory made air ducts and plenums shall be listed and labeled in accordance with UL 181A or UL 181B, and marked in accordance with [Table 603.10](#).

**TABLE 603.10
CLOSURE MARKINGS**

TYPE OF DUCTWORK	STANDARD	TYPE OF CLOSURE SYSTEM	MARKING
Rigid Metallic or Rigid Fiberglass	UL 181A	Pressure Sensitive Tape	181A-P
Rigid Metallic or Rigid Fiberglass	UL 181A	Mastic Tape	181A-M
Rigid Metallic or Rigid Fiberglass	UL 181A	Heat Sensitive Tape	181A-H
Flexible Air Ducts	UL 181B	Pressure Sensitive Tape*	181B-FX*
Flexible Air Ducts	UL 181B	Mastic*	181B-M*

* Mechanical fasteners shall be used in conjunction with a listed pressure sensitive tape or mastic in accordance with UL 181. Nonmetallic mechanical fasteners shall be listed and labeled in accordance with UL 181B and labeled "181B-C."

Chapter 6 – Duct Systems

603.10.1 Duct Leakage Tests

[Not adopted by HCD] Ductwork shall be leak-tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual. Representative sections totaling not less than 10 percent of the total installed duct area shall be tested. Where the tested 10 percent fail to comply with the requirements of this section, then 40 percent of the total installed duct area shall be tested. Where the tested 40 percent fail to comply with the requirements of this section, then 100 percent of the total installed duct area shall be tested. Sections shall be selected by the building owner or designated representative of the building owner.

Chapter 6 – Duct Systems

Positive pressure leakage testing shall be permitted for negative pressure ductwork. The permitted duct leakage shall be not more than the following:

$$L_{max} = C_L P^{0.65} \quad \text{(Equation 603.10.1)}$$

Where:

L_{max} = maximum permitted leakage, (ft³/min)/100 square feet [0.0001 (m³/s)/m²] duct surface area.

C_L = six, duct leakage class, (ft³/min)/100 square feet [0.0001 (m³/s)/m²] duct surface area at 1 inch water column (0.2 kPa).

P = test pressure, which shall be equal to the design duct pressure class rating, inch water column (kPa).

603.10.1.1 Duct Leakage Tests for Residential Buildings

[HCD 1 & HCD 2] See California Energy Code Section 150.0(m)(11) for low-rise residential; and Section 140.4(1) for duct leakage tests for other residential buildings.

Chapter 6 – Duct Systems

603.13 Air Dispersion Systems Where installed, air dispersion systems shall be completely in exposed locations in duct systems under positive pressure, and not pass through or penetrate fire-resistant-rated construction. Air dispersion systems shall be listed and labeled in accordance with UL 2518.

Chapter 8 – Chimneys and Vents

802.3.6 Above-Ceiling or Nonducted Air Handling System

Where a venting system passes through an above-ceiling air space or other nonducted portion of an air-handling system, it shall conform to one of the following requirements:

The venting system shall be a listed special gas vent, other system serving a Category III or Category IV appliance, or other positive pressure vent, with joints sealed in accordance with the appliance or vent manufacturer's instructions.

The vent system shall be installed such that no fittings or joints between sections are installed in the above-ceiling space.

The venting system shall be installed in a conduit or enclosure with joints between the interior of the enclosure and the ceiling space sealed. [NFPA 54:12.4.5.2]

Chapter 8 – Chimneys and Vents

Table 802.4

**TABLE 802.4
TYPE OF VENTING SYSTEM TO BE USED
[NFPA 54: TABLE 12.5.1]**

APPLIANCES	TYPE OF VENTING SYSTEM	LOCATION OF REQUIREMENTS
Listed Category I appliances	Type B gas vent	Section 802.6
Listed appliances equipped with draft hood	Chimney	Section 802.5
Appliances listed for use with Type B gas vent	Single-wall metal pipe	Section 802.7
	Listed chimney lining system for gas venting	Section 802.5.3
	Special gas vent listed for these appliances	Section 802.4.3
Listed vented wall furnaces	Type B-W gas vent	Section 802.6, Section 907.0
Category II appliances Category III appliances Category IV appliances	As specified or furnished by manufacturers of listed appliances	Section 802.4.1 and Section 802.4.3
Incinerators	Single-wall metal pipe	NFPA 82
Appliances that can be converted to use of solid fuel Unlisted combination gas- and oil-burning appliances Combination gas- and solid-fuel-burning appliances Appliances listed for use with chimneys only Unlisted appliances	Chimney	Section 802.5
Listed combination gas- and oil-burning appliances	Type L vent	Section 802.6
	Chimney	Section 802.5
Decorative appliances in vented fireplace	Chimney	Section 911.2
Gas-fired toilets	Single-wall metal pipe	Section 802.7, Section 929.3
Direct-vent appliances	—	Section 802.2.6
Appliances with integral vents	—	Section 802.2.7

Chapter 8 – Chimneys and Vents

802.6 Gas Vents

The installation of gas vents shall meet the following requirements:

1. Gas vents shall be installed in accordance with the manufacturer's installation instructions.
2. A Type B-W gas vent shall have a listed capacity not less than that of the listed vented wall furnace to which it is connected.
3. Gas vents installed within masonry chimneys shall be installed in accordance with the manufacturer's installation instructions. Gas vents installed within masonry chimneys shall be identified with a permanent label installed at the point where the vent enters the chimney. The label shall contain the following language: "This gas vent is for appliances that burn gas. Do not connect to solid or liquid fuel-burning appliances or incinerators."
4. Screws, rivets, and other fasteners shall not penetrate the inner wall of double-wall gas vents, except at the transition from the appliance draft hood outlet, flue collar, or single-wall metal connector to a double-wall vent.

Chapter 11 - Refrigeration

1103.1 Classification of Refrigerants

Refrigerants shall be classified in accordance with Table 1102.3 or in accordance with ASHRAE 34 where approved by the Authority Having Jurisdiction.

1103.1.1 Safety Group

Table 1102.3 classifies refrigerants by toxicity and flammability, and assigns safety groups using combinations of toxicity class and flammability class. For the purposes of this chapter, the refrigerant Groups A1, A2L, A2, A3, B1, B2L, B2, and B3 shall be considered to be individual and distinct safety groups. Each refrigerant is assigned into not more than one group.

Chapter 11 - Refrigeration

1106.2 Refrigeration Machinery Room, General Requirements

Where a refrigeration system is located indoors and a machinery room is required in accordance with Section 1106.1, the machinery room shall be in accordance with Section 1106.2.1 through Section 1106.2.5.2.

1107.0 Machinery Room, Special Requirements

1107.1 General

In cases specified in the rules of Section 1106.1, a refrigeration machinery room shall comply with the special requirements in accordance with Section 1107.1.1 through Section 1107.1.10, in addition to Section 1106.2.

Chapter 12 - Hydronics

1205.2 Pressure Testing

System piping and components shall be tested with a pressure of not less than one and one-half times the operating pressure but not less than 100 psi (689 kPa). Piping shall be tested with water or air except that plastic pipe shall not be tested with air. Test pressures shall be held for a period of not less than 30 minutes with no perceptible drop in pressure. These tests shall be made in the presence of the Authority Having Jurisdiction.

Chapter 12 - Hydronics

Exception: For PEX, PP-R, PP-RCT, PEX-AL-PEX, PE-RT, and PE-AL-PE piping systems, testing with air shall be permitted where authorized by the manufacturer's instructions for the PEX, PP-R, PP-RCT, PEX-AL-PEX, PE-RT, and PE-AL-PE pipe and fittings products, and air testing is not prohibited by applicable codes, laws, or regulations outside this code.

Note: [HCD 1 & HCD 2] PEX-AL-PEX is not adopted in the California Plumbing Code for use in potable water supply and distribution systems.

Questions?

Thank you!

2019 California Fire Code

Presented by: Raymond D. Simpson, CFM

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Important Changes to the 2019 CFC & SJMC Modifications

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Raymond D Simpson, CFM

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Important Changes to the 2019 CFC & SJMC Modifications		
Section(s) and Issue(s)	Type of Change	Comment
SJMC 17.12	Revision	The Municipal code has been updated to adopt the 2019 CFC and renumbered. Substantial additions have been incorporated primarily to include new HazMat related processes. For the most part, new definitions of these processes.
-SJMC – CFC 105.6. “Additional permits”	New Provision	Annual Permits required for 3D Printing Additive Manufacturing; lithium battery systems; & on-demand mobile fueling.
CFC Chapter 2 “DEFENITIONS”	New and Revised	Mostly about “Care” facilities. Care Suite; Community Care Facility; Congregate Health Facility (CLHF); Foster Family Home; Non-Patient Care Suite; and Residential Group R-2.2 (CDCR ONLY) have been added.
-SJMC- CFC Chapter 2 “DEFENITIONS”	Revisions - Correlation	Definitions Related to Storage, Handling And Use of Regulated Materials. Addition of language modified to reflect language adopted by Santa Clara County Fire Prevention Officers. Significant Examples are definitions related to 3D Printers; Marijuana industry; Moderately Toxic Gas and Minimum Threshold Quantity; and Workstations.
CFC Chapter 3 “GENERAL REQUIREMENTS”	Revisions	Clarification of safety provisions for indoor storage of motor vehicles recognizing alternate fuels & advanced technology. Increased separation and Annual permit for outdoor storage of Pallets. Also see Chapter 28 for Lumberyards...
-SJMC- CFC Chapter 3 “GENERAL REQUIREMENTS”	No Change New	Deleted new 315.1 which Deletes Hose Stream or Sprinkler Stream Ceiling Clearance Exceptions for High Piled Storage. Add requirements for 3D printing.
CFC Chapter 4 “EMERGENCY PLANNING AND PREPAREDNESS”	Revisions	Thresholds and requirements for crowd managers at events have been revised. Facility lockdown regulations have been updated with more detail.
CFC Chapter 5 “FIRE SERVICE FEATURES”	Revision	ERRC requirements now reference NFPA 1221 which requires coverage in 95% of the building and system malfunction monitoring.
-SJMC- CFC Chapter 5 “FIRE SERVICE FEATURES”	New	Fire Command Centers will be requires to be 2 hours fire resistive, provided with an independent ventilation or air-conditioning system with 100% outdoor air supply and connected to emergency power.

Important Changes to the 2019 CFC & SJMC Modifications		
Section(s) and Issue(s)	Type of Change	Comment
CFC Chapter 6 “BUILDING SERVICES AND SYSTEMS”	Revision	Fuel oil allowances for engines identify the difference between portable and stationary units.
	Relocate	PV moved to Chapter 12
	New	New class of low flammability gases (GroupA2L)
	Revised	Nonmetallic cooking oil tanks now to be listed with the capacity not to exceed 200 gallons.
CFC Chapter 8 “INTERIOR FINISH, DECORATIVE MATERIALS AND FURNISHINGS”	Revised	Modified the floor covering requirements for prisons with regard to fire safety. Limitations on combustible decorative materials have been added or clarified.
CFC Chapter 9 “FIRE PROTECTION AND LIFE SAFETY SYSTEMS”		901, General- Integrated testing required referencing NFPA 4. 903, AS- Modifications and Additions have little effect on current SJFD policies. 904, Alt FE- Recognizes Mist and Aerosol Hood protection. Requires Hood protection in Care facilities and college dormitories. 905, Standpipes– FCO is authorized to require locking caps. We are considering it. 907, FA- Now references NFPA 72 for plans. A occupancies now required to FAS if over 100 occupants on any floor above or below the ground floor. 916, Gas Detection- A new section was created to consolidate the related code requirements.

Important Changes to the 2019 CFC & SJMC Modifications		
Section(s) and Issue(s)	Type of Change	Comment
-SJMC- CFC Chapter 9 “FIRE PROTECTION AND LIFE SAFETY SYSTEMS”		<p>Most of the discussion of Fire System will be as part of our Modifications to Chapter 80.</p> <p>907, FA- R-2 occupancies required to have future capabilities to support visible alarm notifications is amended to include all instead of just one.</p> <ul style="list-style-type: none"> - FA for high rise buildings is amended: * require class A or class X redundant pathways. * allow flexible metallic conduit (FMC). * fire alarm network communication control units to be evenly distributed. - FA Signal Transmission. All new or replacement of fire alarm panels shall transmit alarm, trouble and supervisory signals descriptively with the correct device identification point and location to UL approved central station.
-SJMC- CFC Chapter 10 “MEANS OF EGRESS”		SJFD made no modifications to chapter 10. The Building department will point to any significant changes as the language is the same in both the CFC and CBC.
CFC Chapter 12 “ENERGY SYSTEMS”	New	New chapter to consolidate Emergency and Standby Power; Solar Photovoltaic Power, Stationary Fuel Cell Power; and Electrical Energy Storage Systems requirements
CFC Chapter 22 “COMBUSTIBLE DUSTPRODUCING OPERATIONS”	New	References NFPA 652 to provide a process to conduct a dust hazard analysis.
CFC Chapter 23 “MOTOR FUEL-DISPENSING FACILITIES AND REPAIR GARAGES”	New	Some additional safety devices and precautions have been added. Now reference NFPA 2 for Hydrogen.
CFC Chapter 24 “FLAMMABLE FINISHES”	New	Electrical has been aligned with the requirements of NFPA70 (CEC) and 33. 1 hour separation between booths has been added to correlate with CBC requirements.

Important Changes to the 2019 CFC & SJMC Modifications		
Section(s) and Issue(s)	Type of Change	Comment
CFC Chapter 28 “LUMBER YARDS AND AGRO-INDUSTRIAL, SOLID BIOMASS AND WOODWORKING FACILITIES”	New	Allows this specialized industry to store pallets to different criteria than generalized in Section 315.
CFC Chapter 31 “TENTS, TEMPORARY SPECIAL EVENT STRUCTURES AND OTHER MEMBRANE STRUCTURES”	Revised and New	<ul style="list-style-type: none"> • Umbrella Structures are now recognized in the definitions of chapter 2 which bring them under regulation if they exceed 400 sf. • Tents and other membrane structures erected as a special amusement building shall be equipped with an automatic sprinkler system. • A detailed site and floor plan for tents or membrane structures with an occupant load of 50 or more shall be provided including analysis of structural stability. • Flame resistance is now to be in accord with NFPA 701. • Temporary special event structures (formally Temporary Stage Canopy) is now expanded to include all temporary structures greater than 400 sf used for special events. • A new section has been added specific to Outdoor assembly events. • LP-gas equipment shall be approved and in accordance with Chapter 61 (LP Gases) and with the California Plumbing Code.
CFC Chapter 32 “HIGH- PILED COMBUSTIBLE STORAGE”	Revised and New	High-Piled Combustible Storage has been substantially updated to correlate with the requirements of NFPA 13 and FM Global Tests. There is also more substantial FD access requirements.
CFC Chapter 39 “PROCESSING AND EXTRACTION FACILITIES”	New	A new chapter focused on the processing and extraction of oils and fats from various plants

Important Changes to the 2019 CFC & SJMC Modifications		
Section(s) and Issue(s)	Type of Change	Comment
-SJMC- CFC Chapter 39 “PROCESSING AND EXTRACTION FACILITIES”	New	<p>-We modify the new code to restrict to operation to Group F or H occupancies and do not allow the use of LPG for extraction.</p> <p>- Added to Section 3904 door swing and panic door requirements.</p> <ul style="list-style-type: none"> • Added requirements for extraction room shall be fully enclosed continuous, non-combustible, and smooth except for carbon dioxide extraction systems when using flammable liquids such as ethanol. • Added requirement for luminaires attached to the walls or ceilings of an extraction room or booth, but outside of any classified area and separated from the flammable vapor areas by vapor-tight glass panels, shall be suitable for use in ordinary hazard locations. Such luminaires shall be serviced from outside the flammable vapor areas. <p>- Added to section 3405 requirement for gas detection for both ethanol and carbon dioxide.</p> <ul style="list-style-type: none"> • Updated section to be fore flammable liquids like ethanol or carbon dioxide including adding requirements for gas detection. • Added protection from sources of ignition and open flame and sparks, and electrical equipment. <p>- Added ventilation requirements to section 3406 and interlocking with ventilation systems so the system shut downs if ventilation system is not operating.</p> <ul style="list-style-type: none"> • Added hazardous materials exhaust system requirements.
-SJMC- CFC Chapter 49 “REQUIREMENTS FOR WILDLAND-URBAN INTERFACE FIRE AREAS”	Revised	Amendment of Section 4906.2 to include application of Local Classifications of WUI Area defined by San Jose Fire Department.
-SJMC- CFC Part V– HAZARDOUS MATERIALS	Revisions - Correlation	Provisions Related to Storage, Handling And Use of Regulated Materials. Addition of language modified to reflect language adopted by Santa Clara County Fire Prevention Officers.

Important Changes to the 2019 CFC & SJMC Modifications		
Section(s) and Issue(s)	Type of Change	Comment
CFC Chapter 50 “HAZARDOUS MATERIALS-GENERAL PROVISIONS”	New	<ul style="list-style-type: none"> Removed consumer fireworks as a special exception and consolidates the requirements into its own category (see chapter 56). The maximum allowable quantity of Class 3 oxidizers is increased by approximately 10% in control areas and in Groups M and S occupancies.
-SJMC- CFC Chapter 50 “HAZARDOUS MATERIALS-GENERAL PROVISIONS”	New	<ul style="list-style-type: none"> Include Moderately Toxic Gas as a Health Hazard. Adding limits for toxic gases in elevators where there is no ventilation and limited area.
CFC Chapter 51 “AEROSOLS”	New	<ul style="list-style-type: none"> Limitations of aerosol products in plastic containers is revised and the use of Plastic Aerosol X products is prohibited in higher life hazard occupancies. Specific fire protection requirements have been added to address aerosol cooking spray products.
CFC Chapter 53 “COMPRESSED GASES”	Revised	<ul style="list-style-type: none"> The requirements for construction and ventilation of interior medical gas rooms and cabinets are revised. When the maximum allowable quantity of gas is in the control area is exceeded, the control area is classified as Group H.
	New	<ul style="list-style-type: none"> Requirements for liquefied CO2 in beverage dispensing applications has been correlated with the requirements for gas detection systems.
	New	<ul style="list-style-type: none"> Carbon dioxide enrichment systems are now regulated in response to the proliferation of indoor marijuana cultivation facilities.
-SJMC- CFC Chapter 56 “EXPLOSIVES AND FIREWORKS”	New	<ul style="list-style-type: none"> Added Bond requirements for public firework displays
CFC Chapter 57 “FLAMMABLE AND COMBUSTIBLE LIQUIDS”	New	<ul style="list-style-type: none"> On-demand mobile fueling is allowed at approved locations and under the control of a permit issued by the fire department.

Important Changes to the 2019 CFC & SJMC Modifications		
Section(s) and Issue(s)	Type of Change	Comment
-SJMC- CFC Chapter 57 “FLAMMABLE AND COMBUSTIBLE LIQUIDS”	New	<ul style="list-style-type: none"> • Amended Overfill Protection for Above Ground Tanks. • Added training requirements for mobile fueling. • Added Property Owner Acceptance of Liability for mobile fueling.
-SJMC- CFC Chapter 60 “HIGHLY TOXIC AND TOXIC MATERIALS”	Revised	<ul style="list-style-type: none"> • Adding moderately toxic gases that were previously regulated in the toxic gas ordinance as Class III gases to be part of the model code.
CFC Chapter 61 “LIQUEFIED PETROLEUM GASES”	New	<ul style="list-style-type: none"> • Above ground LP-gas containers with a water capacity of 2,000 gallons or less shall be separated from the public ways by a distance of not less than 5 feet. Containers with a water capacity greater than 2,000 gallons shall be separated from public ways in accordance with table 6104.3.
-SJMC- CFC Chapter 80 “REFERENCED STANDARDS”	Revised	<ul style="list-style-type: none"> • The State did not update the listed NFPA Standards to reflect current editions of these Standards. SJ updated the editions and maintained the modifications of the 2016 Ordinance. • The significant change is that we reinstated the policy of providing sprinklers in concealed spaces.
-SJMC- CFC Appendix B “Fire Flow Requirements for Buildings”	Revised	San Jose adopts Appendix B, but revised the Fire Flow requirements.
-SJMC- CFC Appendix N “INDOOR TRADE SHOWS AND EXHIBITIONS”	New	San Jose adopted this new Appendix.

Questions?

Thank you!

2019 California Building Code (CBC) Volume I

Presented by: Michael Davis, Building Inspection Manager

Chapter 2 | Removal of Definition References

Change Type: Deletion

Change Summary: All definition lists located throughout the code have now been removed based on the general recognition of the format of the CBC and the ongoing use of italics to identify terms that are defined in Chapter 2.

Change Significance:

Throughout the CBC, specific terms are used in a manner that differs from their ordinarily accepted meaning.

Such terms are necessarily defined in order to clarify their meaning within the context of the code.

Chapter 2 | Removal of Definition References

~~402.2 Definitions.~~ The following terms are defined

~~Chapter 2:~~

~~**ANCHOR BUILDING.**~~

~~**COVERED MALL BUILDING.**~~

~~Mall.~~

~~Open mall.~~

~~Open mall building.~~

~~**FOOD COURT.**~~

~~**GROSS LEASABLE AREA.**~~

302.1 | Classification of Outdoor Areas



302.1 | Classification of Outdoor Areas

Change Type: Clarification

Change Summary: It has been clarified that occupied roofs are to be assigned one or more occupancy classifications in a manner consistent with the classification of uses inside the building, based upon the fire and life safety hazards posed by the rooftop activities.

Change Significance:

The code has historically been silent in regard to the occupancy classification of occupied roofs. It has been clarified that occupied roofs are to be assigned one or more occupancy classifications in a manner consistent with the classification of uses inside the building, based upon the fire and life safety hazards posed by the rooftop activities.

302.1 | Classification of Outdoor Areas (Continued)

Change Significance:

It is critical that an occupancy classification be assigned to any occupied portion of a building in order that the appropriate fire and life safety criteria are applied.

For example, where a rooftop contains a restaurant having dining seating for 50 or more persons, the occupied roof would be classified as a Group A-2 occupancy in order to address those hazards associated with such an assembly use.

404.6 | Enclosure of Atriums



404.6 | Enclosure of Atriums

Change Type: Modification

Change Summary: The requirement that those spaces not separated from an atrium be accounted for in the design of the smoke control system now applies only in those cases where the atrium is required to be provided with a smoke control system.

Change Significance:

As a general rule, an enclosure separation is required between an atrium and the remainder of the building.

404.6 | Enclosures of Atriums (Continued)

Change Significance:

A fourth exception has been provided to omit the fire barrier requirement between the building adjoining spaces and the atrium. This exception can be implemented when the atrium is not required to be provided with a smoke control system.

Section 404.5 identifies conditions for when smoke control for atriums is not required.

406.3 | Regulation of Private Garages

Change Type: Clarification

Change Summary: Parking structures that meet the definition of private garages are now permitted to comply with the provisions for public parking garages as an alternative approach.

Change Significance:

In the 2016 CBC, a new definition for private garage was introduced describing a private garage as a building or portion of a building where motor vehicles used by the tenants of the building or buildings on the premises are stored or kept, without any limitation on floor area.

406.3 | Regulation of Private Garages (Continued)

Change Significance:

An allowance has now been provided such that private garages are permitted to comply with the provisions for public parking garages as an alternative approach.

Private garages, as regulated by Section 406.3, are required to be classified as Group U occupancies and are limited to 1,000 square feet of floor area.

Multiple garages are permitted in the same building, but only where separated by minimum 1-hour fire barriers and/or horizontal assemblies.

406.3 | Regulation of Private Garages (Continued)

Change Significance:

Often there are conditions under which a much larger Group S-2 open or enclosed parking structure is intended to be limited for use only by the building's tenants.

The code now allows those parking structures that meet the definition of private garage to be designed and constructed under the provisions for public garages.

420.10 | Dormitory Cooking Facilities

Change Type: Addition

Change Summary: The installation and use of domestic cooking appliances are now regulated in both common areas and sleeping rooms of Group R-2 college dormitories.

In spite of the many concerns for fire safety in regards to cooking appliances, there have never been requirements in the CBC that regulate such appliances in college residences.

420.10 | Dormitory Cooking Facilities (Continued)

Change Significance:

The installation and use of domestic cooking appliances are now regulated in both common areas and sleeping rooms of Group R-2 college dormitories.

The scope of the new provisions is limited to those appliances intended to be used by residents of Group R-2 college dormitories.

420.10 | Dormitory Cooking Facilities (Continued)

Change Significance:

It does not apply to residential dwelling units on college campuses that are not classified as dormitories. In addition to a limit on the types of appliances and their locations, cooktops and ranges are further regulated due to their increased hazard.

They shall be protected through the installation of an approved automatic fire extinguishing system.

420.10 | Dormitory Cooking Facilities (Continued)

Change Significance:

A domestic cooking hood shall also be installed in accordance with Section 505 of the California Mechanical Code.

The types of appliances permitted to be installed and used include ovens, ranges, cooktops, warmers, coffee makers, and microwaves.

Due to the heightened hazard posed by cooktops, ranges, and ovens, such appliances are not permitted within sleeping rooms.

424.1 | Children's Play Structures



424.1 | Children's Play Structures

Change Type: Modification

Change Summary: The dimensional criteria under which children's play structures are scoped by the CBC have been revised, resulting in the potential for many more structures to be regulated for fire concerns.

Play structures must be constructed of noncombustible materials, or as an option if combustible, comply with alternate methods including the use of fire-retardant-treated wood, textiles complying with the designated flame propagation performance criteria, and plastic exhibiting an established maximum peak rate of heat release.

424.1 | Children's Play Structures (Continued)

Change Significance:

The dimensional criteria under which children's play structures are scoped by the CBC have been revised, resulting in the potential for many more structures to be regulated for fire concerns.

Historically, requirements for children's play structures have only been applicable where the structure exceeds both the specified height and the specified floor area set forth in the code.

Many such structures have not been regulated by the IBC because either their height or floor area fell slightly below the code threshold, even though they were extensive in size and fire hazard.

424.1 | Children's Play Structures (Continued)

Change Significance:

By revising the compliance trigger in a manner such that only one aspect of their size, either height or floor area, need exceed the code's limits for the provisions to apply, a significant increase in the number of regulated structures is expected.

Specifically, where the height of the children's play structure exceeds 10 feet, or where the floor area of the structure is greater than 150 square feet, the materials, fire protection, separation, and area limits of Section 424 must be met.

503.1, 706.1 | Scope of Fire Wall Use

Change Type: Modification

Change Summary: The use of fire walls is now strictly limited to only the determination of permissible types of construction, based upon allowable building area and height.

Change Significance:

The use of fire walls allows for each smaller building to be regulated independently rather than one large building.

503.1.4 | Allowable Height and Area of Occupied Roofs

Change Type: Addition

Change Summary: New criteria are now provided establishing the appropriate methodology in the regulation of building height in stories above grade plane where one or more occupancies is located on the roof.

Change Significance:

The CBC regulates the size of buildings, both building area and building height, in order to limit to a reasonable level the magnitude of a fire that potentially may develop.

503.1.4 | Allowable Height and Area of Occupied Roofs (Continued)

Change Significance:

A building's maximum allowable height in regard to number of stories above grade plane is determined based upon the building's type of construction and the occupancy classification of the uses involved.

New criteria are now provided establishing the appropriate methodology in the regulation of building height in stories above grade plane where one or more occupancies is located on the roof.

503.1.4 | Allowable Height and Area of Occupied Roofs (Cont.)

Change Significance:

Because a roof deck has no floor or roof above it, an occupied roof does not qualify as a story. However, the presence of occupants and fire loading on an occupied roof has always raised questions as to whether or not some degree of limitation should be provided.

The application of Exception 1 permits the placement of any occupancy classification, or classifications, on the roof provided two conditions are met:

1. The building is fully sprinklered in accordance with NFPA 13 or 13R as applicable.
2. Under all conditions, occupant notification must be provided the occupied portion of the roof.

503.1.4 | Allowable Height and Area of Occupied Roofs (Continued)

Change Significance:

Exception 2 addresses assembly occupancies located on the roofs of open parking garages.

Where the garage is of noncombustible Type I or II construction, Group A assembly occupancies are permitted on the roof without applying the fire protection system conditions set forth in Exception 1.

In order to maintain the rooftop openness needed for the proper application of the new provisions, any elements that enclose the occupied roof area are limited to a maximum height of 4 feet above the roof's surface.

503.1.4 | Allowable Height and Area of Occupied Roofs (Cont.)

Change Significance:

Such limits are not applicable for those structures designed and constructed in compliance with the provisions of Section 1510 regarding penthouses and other rooftop structures.

In addition to the allowance that an occupied roof is not considered as a story for purposes of applying the IBC, it is also not considered as building area in the regulation of allowable floor area.

Addressed in much the same manner as penthouses and other roof structures, the roof area is not a factor in determining the permissible size of the building.

Table 509 | Incidental Uses

Change Type: Clarification

Change Summary: The current description in Table 509 regulating incidental uses in regard to rooms containing stationary storage battery systems has been revised to allow for ongoing consistency with the *California Fire Code* (CFC). In addition, a new entry dealing with rooms housing electrical installations and transformers references applicable provisions in *California Electrical Code* (CEC).

Table 509 | Incidental Uses (Continued)

Change Significance:

The current description in Table 509 regarding rooms containing stationary storage battery systems has been revised to allow for ongoing consistency with the California Fire Code (CFC).

In addition, a new incidental use dealing with rooms housing electrical installations and transformers references applicable provisions in California Electrical Code (CEC).

The CBC requires that rooms where such battery systems are located be regulated as incidental uses.

Table 509 | Incidental Uses (Continued)

Change Significance:

The scoping provisions within the code have previously been specific in regard to the thresholds for applying the incidental use provisions.

Table 509 now simply references IFC Table 1206.2 so that future revisions to the IFC dealing with the types of batteries and quantities of materials will be automatically addressed in the table.

Table 509 references specific sections in the CEC for the construction of electrical equipment rooms.

Table 509 | Incidental Uses (Continued)

Change Significance:

This new reference accomplishes two major objectives:

1. Make CBC users aware that important construction requirements can be found in another publication.
2. Make the requirements consistent with CBC language, format and references.

510.2 | Horizontal Building Separation

Change Type: Clarification

Change Summary: Vertical offsets are permitted in the horizontal fire-resistance-rated separation mandated for “podium buildings” provided the minimum required fire-resistance rating is maintained for the offsets and their supporting elements.

Change Significance:

Where the horizontal building separation allowance is applied for the purpose of determining area limitations, continuity of fire walls, limitation on number of stories and type of construction, six conditions must be met.

510.2 | Horizontal Building Separation (Continued)

Change Significance:

The first condition requires that the separation be a minimum 3-hour horizontal assembly.

Condition 2 addressing the minimum type of construction below the horizontal assembly has also been revised to clarify that the Type IA construction requirement is applicable to both the building below the horizontal assembly, as well as the horizontal assembly itself.

510.2 | Horizontal Building Separation (Continued)

Change Significance:

The provisions of Section 510.2 are among the very few that recognize a horizontal fire-resistive separation as a means to create separate buildings when applying specified code requirements.

It has been clarified that vertical offsets are permitted in the horizontal separation, provided the minimum required fire-resistance rating is maintained for the offsets and their supporting elements.

Table 601, Note b | Fire Protection of Structural Roof Members

Change Type: Modification

Change Summary: All portions of the roof construction, including primary structural frame members such as girders and beams, are now selectively exempted from fire-resistance requirements based on Table 601 where every portion of the roof construction is at least 20 feet above any floor below.

Table 601, Note b | Fire Protection of Structural Roof Members (Continued)

Change Significance:

The basic fire-resistance ratings for the various types of construction are established in Table 601.

Footnote b has historically modified the base requirements in the table, as they relate to the roof construction, by selectively eliminating the requirement for protecting roof structural members where the roof construction is at least 20 feet above the floor below.

Table 601, Note b | Fire Protection of Structural Roof Members (Continued)

Change Significance:

Because footnote b was only applicable to the building element “roof construction and associated secondary members,” and was not referenced in the requirements for “primary structural frame,” its use was often not applied to roof girders, beams and similar primary structural members.

By expanding the scope of the footnote to primary structural frame elements, as well as specifically mentioning in the footnote its application to primary structural frame members, it is very clear that all portions of the roof construction are exempt from fire-resistance requirements based on Table 601.

713.8.1 | Membrane Penetrations of Shaft Enclosures

Change Type: Modification

Change Summary: Membrane penetrations not related to the purpose of a shaft enclosure are no longer prohibited from penetrating the outside of the enclosure.

Change Significance:

Penetrations of the exterior membrane of the fire-resistance-rated assembly are now permitted provided they are in compliance with the membrane penetration provisions of Section 714.4.2.

713.8.1 | Membrane Penetrations of Shaft Enclosures (Cont.)

Change Significance:

The new exception will no longer limit the type of or purpose for the penetration but will simply limit the location to the exterior membrane and require the proper protection.

The provisions are now consistent for both shaft enclosures and interior exit stairways.

A similar allowance was added in the 2012 edition of the IBC that provides for membrane penetrations on the exterior side of enclosures for interior exit stairways.

1006.3, 1006.3.1 | Egress through Adjacent Stories

Change Type: Clarification

Change Summary: The determination of means of egress requirements has been clarified where the occupants must travel to an adjacent story to reach a complying exit or exits.

Change Significance:

A newly introduced provision in Section 1006.3 now states that in situations where the occupants egress through an adjacent story to reach the exit, the additional occupant load is not considered when determining the required number of exits from the adjacent story.

The end result is that the number of exits, or access to exits, for each story is to be based solely on the occupant load for that story.

1008.2.3 | Illumination of the Exit Discharge

Change Type: Clarification

Change Summary: The introduction of illumination provisions specific to the exit discharge portion of the means of egress clarifies the extent of the illumination requirement. In addition, new language recognizes a long-held allowance for the use of safe dispersal areas and the necessary illumination where such areas are provided.

Change Significance:

The new provisions clearly specify that the required illumination must be provided for the entire exit discharge path to the public way.

1008.2.3 | Illumination of the Exit Discharge (Continued)

Change Significance:

There are conditions under which the exit discharge is extensive and the use of a safe dispersal area is an acceptable alternative.

Through a reference to Section 1028.5, a safe dispersal area must be located at least 50 feet from the building and provide adequate area to accommodate the anticipated occupant load. A minimum level of 1 footcandle is required to, and within, the safe dispersal area.

1023.5, 1024.6 | Exit Stairway and Exit Passageway Penetrations

Change Type: Modification

Change Summary: Security system and two-way communication system components are now specifically permitted to penetrate the fire-resistant-rated enclosure of exit passageways, interior exit stairways, and interior exit ramps.

Change Significance:

It was deemed important to make it clear that such penetrations are acceptable and sometimes required.

1023.5, 1024.6 | Exit Stairway and Exit Passageway Penetrations (Continued)

Change Significance:

As an example, NFPA 101 Life Safety Code requires stairway video monitoring in high-rise buildings with an occupant load of 4,000 or more persons.

In addition, the specified penetrations now include those related to two-way communication systems that are required in areas of refuge for accessibility purposes. The inclusion of these items now clearly allows for these systems to be provided in the exit enclosure to provide for safety and security of the building while still maintaining the integrity of the enclosure.

1507.18 | Building-Integrated Photovoltaic Panels

Change Type: Addition

Change Summary: Building-integrated photovoltaic panel systems have specific requirements as a roof-covering material in the California Building Code.

Change Significance:

A new definition for BIPV roof panels has been added to Chapter 2 to identify the panels as a unique building-integrated photovoltaic product.

1507.18 | Building-Integrated Photovoltaic Panels (Continued)

Change Significance:

A new definition for BIPV roof panels has been added to Chapter 2 to identify

Building-integrated photovoltaic (BIPV) roof panels form part of the building envelope and are subject to the requirements for roof coverings.

BIPV panels are larger than typical BIPV shingles. The panels are a thin-film layer and can be the typical rectangular panel shape or have a rounded shape. There are now clay roof tile-shaped BIPVs available.

Questions?

Thank you!

BREAK

12:30 – 1:30 PM

2019 California Building Code (CBC) Volume II

Presented by: Marc Garcia, S.E., CASp

California Building Code Structural Reference Standards

Reference Standards (Changes are a seminar in themselves)

Topic	2016 CBC	2019 CBC
Loading	ASCE 7-10 (with supp. #1)	ASCE 7-16
Concrete	ACI 318-14	ACI 318-14
Masonry	TMS 402-2013	TMS 402-2016
Structural Steel	AISC 360-10 and 341-10	AISC 360-16 and 341-16
Cold-Formed Steel	Various AISI	Various AISI
Wood	NDS-2016 and SDPWS-2015	NDS-2018 and SDPWS-2015

Training

- Multiple seminars are available thru various industry and professional organizations
 - ASCE
 - AISC
 - ACI
 - NWC
 - APA
 - WOODWORKS
 - NCSEA and it's local organization SEAONC
 - E.T.C.

Significant Change to Seismic Loading

ASCE 7-10 ASCE 7-16

- The seismic maps and associated coefficients have been refined
- If sufficient data is not available to determine site class, D is to be assumed and F_a is to be a minimum of 1.2
 - If S_s remains the same... seismic force will go up 20% for many cases without sufficient data

TABLE 1613.2.3(1)
VALUES OF SITE COEFFICIENT F_a ^a

SITE CLASS	MAPPED RISK TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE _R) SPECTRAL RESPONSE ACCELERATION PARAMETER AT SHORT PERIOD					
	$S_s \leq 0.25$	$S_s = 0.50$	$S_s = 0.75$	$S_s = 1.00$	$S_s = 1.25$	$S_s \geq 1.5$
A	0.8	0.8	0.8	0.8	0.8	0.8
B	0.9	0.9	0.9	0.9	0.9	0.9
C	1.3	1.3	1.2	1.2	1.2	1.2
D	1.6	1.4	1.2	1.1	1.0	1.0
E	2.4	1.7	1.3	Note b	Note b	Note b
F	Note b	Note b	Note b	Note b	Note b	Note b

a. Use straight-line interpolation for intermediate values of mapped spectral response acceleration at short period, S_s .
b. Values shall be determined in accordance with Section 11.4.8 of ASCE 7.



$$S_{MS} = F_a S_s$$



$$S_{DS} = \frac{2}{3} S_{MS}$$

Loadings Defined on Construction Documents

- Has further clarified and added loads that must be on the construction documents
 - Dead loads
 - Revised the wind terminology
 - Added Rain Loading Data
 - Specifically requires description and location of equipment

1603.1 General.

Construction documents shall show the size, section and relative locations of structural members with floor levels, column centers and offsets dimensioned. The design loads and other information pertinent to the structural design required by Sections 1603.1.1 through 1603.1.9 shall be indicated on the construction documents.

Exception: Construction documents for buildings constructed in accordance with the conventional light-frame construction provisions of Section 2308 shall indicate the following structural design information:

1. Floor and roof dead and live loads.
2. Ground snow load, P_g .
3. Basic design wind speed, V , miles per hour (mph) (km/hr) and allowable stress design wind speed, V_{asd} , as determined in accordance with Section 1609.3.1 and wind exposure.
4. Seismic design category and site class.
5. Flood design data, if located in flood hazard areas established in Section 1612.3.
6. Design load-bearing values of soils.
7. Rain load data.

1603.1.8 Special loads.

Special loads that are applicable to the design of the building, structure or portions thereof, including but not limited to the loads of machinery or equipment, and that are greater than specified floor and roof loads shall be specified by their descriptions and locations.

1603.1.8.1 Photovoltaic panel systems.

The dead load of rooftop-mounted photovoltaic panel systems, including rack support systems, shall be indicated on the construction documents.

1603.1.9 Roof rain load data.

Rain intensity, i (in/hr) (cm/hr), shall be shown regardless of whether rain loads govern the design.

Framing Supporting Glass

- Code now specifically addresses the deflection requirements of the structure supporting glass
 - Based on American Architectural Association (AAMA) TIR-A11

1604.3.7 Framing supporting glass.

The deflection of framing members supporting glass subjected to 0.6 times the “component and cladding” wind loads shall not exceed either of the following:

1. $\frac{1}{175}$ of the length of span of the framing member, for framing members having a length not more than 13 feet 6 inches (4115 mm).
2. $\frac{1}{240}$ of the length of span of the framing member + $\frac{1}{4}$ inch (6.4 mm), for framing members having a length greater than 13 feet 6 inches (4115 mm).

Live Loads (Table 1607.1)

- Clarified when live load reductions for heavy loading can be used.
- Balcony Loading
 - Bring into alignment with ASCE 7
 - Recognizes the differing load pattern present on decks and to address the recent failures

Live Loads (Table 1607.1)

TABLE 1607.1
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_p
AND MINIMUM CONCENTRATED LIVE LOADS^a

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (pounds)
1. Apartments (see residential)	—	—
2. Access floor systems	—	—
Office use	50	2,000
Computer use	100	2,000
3. Armories and drill rooms	150 ^b	—
4. Assembly areas	—	—
Fixed seats (fastened to floor)	60 ^c	—
Follow spot, projections and control rooms	50	—
Lobbies	100 ^c	—
Movable seats	100 ^c	—
Stage floors	150 ^c	—
Platforms (assembly)	100 ^c	—
Other assembly areas	100 ^c	—
5. Balconies and decks ^d	1.5 times the live load for the area served, not required to exceed 100	—
6. Catwalks	40	300
7. Cornices	60	—
8. Corridors	—	—
First floor	100	—
Other floors	Same as occupancy served except as indicated	—
9. Dining rooms and restaurants	100 ^e	—
10. Dwellings (see residential)	—	—
11. Elevator machine room and control room grating (on area of 2 inches by 2 inches)	—	300
12. Finish light floor plate construction (on area of 1 inch by 1 inch)	—	200
13. Fire escapes	100	—
On single-family dwellings only	40	—
14. Garages (passenger vehicles only)	40 ^f	Note a
Trucks and buses	See Section 1607.7	—
15. Handrails, guards and grab bars	See Section 1607.8	—
16. Helipads	See Section 1607.6	—
17. Hospitals	—	—
Corridors above first floor	80	1,000
Operating rooms, laboratories	60	1,000
Patient rooms	40	1,000
18. Hotels (see residential)	—	—
19. Libraries	—	—
Corridors above first floor	80	1,000
Reading rooms	60	1,000
Stack rooms	150 ^{g,h}	1,000
20. Manufacturing	—	—
Heavy	250 ⁱ	3,000
Light	125 ⁱ	2,000
21. Marquees, except one- and two-family dwellings	75	—
22. Office buildings	—	—
Corridors above first floor	80	2,000
File and computer rooms shall be designed for heavier loads based on anticipated occupancy	—	—
Lobbies and first-floor corridors	100	2,000
Offices	50	2,000

(continued)

TABLE 1607.1—continued
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_p
AND MINIMUM CONCENTRATED LIVE LOADS^a

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (pounds)
23. Penal institutions	—	—
Cell blocks	40	—
Corridors	100	—
24. Recreational uses:	—	—
Bowling alleys, poolrooms and similar uses	75 ^a	—
Dance halls and ballrooms	100 ^a	—
Gymnasiums	100 ^a	—
Ice skating rink	250 ^a	—
Reviewing stands, grandstands and bleachers	100 ^{a,b}	—
Roller skating rink	100 ^a	—
Stadiums and arenas with fixed seats (fastened to floor)	60 ^{a,c}	—
25. Residential	—	—
One- and two-family dwellings	—	—
Uninhabitable attics without storage	10	—
Uninhabitable attics with storage ^{1,4}	20	—
Habitable attics and sleeping areas ¹	30	—
Canopies, including marquees	20	—
All other areas	40	—
Hotels and multifamily dwellings	—	—
Private rooms and corridors serving them	40	—
Public rooms and corridors serving them	100	—
26. Roofs	—	—
All roof surfaces subject to maintenance workers	—	300
Awnings and canopies:	—	—
Fabric construction supported by a skeleton structure	5 ^e	—
All other construction, except one- and two-family dwellings	—	—
Ordinary flat, pitched, and curved roofs (that are not occupiable)	20	—
Primary roof members exposed to a work floor	20	—
Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs over manufacturing, storage warehouses, and repair garages	—	—
All other primary roof members	—	—
Occupiable roofs:	—	—
Roof gardens	100	—
Assembly areas	100 ^a	—
All other similar areas	Note 1	Note 1
27. Schools	—	—
Classrooms	40	1,000
Corridors above first floor	80	1,000
First-floor corridors	100	1,000
28. Scintels, skylight ribs and accessible ceilings	—	200
29. Sidewalks, vehicular driveways and yards, subject to trucking	250 ^{1,0}	8,000 ¹

(continued)

TABLE 1607.1—continued
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_p
AND MINIMUM CONCENTRATED LIVE LOADS^a

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (pounds)
30. Stairs and exits	—	—
Cell blocks	40	300 ¹
Corridors	100	300 ¹
31. Storage warehouses (shall be designed for heavier loads if required for anticipated storage)	—	—
Heavy	250 ¹	—
Light	125 ¹	—
32. Stores	—	—
Retail	—	—
First floor	100	1,000
Upper floors	75	1,000
Wholesale, all floors	125 ¹	1,000
33. Vehicle barriers	—	See Section 1607.9
34. Walkways and elevated platforms (other than exitways)	60	—
35. Yards and terraces, pedestrians	100 ¹	—
36. [OSHPD IR, 2 & 5] Storage racks and wall-hung cabinets	Total loads ²	—

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm², 1 square foot = 0.0929 m², 1 pound per square foot = 0.0479 kN/m², 1 pound = 0.004448 kN, 1 pound per cubic foot = 16 kg/m³.

- a. Floors in garages or portions of buildings used for the storage of motor vehicles shall be designed for the uniformly distributed live loads of this table or the following concentrated loads: (1) for garages restricted to passenger vehicles accommodating not more than nine passengers, 3,000 pounds acting on an area of 4¹/₂ inches by 4¹/₂ inches; (2) for mechanical parking structures without slab or deck that are used for storing passenger vehicles only, 2,250 pounds per wheel.
- b. The loading applies to stack room floors that support nonmobile, double-faced library book stacks, subject to the following limitations:
 1. The nominal book stack unit height shall not exceed 90 inches.
 2. The nominal shelf depth shall not exceed 12 inches for each face.
 3. Parallel rows of double-faced book stacks shall be separated by aisles not less than 36 inches wide.
- c. Design in accordance with ICC 300.
- d. Other uniform loads in accordance with an approved method containing provisions for truck loadings shall be considered where appropriate.
- e. The concentrated wheel load shall be applied on an area of 4.5 inches by 4.5 inches.
- f. The minimum concentrated load on stair treads shall be applied on an area of 2 inches by 2 inches. This load need not be assumed to act concurrently with the uniform load.
- g. Where snow loads occur that are in excess of the design conditions, the structure shall be designed to support the loads due to the increased loads caused by drift buildup or a greater snow design determined by the building official (see Section 1608).
- h. See Section 1604.8.3 for decks attached to exterior walls.
- i. Uninhabitable attics without storage are those where the maximum clear height between the joists and rafters is less than 42 inches, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.

(continued)

TABLE 1607.1—continued
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_p
AND MINIMUM CONCENTRATED LIVE LOADS^a

j. Uninhabitable attics with storage are those where the maximum clear height between the joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses.

The live load need only be applied to those portions of the joists or truss bottom chords where both of the following conditions are met:

- i. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is not less than 30 inches.
- ii. The slopes of the joists or truss bottom chords are not greater than two units vertical in 12 units horizontal.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.

k. Attic spaces served by stairways other than the pull-down type shall be designed to support the minimum live load specified for habitable attics and sleeping rooms.

l. Areas of occupiable roofs, other than roof gardens and assembly areas, shall be designed for appropriate loads as approved by the building official. Unoccupied landscaped areas of roofs shall be designed in accordance with Section 1607.13.3.

m. Live load reduction is not permitted.

n. Live load reduction is only permitted in accordance with Section 1607.11.1.2 or Item 1 of Section 1607.11.2.

o. Live load reduction is only permitted in accordance with Section 1607.11.1.3 or Item 2 of Section 1607.11.2.

p. [OSHPD IR, 2 & 5] The minimum vertical design live load shall be as follows:

Paper media:

- 12-inch-deep (305 mm) shelf 33 pounds per linear foot (482 N/m)
- 15-inch-deep (381 mm) shelf 41 pounds per linear foot (598 N/m), or 33 pounds per cubic foot (5183 N/m³) per total volume of the rack or cabinet, whichever is less.

Film media:

- 18-inch-deep (457 mm) shelf 100 pounds per linear foot (1459 N/m), or 50 pounds per cubic foot (7853 N/m³) per total volume of the rack or cabinet, whichever is less.

Other media:

- 20 pounds per cubic foot (311 N/m³) or 20 pounds per square foot (958 Pa), whichever is less, but not less than actual loads.

1607.7.3 Heavy vehicle garages. Garages designed to accommodate vehicles that exceed a 10,000-pound (4536 kg) gross vehicle weight rating, shall be designed using the live loading specified by Section 1607.7.1. For garages the design for impact and fatigue is not required.

Exception: The vehicular live loads and load placement are allowed to be determined using the actual vehicle weights for the vehicles allowed onto the garage floors, provided that such loads and placement are based on rational engineering principles and are approved by the building official, but shall be not less than 50 psf (2.9 kN/m²). This live load shall not be reduced.

1607.7.4 Forklifts and movable equipment. Where a structure is intended to have forklifts or other movable equipment present, the structure shall be designed for the

Loading of Firewalls

- Code now defines the loading requirement to demonstrate structural stability in a fire collapse condition.
 - 5 PSF

1607.15.2 Fire walls.

In order to meet the structural stability requirements of Section 706.2 where the structure on either side of the wall has collapsed, fire walls and their supports shall be designed to withstand a minimum horizontal allowable stress load of 5 psf (0.240 kN/m²).

Special Inspection of MTL Plate Trusses

- For trusses over 60" tall where the truss design requires permanent field installed member bracing. Special inspection is now required.

1705.5.2 Metal-plate-connected wood trusses.

Special inspections of wood trusses with overall heights of 60 inches (1524 mm) or greater shall be performed to verify that the installation of the permanent individual truss member restraint/bracing has been installed in accordance with the approved truss submittal package. For wood trusses with a clear span of 60 feet (18 288 mm) or greater, the special inspector shall verify during construction that the temporary installation restraint/bracing is installed in accordance with the approved truss submittal package.

Elevator Hoistways at Corridors

- Code specifically identifies that corridor continuity must be maintained at elevator hoistways.

3006.2.1 Rated corridors.

Where corridors are required to be fire-resistance rated in accordance with Section 1020.1, elevator hoistway openings shall be protected in accordance with Section 3006.3.



Questions?

Thank you!

2019 City of San José Local Amendments

Presented by: James Son, S.E., CASp

California Building Code (CBC)

Structural Design

- ASCE 7-10, Section 12.12.3 *Minimum Distance for Building Separation* is $\Delta_M = C_d \delta_{\max} / I$.
- Modify this equation to $\Delta_M = C_d \delta_{\max}$ where:
 - C_d = deflection amplification factor in Table 12.2-1 of ASCE 7
 - δ_{\max} = maximum displacement defined in Section 12.8.4.3 of ASCE 7

Structural Tests and Special Inspections

- CBC section 1705.3 exempts concrete special inspections of isolated spread footings for buildings three stories or less above grade plane that are fully supported on earth or rock.
- to limit this exception to the footings designed based on a specified compressive strength ($f'c$) of no greater than 2,500 pounds per square inch.

Gypsum Board and Let-in-Brace

- CBC section 2308.6.3 allows certain type of construction for the conventional lateral bracing.
- To limit the use of certain braced wall construction by amending the whole section to omit let-in-bracing and gypsum board sheathing materials for use in braced wall panels.
- Amend section 2308.6.3 for braced wall line sheathing to reflect the CSJ proposed braced wall construction criteria to specify the maximum spacing of wall studs and the minimum nailing requirements for sheathing, and eliminate the Method GB.

Gypsum Board and Let-in-Brace continued...

- Amend Table 2308.6.1 to disallow Bracing Methods of LIB and GB.
- Additional sheathing attachment requirement of section 2308.6.9 to require all braced wall panels to extend to the roof sheathing and attach to the roof framing through mechanical means (e.g. nails and/or metal framing clip angles).

California Residential Code (CRC)

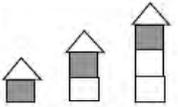
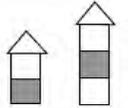
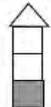
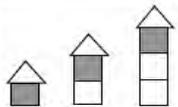
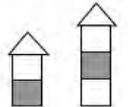
Braced Wall Panels

- CRC section R602.10, Table 602.10.3(3) provides prescriptive required minimum total lengths of braced wall panels for various seismic design categories based on story height and types of braced walls.

Table R602.10.3(3)

WALL CONSTRUCTION

TABLE R602.10.3(3)
BRACING REQUIREMENTS BASED ON SEISMIC DESIGN CATEGORY

<ul style="list-style-type: none"> • SOIL CLASS D^b • WALL HEIGHT = 10 FEET • 10 PSF FLOOR DEAD LOAD • 15 PSF ROOF/CEILING DEAD LOAD • BRACED WALL LINE SPACING ≤ 25 FEET 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^{a,c}				
Seismic Design Category	Story Location	Braced Wall Line Length (feet) ^c	Method LIB ^d	Method GB	Methods DWB, SFB, PBS, PCP, HPS, CS-SFB ^d	Method WSP	Methods CS-WSP, CS-G, CS-PF
C (townhouses only)		10	2.5	NP	2.5	1.6	1.4
		20	5.0	NP	5.0	3.2	2.7
		30	7.5	NP	7.5	4.8	4.1
		40	10.0	NP	10.0	6.4	5.4
		50	12.5	NP	12.5	8.0	6.8
		10	NP	NP	4.5	3.0	2.6
		20	NP	NP	9.0	6.0	5.1
		30	NP	NP	13.5	9.0	7.7
		40	NP	NP	18.0	12.0	10.2
		50	NP	NP	22.5	15.0	12.8
		10	NP	NP	6.0	4.5	3.8
		20	NP	NP	12.0	9.0	7.7
		30	NP	NP	18.0	13.5	11.5
		40	NP	NP	24.0	18.0	15.3
		50	NP	NP	30.0	22.5	19.1
D ₀		10	NP	NP	5.6	1.8	1.6
		20	NP	NP	11	3.6	3.1
		30	NP	NP	16.6	5.4	4.6
		40	NP	NP	22.0	7.2	6.1
		50	NP	NP	27.6	9.0	7.7
		10	NP	NP	NP	3.8	3.2
		20	NP	NP	NP	7.5	6.4
		30	NP	NP	NP	11.3	9.6
		40	NP	NP	NP	15.0	12.8
		50	NP	NP	NP	18.8	16.0
		10	NP	NP	NP	NP	NP
		20	NP	NP	NP	NP	NP
		30	NP	NP	NP	NP	NP
		40	NP	NP	NP	NP	NP
		50	NP	NP	NP	NP	NP

Bracing Requirements
Based on Seismic
Design Category

San José's Natural Gas Infrastructure Prohibition and Reach Code Ordinances

These new ordinances will apply to any building/structure for which application for a building permit is made on or after January 1, 2020.

		Natural Gas Infrastructure Prohibition Requirements	Reach Code Requirements ¹	
Occupancy Type		Requirements Supplementing Reach Code ²	All-Electric Building Requirements ²	Mixed Fuel Building Requirements ²
Single-family, Detached Accessory Dwelling Unit (ADU), and Low-rise Multi-family		Requires all-electric building.	Efficiency: To Code Electric Vehicle Charging Infrastructure (EVCI): Single-family: 1 EV Ready; Detached ADU: 1 EV Ready (if space is required by Code); Low-rise Multi-family: 10% EVSE, 20% EV Ready, 70% EV Capable	<i>Not applicable per Natural Gas Infrastructure Prohibition.</i>
Low-Rise Hotel/Motel		<i>Not applicable.</i>	Efficiency: To Code EVCI: 10% EVSE, 20% EV Ready, 70% EV Capable	Efficiency: EDR = min. 10 point reduction; electrification-ready EVCI: Same as All-Electric Building Requirements
High-rise Multi-family and Hotel/Motel		<i>Not applicable.</i>	Efficiency: To Code EVCI: High-rise Multi-family: 10% EVSE, 20% EV Ready, 70% EV Capable; Hotel/Motel: 10% EVSE, 0% EV Ready, 50% EV Capable	Efficiency³: 6%; electrification-ready EVCI: Same as All-Electric Building Requirements
Other Non-residential		<i>Not applicable.</i>	Efficiency: To Code EVCI: 10% EVSE, 0% EV Ready, 40% EV Capable	Efficiency³: Office & Retail: 14%; Industrial/Manufacturing: 0%; All other non-residential occupancies: 6%; all electrification-ready EVCI: Same as All-Electric

1. Solar-readiness is required for all buildings.
2. Find details, including all pertinent definitions, within ordinance documents on the San José Reach Code website.
3. Efficiency for non-residential occupancies refers to an energy performance requirement or a compliance margin (%) above the 2019 Building Energy Code.

Learn more at the San José Reach Code website: <https://www.sanjoseca.gov/reachcode>

Questions?

Thank you!

2019 Reach Code – Electric Vehicle Charging Infrastructure

Presented by: Sean Denniston, Senior Project Manager
New Buildings Institute



IDEAS Z2 Design Facility, San Jose (Credit: David Wakely)

nbi new buildings
institute

San José Reach Code: Electric Vehicle Charging Infrastructure

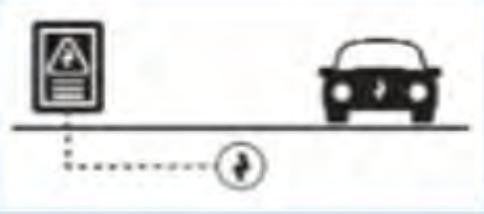
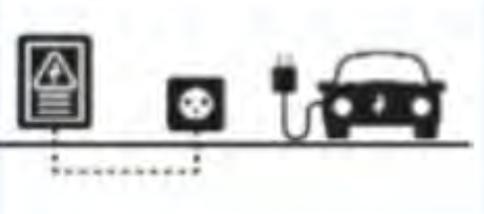
February 28, 2020



EVCI Definitions

Level 1		15-20 Amp, 120v AC (standard household outlet) Driving Distance provided: 3-4 miles/hour
Level 2		208/240v AC Driving Distance provided: 25-30 miles/hour
DC Fast Charge		80-400 Amp, 200-600v DC Driving Distance provided: 125-1000 miles/hour

EVCI Definitions

<p>EV Capable <i>(Some assembly required)</i></p>		<p>Raceway (conduit), electrical capacity (breaker space)</p>
<p>EV Ready <i>(Plug & Play)</i></p>		<p>Raceway (conduit), electrical service capacity, overcurrent protection devices, wire and outlet (i.e. full circuit)</p>
<p>EV Supply Equipment (EVSE) Installed <i>(Level 2 Charge!)</i></p>		<p>All the equipment needed to deliver electrical energy from an electricity source to the EV</p>

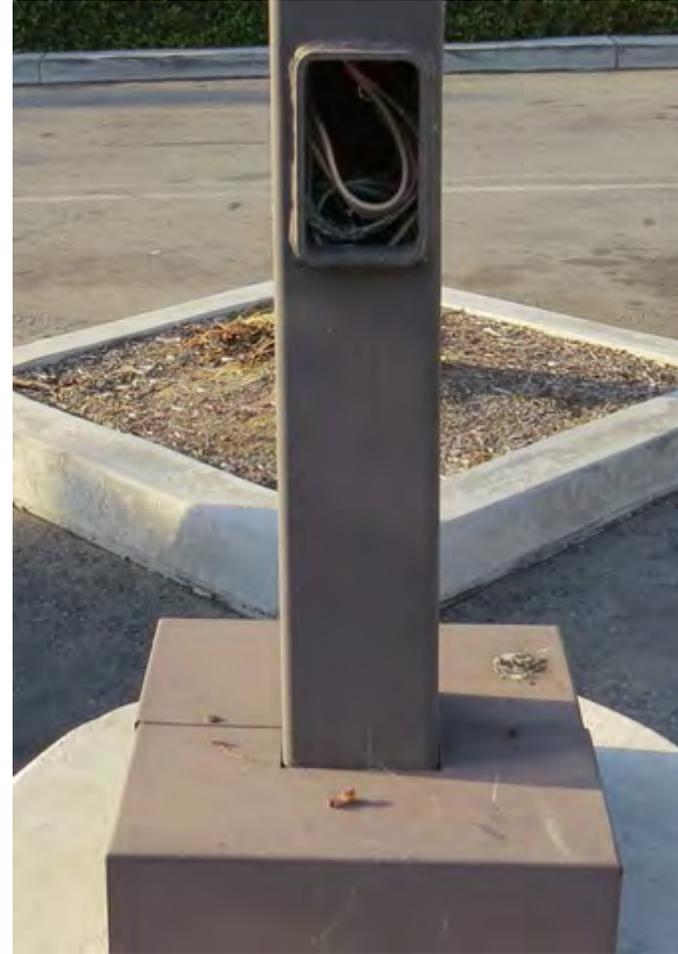
Courtesy TRC, PCE & SVCE

What's already included in the Title 24?

	2016	2019
Building Electrification	None	Electrification-ready water heating for low-rise residential
Electric Vehicle Charging Infrastructure	EV parking requirements for single family, multifamily and commercial (San Jose CALGreen)	More extensive EV parking requirements
Solar PV	Solar readiness for single-family, multi-family (up to 10 stories) & low-rise commercial (except healthcare)	+ Mandatory PV for low-rise residential

	2019 Base Code	San Jose Reach Code	Code Language
Single Family	1 EV Ready	1 EV Ready	Section 4.106.4.1
Multifamily	3% for 17 or more spaces	10% spaces EVSE 20% spaces EV Ready 70% EV Capable	Section 4.106.4.2
Low-Rise Hotel / Motel	4-10% spaces EV Ready	10% spaces EVSE 50% spaces EV Capable	Section 4.106.4.3.1
All Non-Res	4-10% spaces EV Ready	10% spaces EVSE 40% spaces EV Capable	Section 5.106.5.3.1

EV Ready



For each EV Ready Space:

- Full circuit with 40A of capacity

EV Capable



For each EV Capable Space

- Conduit from panel to space



For each EV Capable Space

- Physical space for breaker
- 8A of capacity

On-Site Inspection: EVSE



On-Site Inspection: EVSE

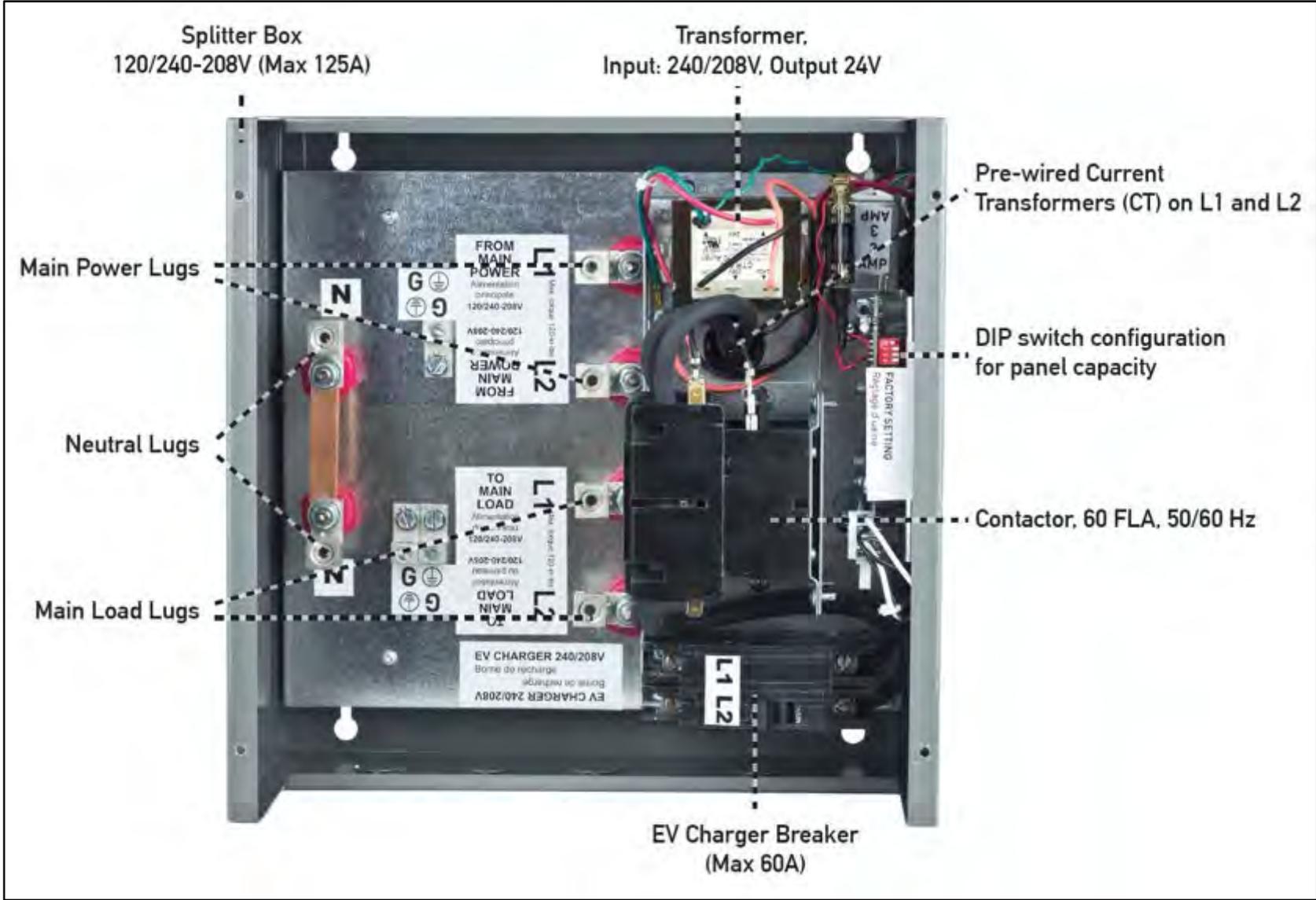


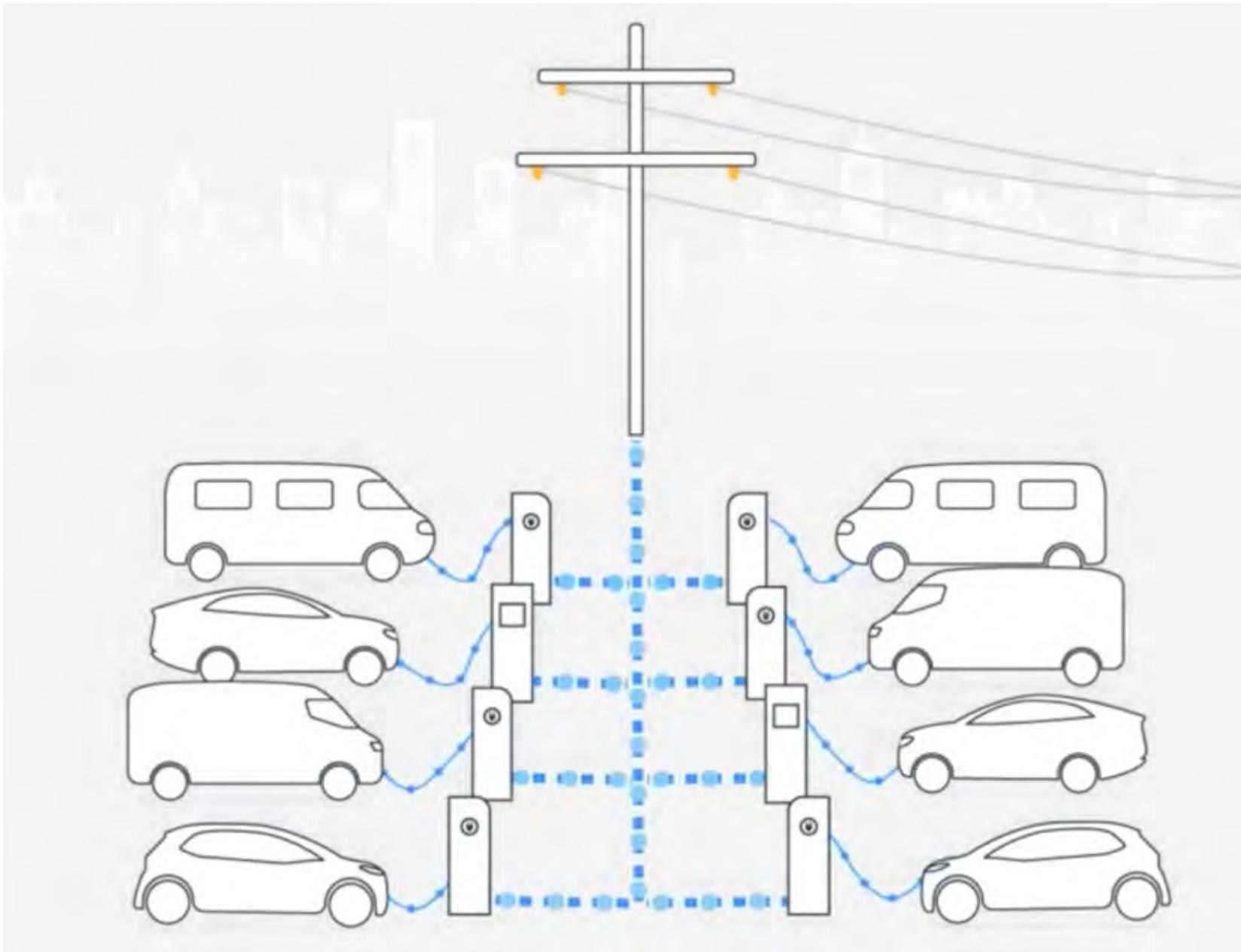
On-Site Inspection: EVSE



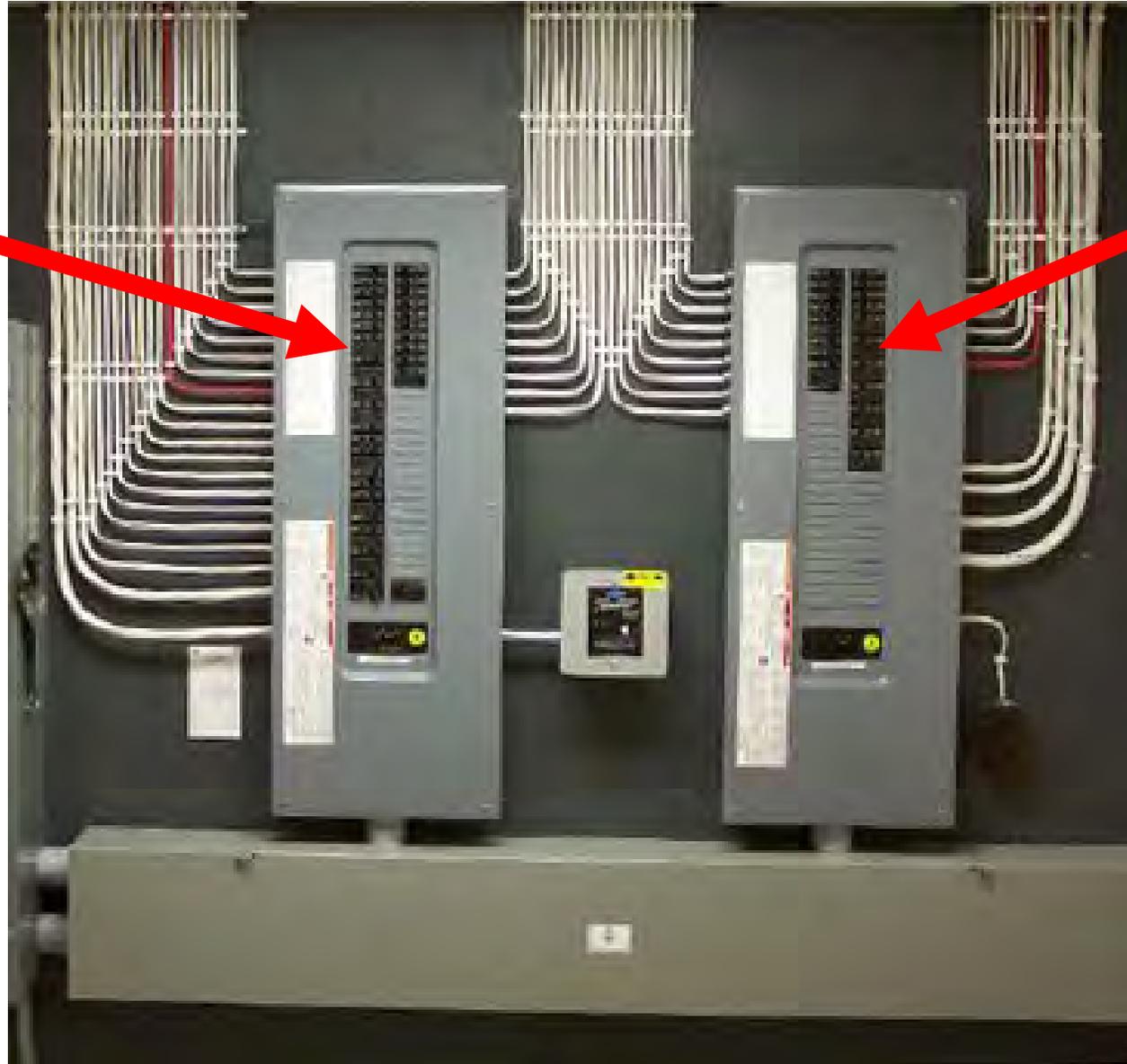
32A Output







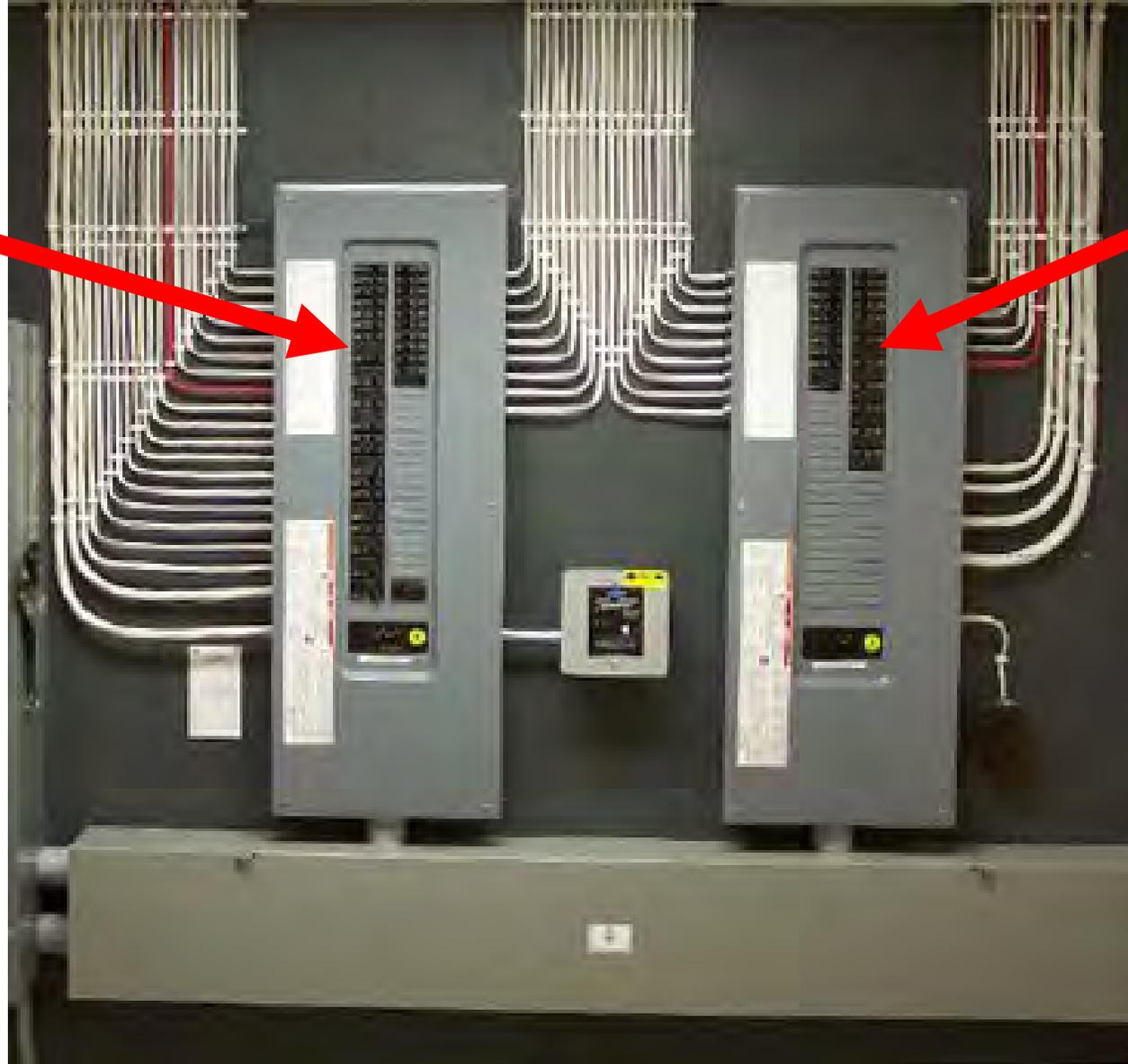
**5 EVSE
Spaces**



**20 EV
Capable
Spaces**

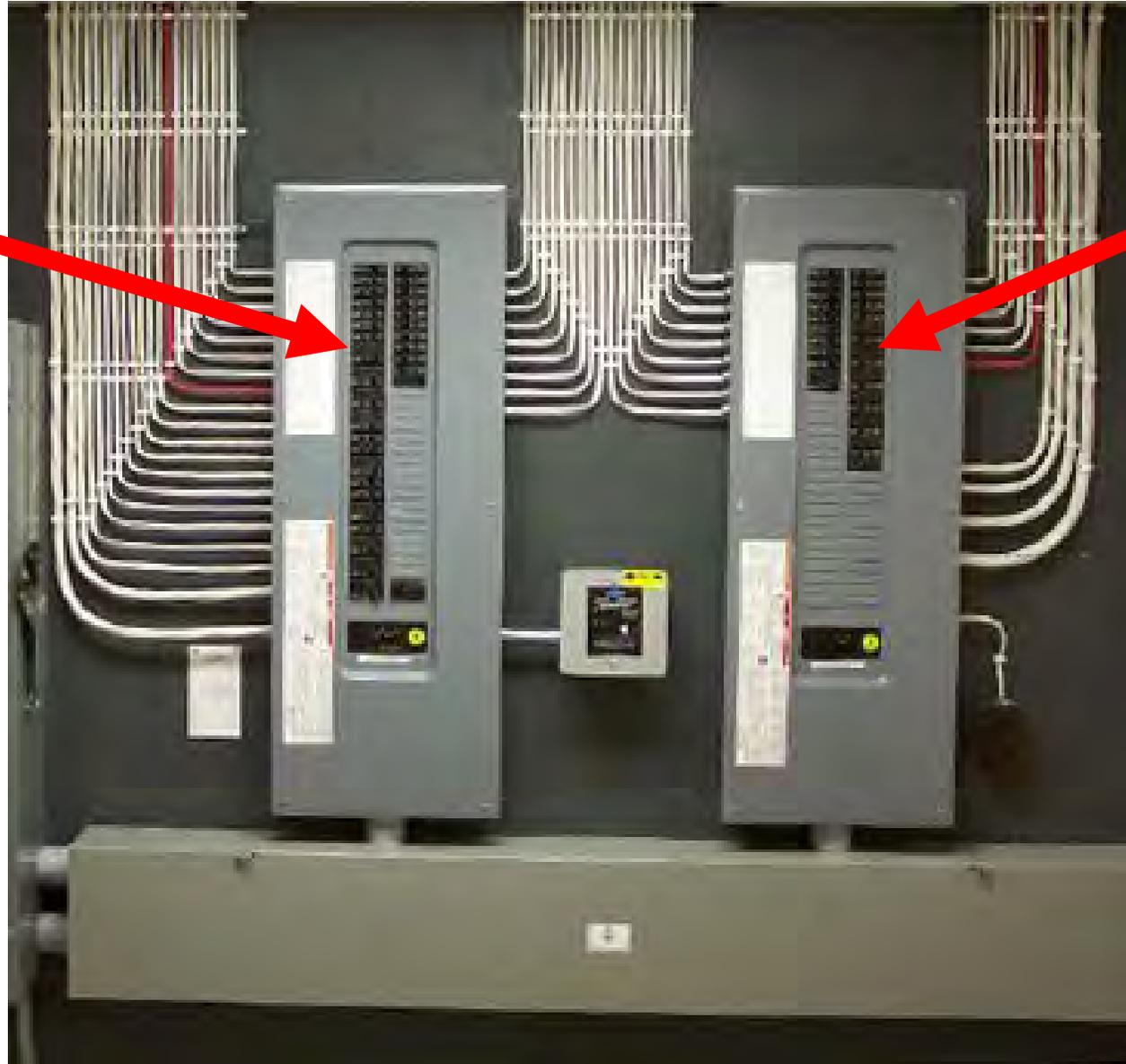


**5 EVSE
Spaces
=
200A @
240V
Additional
Capacity**



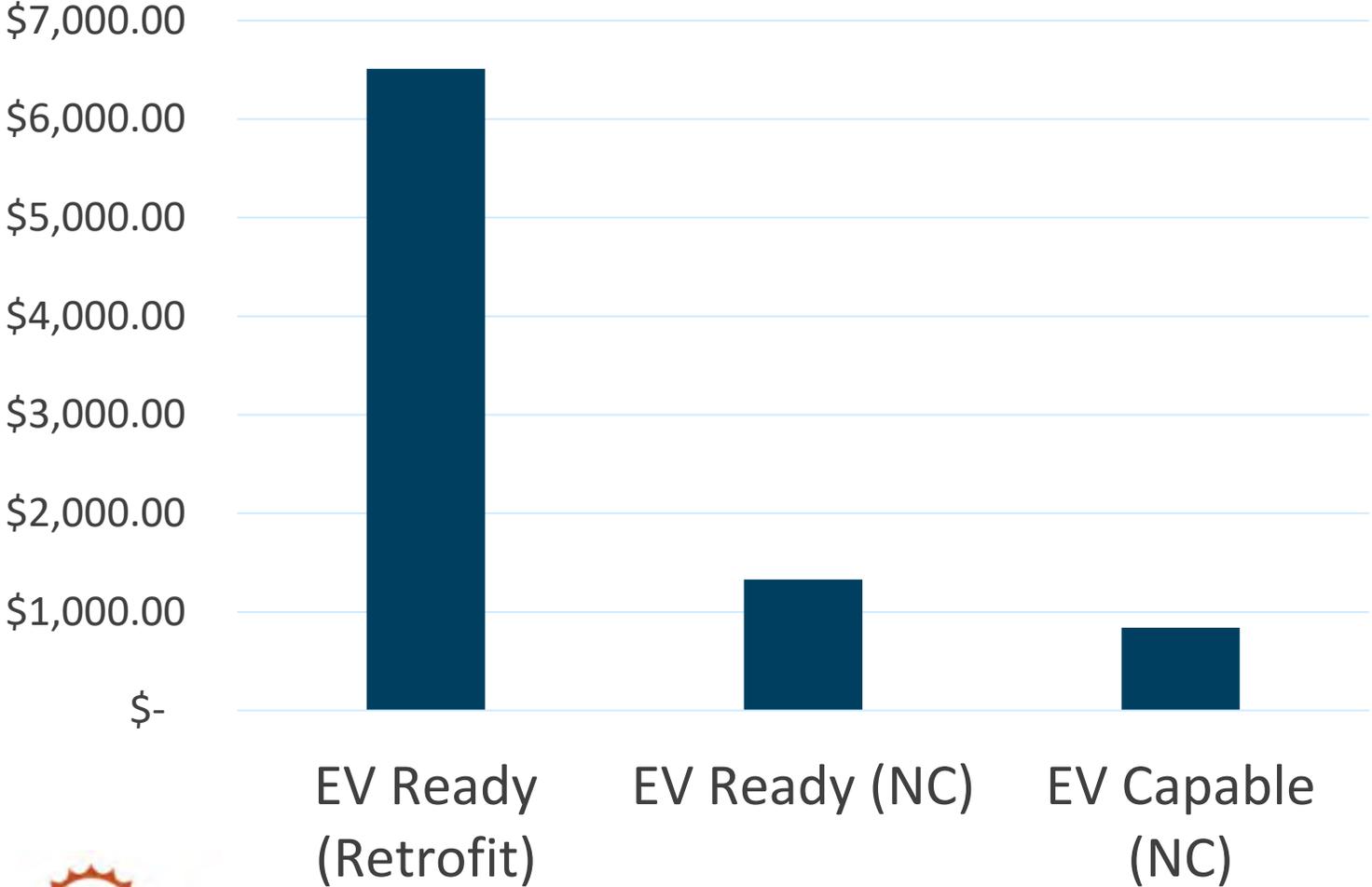
**20 EV
Capable
Spaces
=
160A @
240V
Additional
Capacity**

**5 EVSE
Spaces
=
40A @
240V
Additional
Capacity**



**20 EV
Capable
Spaces
=
160A @
240V
Additional
Capacity**

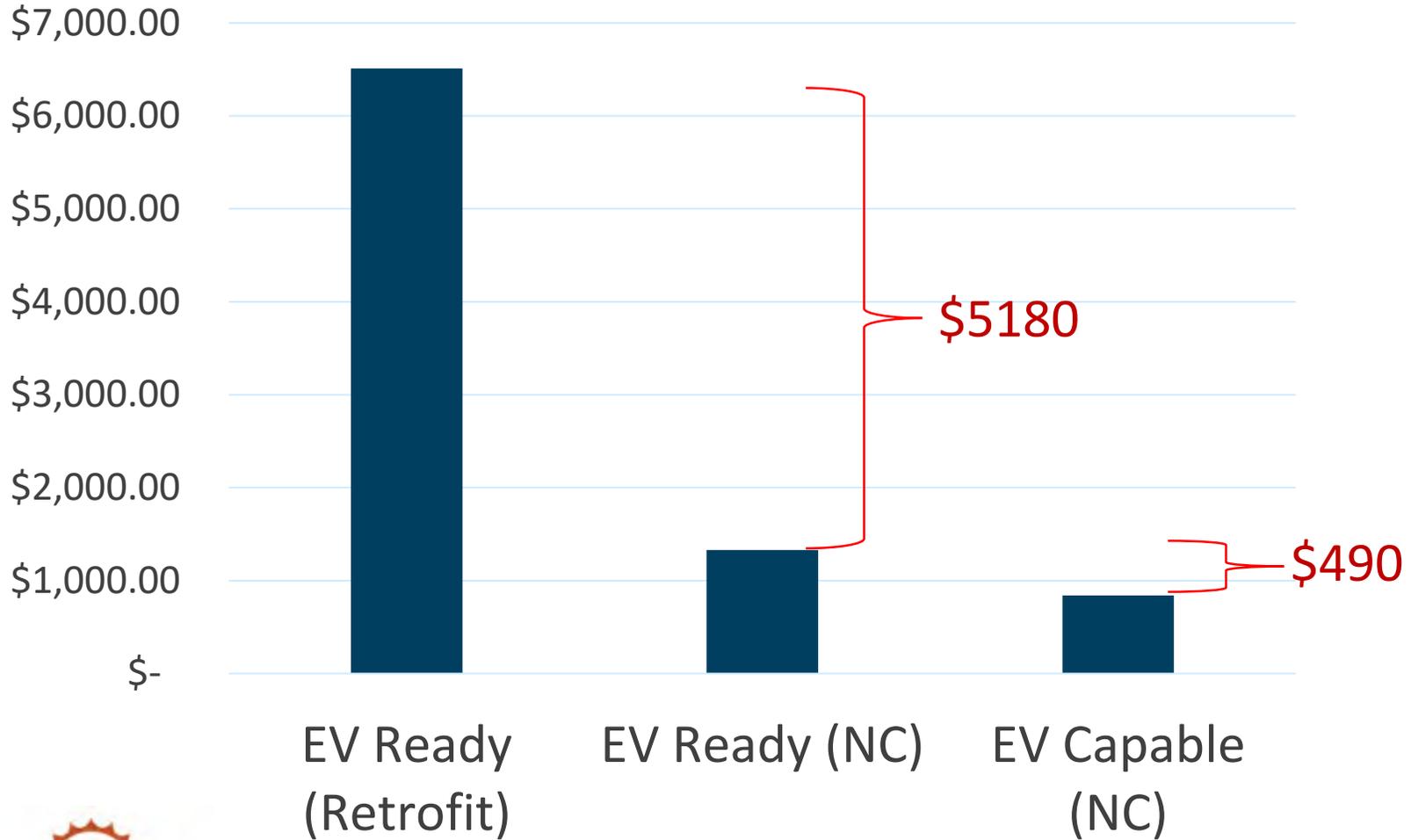
EVCI – Cost of New vs. Retrofit (Parking Lot)



“Driving Plug-In Electric Vehicle Adoption with Green Building Codes” by Energy Solutions, PG&E, ARB.
(Graphic courtesy TRC, PSE & SVCE)



EVCI – Cost of New vs. Retrofit (Parking Lot)



“Driving Plug-In Electric Vehicle Adoption with Green Building Codes” by Energy Solutions, PG&E, ARB.
(Graphic courtesy TRC, PCE & SVCE)



Questions?

nbi new buildings
institute



Wayne Aspinall Federal Building & Courthouse, Grand Junction, CO



Thank you!



2019 California Residential Code (CRC)

Presented by: Andrew Wozencroft, P.E., Senior Engineer

&

Gilbert Pham, Building Inspector

2019 California Residential Code (CRC)

Course Description

- This seminar provides an overview of the 2019 Significant Changes to the California Residential Code.

PART 1: Building Planning

Chapter 3 Overview

- R302.1 Exterior Walls
- R302.2 Townhouse Separation
- R302.3 Two-Family Dwelling Separation
- R302.4.2 Membrane Penetrations
- R302.5 Dwelling-Garage Opening Protection
- R302.13 Fire Protection of Floors above Crawl Spaces

PART 1: Building Planning

Chapter 3 (Continued)

- R308.4.2 Glazing adjacent to doors
- R308.4.4 Glazing in Guards & railings
- R310.1 Emergency escape & rescue openings
- R310.3 Area wells for emergency escape & rescue doors

PART 1: Building Planning

Chapter 3 (Continued)

- R311.7.3 Maximum stair rise between landings
- R311.7.11, R311.7.12 Alternating tread devices & ships ladders
- R312.1 Guards
- R317.3 Fasteners in treated Wood

PART 1: Building Planning

Chapter 3 (Continued)

- R324.6 Roof access for Photovoltaic solar energy systems
- R324.6.2.2 Solar Panels near emergency escape & rescue openings
- R325.3 Mezzanine area limitation
- R325.6, R202 Habitable attics

R302.1 Exterior Walls

- **Change Type:** Modification
- **Change Summary:** References to the *California Building Code* (CBC) in the Tables offer additional options and provide flexibility in determining the fire-resistance rating of exterior wall assemblies. Table footnotes have been revised to clarify the correlation between gable end vents and the fire-resistance requirements for projections.

R302.1 Exterior Walls (Continued)

- **Change Significance:** The CRC now also recognizes methods of construction in the CBC for fire-resistant protection of projections, as required when the location of a roof overhang does not provide adequate fire separation distance. For projections less than 5 feet from the lot line for dwellings without sprinklers and less than 3 feet for buildings with sprinklers, the projection may be constructed of heavy timber or fire-retardant-treated (FRT) wood.

R302.1 Exterior Walls (Continued)

- **Change Significance:** These methods are considered equivalent to 1-hour protection on the underside of a roof projection and have been acceptable for similar purposes when constructed under the CBC. Dimensions for heavy timber roof framing and roof decking are considerably greater than conventional light frame construction, as described in CBC Section 602.4. In addition, concealed roof spaces are not allowed when using the heavy timber method for fire resistance.

R302.2 Townhouse Separation

- **Change Type:** Modification
- **Change Summary:** Two paths for achieving the fire-resistant separation between townhouse dwelling units—two 1-hour walls or a common wall are spelled out in the townhouse provisions.

R302.2 Townhouse Separation (Continued)

- **Change Significance:**
 - By reference, the CRC now accepts those proven methods that have been used successfully in the CBC for many years.
 - Some methods require a determination by the building official, either approval in accordance with the alternative methods provisions in CRC Section R104.11 or acceptance of designs from approved sources or agencies.

R302.3 Two-Family Dwelling Separation

- **Change Type:** Modification
- **Change Summary:** A new reference to Section 703.3 of the *California Building Code* (CBC) provides alternatives for determining the fire-resistance rating of wall and floor/ceiling assemblies for separation of dwelling units.

R302.3 Two-Family Dwelling Separation (Continued)

- **Change Significance:** The added reference emphasizes that there are a number of paths available to satisfy the fire-resistance-rating requirements and provide flexibility in the code.

R302.4.2 Membrane Penetrations

- **Change Type:** Modification
- **Change Summary:** Listed luminaires that have been tested for the application are specifically permitted for fire-resistant-rated ceiling membrane penetrations.

R302.4.2 Membrane Penetrations (Continued)

Change Significance:

- There are exceptions for penetrations by noncombustible materials with certain limitations as well as membrane penetrations by steel and listed electrical boxes in wall assemblies under specific conditions.
- The new exception recognizes listed luminaires (complete lighting units) for penetrating the ceiling membrane or a fire-resistant-rated floor/ceiling assembly, provided the luminaire has been tested as part of that assembly.

R302.4.2 Membrane Penetrations (Continued)

Change Significance:

- In addition, if the luminaire itself is not rated it may be protected by listed materials installed in accordance with their listing.
- The intent of this additional exception is to align these provisions with those in the CBC. Unlike the CBC, the only instance in the IRC where this new provision would apply is in the case of a two-family dwelling where one dwelling unit is above the other and separated by a horizontal assembly. Side-by-side dwelling units are more typical in new construction under the CRC.

R302.5 Dwelling-Garage Opening Protection

- **Change Type:** Modification
- **Change Summary:** An automatic-closing device is now permitted as an alternative to a self-closing device for the door between the garage and dwelling.

R302.5 Dwelling-Garage Opening Protection (Continued)

- **Change Significance:** This alternative addresses a concern by many that self-closing devices are sometimes disabled or removed by the homeowner because of the inconvenience. Given the flexibility to have the door closed or held open, advocates for this change contended that the automatic devices are less likely to be disabled by the occupants.

R302.13 Fire Protection of Floors Above Crawl Spaces

- **Change Type:** Modification
- **Change Summary:** Fire-resistant membrane protection is now required for the applicable floor framing materials above crawl spaces containing fuel-fired or electric-powered heating appliances.

R302.13 Fire Protection of Floors Above Crawl Spaces (Continued)

- **Change Significance:** This modification maintains the provision for appliances and includes electric-powered appliances in addition to fuel-fired ones. Because there are many other types of appliances, such as sump pumps, that are less hazardous than heating appliances, the restriction is now limited to heating appliances.

R302.13 Fire Protection of Floors Above Crawl Spaces (Continued)

- **Change Significance:** The intent is that the installation of any fuel-fired or electric furnace or water heater in a crawl space requires 1/2-inch gypsum board or equivalent on the underside of the floor system, unless that floor system meets one of the exceptions.

R308.4.2 Glazing Adjacent to Doors

- **Change Type:** Modification
- **Change Summary:** Glazing within 24 inches of the hinge side of an in-swinging door now requires safety glazing where the glazing is at an angle less than 180 degrees from the plane of the door.

R308.4.2 Glazing Adjacent to Doors (Continued)

Change Significance:

- For windows installed at an angle less than 180 degrees, safety glazing is only required where the window is located on the hinge side and the door swings in the direction of the glazing.
- Glazing installed greater than 180 degrees from the plane of the in-swinging door poses no hazard of a person being pushed into the glass by the door.

R308.4.4 Glazing in Guards & Railings

- **Change Type:** Modification
- **Change Summary:** Unless laminated glass is used, structural glass baluster panels in guards now require an attached top rail or handrail.

R308.4.4 Glazing in Guards & Railings (Continued)

- **Change Significance:** The intent is that the top rail would remain in place to prevent a fall should the glass give way. To ensure that the rail remains in place, the code requires it to be supported by at least two or more structural baluster panels or otherwise held in place to resist the prescribed loads in case of failure of the glazing.

R310.1 Emergency Escape and Rescue Openings

- **Change Type:** Modification
- **Change Summary:** Emergency escape and rescue openings are no longer required for bedrooms in basements when the dwelling unit is protected with an automatic fire sprinkler system and other conditions are met.

R310.1 Emergency Escape and Rescue Openings (Continued)

Change Significance:

- The CRC now offers an exception to the requirement for emergency escape openings in basement bedrooms when an automatic sprinkler system is installed.
- This change to the code recognizes the increased level of safety provided by a sprinkler system and intends to provide an incentive for builders and owners to voluntarily install such systems.

R310.3 Area Wells for Emergency Escape and Rescue Doors

- **Change Type:** Modification
- **Change Summary:** For emergency escape and rescue doors in basements, a change in terminology replaces “bulkhead enclosures” with “area wells” and provisions for ladders and steps for area wells have been added.

R310.3 Area Wells for Emergency Escape and Rescue Doors (Continued)

- **Change Significance:** The term “area well” has replaced “bulkhead enclosure” to better describe its function and clarify the application of the code. The minimum width for area wells matches the minimum width for window wells.

R310.3 Area Wells for Emergency Escape and Rescue Doors (Continued)

- **Change Significance:** In addition, the minimum requirements for ladders and steps when the window well is deeper than 44 inches below grade are duplicated in the area well requirements. This brings consistency to the code provisions and serves to emphasize that these windows and doors serve the same purpose, emergency escape and rescue, and do not need to comply with the requirements for means of egress in Section R311.

R311.7.3 Maximum Stair Rise Between Landings

- **Change Type:** Modification
- **Change Summary:** The maximum rise of a flight of stairs has increased by 4 inches, from 147 to 151 inches.

R311.7.3 Maximum Stair Rise Between Landings (Continued)

- **Change Significance:** To afford even greater flexibility, the proposal was modified by the committee to increase the height to 12 feet 7 inches (151 inches). To achieve the increased floor-to-floor height would require a minimum of 20 risers so as not to exceed the 7¾-inch maximum riser height.

R311.7.11, R311.7.12 Alternating Tread Devices & Ships Ladders

- **Change Type:** Modification

Change Summary: Alternating tread devices and ships ladders are now permitted as a means of egress for serving lofts that do not exceed 200 square feet in area.

R311.7.11, R311.7.12 Alternating Tread Devices & Ships Ladders (Continued)

Change Significance:

- In the 2019 CRC, alternating tread devices and ships ladders are permitted as a means of egress for serving lofts provided the loft does not exceed 200 square feet in area.
- The move to allow alternating tread devices and ships ladders to serve as a means of egress for these lofts was considered a reasonable and safe solution to an increasingly common circumstance.

R312.1 Guards

- **Change Type:** Clarification

Change Summary: The guard requirements only apply to the specific portion of a walking surface that exceeds 30 inches above grade.

R312.1 Guards (Continued)

Change Significance:

- The 2019 CRC settles the question by specifically requiring a guard only on those portions of a walking surface that exceed the prescribed height of 30 inches above grade.
- This clarifies the language used for when and where these guards are required.

R317.3 Fasteners in Treated Wood

- **Change Type:** Modification

Change Summary: Staples in preservative-treated wood and fire retardant-treated wood are now required to be made of stainless steel.

R317.3 Fasteners in Treated Wood (Continued)

Change Significance:

- In the 2019 CRC, stainless steel staples are added as an additional code accepted solution.
- This addition specifically limits staples to stainless steel when installed in preservative-treated lumber.

R324.6 Roof Access for PV Solar Energy Systems

- **Change Type:** Addition

Change Summary: Requirements for roof access and pathways for firefighters have been introduced into the CRC provisions for rooftop- mounted photovoltaic solar energy systems.

R324.6 Roof Access for PV Solar Energy Systems (Continued)

Change Significance:

- The new provisions in the 2019 CRC mirror the latest edition of the CFC, except only those provisions that apply to one- and two-family dwellings and townhouses appear in the CRC.
- Pathways are provided so firefighters can perform manual ventilation by cutting one or more holes in a building roof.

R324.6 Roof Access for PV Solar Energy Systems (Continued)

Change Significance: Pathways must be at least 36 inches wide, extend from the roof edge to the ridge, and be arranged to avoid obstacles such as plumbing or gas vents.

R324.6.2.2 Solar Panels near Emergency Escape Rescue Openings

- **Change Type:** Addition

Change Summary: Rooftop-mounted photovoltaic solar energy panels and modules are not permitted to be installed directly below emergency escape and rescue openings.

R324.6.2.2 Solar Panels near Emergency Escape Rescue Openings (Continued)

Change Significance:

- Installing a PV solar panel below the escape opening would cause an unsafe condition in an emergency situation.
- The required clear path must be at least 36 inches wide to provide emergency escape from the roof as well as emergency access to the roof.

R325.3 Mezzanine Area Limitation

- **Change Type:** Addition

Change Summary: The area limitation for mezzanines has been increased from one-third to one-half of the area of the room containing the mezzanine under certain conditions.

R325.3 Mezzanine Area Limitation (Continued)

Change Significance: New to the 2019 CRC, an exception allows the maximum area for a mezzanine to be increased from one-third to one-half of the area of the room containing the mezzanine under certain conditions.

R325.3 Mezzanine Area Limitation (Continued)

Change Significance: The intent is to provide design flexibility without adversely affecting life safety. Although the CRC requires automatic fire sprinkler systems in all new dwellings, the mention of a fire sprinkler system in the exception is intended to serve as an incentive to provide sprinklers for those jurisdictions that have amended the requirements of their ordinance.

R325.6, R202 Habitable Attics

- **Change Type:** Addition

Change Summary: The definition of habitable attic has been revised and the technical requirements have been placed in a new section.

R325.6, R202 Habitable Attics (Continued)

Change Significance:

- The definition of habitable attic is revised to describe a finished or unfinished habitable space within an attic. That is a subtle change from previous editions in that the definition previously described a finished or unfinished area that is occupiable space.
- The addition of “habitable space” in the 2019 CRC clarifies what many have inferred from the title: that a habitable attic, even if unfinished, is habitable space (a space for living, sleeping, eating or cooking).

PART 2: Building Construction

Chapter 4-10 Overview

- R408.3 Unvented Crawl Spaces
- Table R602.3(6) Alternate Stud Height
- Tables R602.7(1), R602.7(2) Girder and Header Spans
- Table R602.7.5 Lateral Support for Headers
- R602.10.4.1 Mixing Bracing Methods
- Section R610 Structural Insulated Panels

PART 2: Building Construction

Chapter 4-10 Overview (Continued)

- R703.2 Water-Resistive Barrier
- R802 Roof Framing
- R802.1.5.4 Labeling
- R806.2 Minimum Vent Area
- R806.5 Unvented Attics

PART 2: Building Construction

Chapter 4-10 Overview (Continued)

- Tables R905.1.1(1) and R905.1.1(2)
Underlayment
Requirements for
Photovoltaic Shingles
- R905.17 Building Integrated
Photovoltaic Panels

R408.3 Unvented Crawl Space

- **Change Type:** Modification

Change Summary: Ventilation of the under-floor space is not required when an adequately-sized dehumidifier is provided.

R408.3 Unvented Crawl Space (Continued)

Change Significance:

- In warm, humid climates, such as the southeastern United States, dampness within the crawl space leading to growth of mold and mildew is a concern. While a fan may be used to move air constantly through the crawlspace, use of a dehumidifier to both move air and decrease water content helps minimize growth of mold and mildew.

Table R602.3(6) Alternate Stud Height

- **Change Type:** Addition

Change Summary: A prescriptive requirement is added for studs greater than 10 feet in height, in an exception to Section R602.3.1 as well as a reference to new Table R602.3(6) that applies to 11- and 12-foot-tall walls in one- and two-story buildings.

Table R602.3(6) Alternate Stud Height (Continued)

Change Significance:

- In the 2019 CRC, inconsistencies are addressed for the first time through a new exception within Section R602.3.1 which references Table R602.3(6).

Table R602.3(6) Alternate Stud Height (Continued)

Change Significance:

- Table R602.3(6) considers load-bearing studs over 10 feet in height but not exceeding 12 feet in height.
- With the new Exception No. 3 and table, it is possible to select stud heights of 11 or 12 feet and have prescriptive requirements consider gravity loads (dead, live and snow loads) and lateral loads (wind and seismic).

Table R602.7(1), R602.7(2) Girder & Header Spans

- **Change Type:** Modification

Change Summary: Girder and header spans are updated and a footnote is added to clarify that headers and girders are assumed to be braced. For headers with pony walls above, a further reduction in span is taken for 2 x 8 and larger headers.

Table R602.7.5 Lateral Support for Headers

- **Change Type:** Modification

Change Summary: The 2016 CRC full-height stud table is significantly altered. The table increases the number of king studs in higher wind regions and requires only one or two king studs at each end of a header in regions with 115 mph wind speeds.

Table R602.7.5 Lateral Support for Headers (Continued)

Change Significance:

- In the 2019 CRC, updated Table R602.7.5 simplifies the full-height stud, or king stud, requirement while removing conservative assumptions and the 16-inch maximum stud spacing.

Table R602.10.4.1 Mixing Bracing Methods

- **Change Type:** Modification

Change Summary: Mixing of continuous sheathing methods with an intermittent alternate bracing method is clarified. Braced wall line(s) containing an intermittent alternate method must have sufficient bracing length for the alternate method, not just for the continuous sheathing method.

Table R602.10.4.1 Mixing Bracing Methods (Continued)

Change Significance:

- This appears to be a small change but can significantly increase the length of bracing required, especially in high seismic or high wind regions.

Table R610 Structural Insulated Panels

- **Change Type:** Modification

Change Summary: The section on structural insulated panels is reorganized. Information on facers, core and adhesive requirements are now located in APA PRS 610.1 and deleted from the CRC.

Table R610 Structural Insulated Panels (Continued)

Change Significance:

- The updates in the 2019 CRC are intended to bring the SIP provisions in line with other sections of the CRC.
- As a result, much of the manufacturing information on SIP core, facers and adhesive requirements is deleted from the CRC and located only in the PRS 610.1.

R703.2 Water-Resistive Barrier

- **Change Type:** Modification

Change Summary: Water-resistive barrier materials other than No. 15 asphalt felt must be installed following the manufacturer's installation instructions. The exemption for detached accessory buildings is deleted.

R703.2 Water-Resistive Barrier (Continued)

Change Significance:

- The 2019 CRC Section R703.2 clarifies requirements for No. 15 asphalt felt and identifies requirements for other approved WRBs by requiring use of the manufacturer's installation instructions to improve installation accuracy.
- Continuous barriers requirements for WRBs apply to both No. 15 asphalt felt and other approved WRB material regardless of lay-up or installation method.

R802 Roof Framing

- **Change Type:** Modification

Change Summary: Section R802, design and construction of roofs, has been clarified by dividing the content into three separate sections on roof ridges, rafters and ceiling joists.

R802 Roof Framing (Continued)

Change Significance:

- The reorganized 2019 CRC Section R802 intends to clarify roof and ceiling assembly requirements by organizing the section into components, specifically by dividing the content into three separate sections: Section R802.3 Roof ridge, Section R802.4 Rafters, and Section R802.5 Ceiling joists.
- New to the 2018 IRC, in Section R802.5.2.1, wood structural panel roof sheathing may cantilever nine inches beyond the gable end-wall without support.

R802.1.5.4 Labeling

- **Change Type:** Modification

Change Summary: Each stick of fire-retardant-treated (FRT) lumber and each FRT wood structural panel require a label with eight specific items of information.

R802.1.5.4 Labeling (Continued)

Change Significance:

- The 2019 CRC Section R802.1.5.4 clarifies the intent to have fire-retardant-treated wood (FRTW) have two labels: one for the general grading and identification of the lumber or panel, the second for the fire-retardant treatment.
- The updated provision also explicitly states that each piece of lumber must be labeled with both marks.

R806.2 Minimum Vent Area

- **Change Type:** Modification

Change Summary: The minimum vent area exception is clarified, stating that net free ventilation may be less than 1/150 only if both required conditions are met. Lower vents must be located in the bottom third of the attic space.

R806.2 Minimum Vent Area (Continued)

Change Significance:

- The change to the exception of CRC Section R806.2 aligns the CRC with requirements in the *California Building Code* (CBC) for reduction in ventilation area.
- The exception also considers issues with placing lower vents in an eave or cornice. Due to property line separation requirements, eave or cornice vents may not be achievable.

R806.5 Unvented Attics

- **Change Type:** Modification

Change Summary: Item 5.2 is added as an alternative path for unvented attics and rafter assemblies to the requirements of Item 5.1. The new option is limited to warm climates and has 10 requirements to address in the installation of air-permeable insulation.

R806.5 Unvented Attics (Continued)

Change Significance:

- The new subsection adds a vapor diffusion port or vent. The port acts as a moisture control measure, allowing moisture in the attic to be removed by vapor diffusion rather than by air change.
- This allows the attic assembly to remain airtight while providing a path for vapor moisture via vapor diffusion.
- An airtight attic can enhance energy efficiency and give an alternative to rigid board or spray polyurethane foam methods.

R806.5 Unvented Attics (Continued)

Change Significance:

- Additionally, the unvented attic option eases design issues in wildland-urban interface regions where the elimination of eave vents and air sealing the upper attic vents at ridges reduces the entry of embers in wildfires. In hurricane-prone regions, elimination of roof vents reduces entry of rainwater during hurricanes.

Table R905.1.1(1), R905.1.1(2)

Underlayment Requirements for PV Shingles

- **Change Type:** Modification

Change Summary: Underlayment requirements for photovoltaic (PV) shingles are revised for consistency with other roofing materials and moved to the Tables R905.1.1(1) and R905.1.1(2) for underlayment.

Table R905.1.1(1), R905.1.1(2)

Underlayment Requirements for PV Shingles (Continued)

Change Significance:

- PV shingle underlayment types, fastening requirements and wind speed triggers are revised for consistency with the other roof covering types.
- For the two-layer underlayment application on low-sloped roofs, ends of the underlayment should be lapped 4 inches and offset 6 feet in successive rows as required for the single-layer application.

Table R905.1.1(1), R905.1.1(2)

Underlayment Requirements for PV Shingles (Continued)

Change Significance:

- An exception is added to Section R905.1.1 explicitly allowing use of two layers of underlayment rather than the single layer called out in Table R905.1.1(2).
- The intent of this change is to allow designers and builders to use two layers of underlayment at the roof edge to protect against water penetration during high winds.

R905.17 Building Integrated PV Panels

- **Change Type:** Modification

Change Summary: New Section R905.17 addresses installation and attachment of building-integrated photovoltaic (BIPV) roof panels.

R905.17 Building Integrated PV Panels (Continued)

Change Significance:

- A new definition for BIPV roof panels is added to Chapter 2 and new text in Section R324 points to the technical requirements in Section R905.
- A new standard, UL 1897 Uplift Tests for Roof Covering Systems, is added to Chapter 44 as the roof panels are too large to test using ASTM D 3161, the standard used to test photovoltaic shingles which also may act as a roof covering.

Questions?

Thank you!

2019 Reach Code Building Energy Efficiency Standards

Presented by: Sean Denniston, Senior Project Manager
New Buildings Institute



IDEAS Z2 Design Facility, San Jose (Credit: David Wakely)

nbi new buildings
institute

San José Reach Code: Background

February 28, 2020





What is a Reach Code?

Minimum Base Codes

- Set minimum levels of efficiency for building design and construction



Reach Codes

- Overlays the base code
- Includes additional requirements, such as:
 - Energy efficiency
 - Water efficiency
 - **Electrification**
 - **EV charging infrastructure**
 - **Solar PV**

CLIMATE SMART SAN JOSE

A People-Centered Plan for a
Low-Carbon City



Why is San José Pursuing a Reach Code?

Goals for 2030

- 47% of homes are all-electric
- 37,975 zero net carbon (ZNC) homes
- 70M sf of ZNC commercial buildings
- 61% of all passenger vehicles are electric
- 668 MW of solar installed

CLIMATE SMART SAN JOSE

A People-Centered Plan for a
Low-Carbon City



Building Electrification

- 47% of homes are all-electric
- 37,975 zero net carbon (ZNC) homes
- 70M sf of ZNC commercial buildings

EV charging infrastructure

- 61% of all passenger vehicles are electric

Solar PV

- 668 MW of solar installed

Reach Code Requirements



- Building Electrification
- Electric Vehicle Charging Infrastructure
- Solar PV

What's already included in the Title 24?

	2016	2019
Building Electrification	None	Electrification-ready water heating for low-rise residential
Electric Vehicle Charging Infrastructure	EV parking requirements for single family, multifamily and commercial (San Jose CALGreen)	More extensive EV parking requirements
Solar PV	Solar readiness for single-family, multi-family (up to 10 stories) & low-rise commercial (except healthcare)	Adds Mandatory PV for low-rise residential



IDEAS Z2 Design Facility, San Jose (Credit: David Wakely)

nbi new buildings
institute

San José Reach Code: Efficiency/Electrification

February 28, 2020



Reach Code Requirements



- **Building Electrification**
- Electric Vehicle Charging Infrastructure
- Solar PV

Building Electrification Components

1. Gas Infrastructure Moratorium in Low-Rise Residential
2. Increased efficiency in other Mixed-Fuel Buildings
3. Electrification Readiness in Mixed-Fuel Buildings

- Low-Rise Residential Requirements
- Non-Residential Requirements



Low-Rise Residential



Cottle Zero Net Energy Home, San Jose (Credit: DOE)

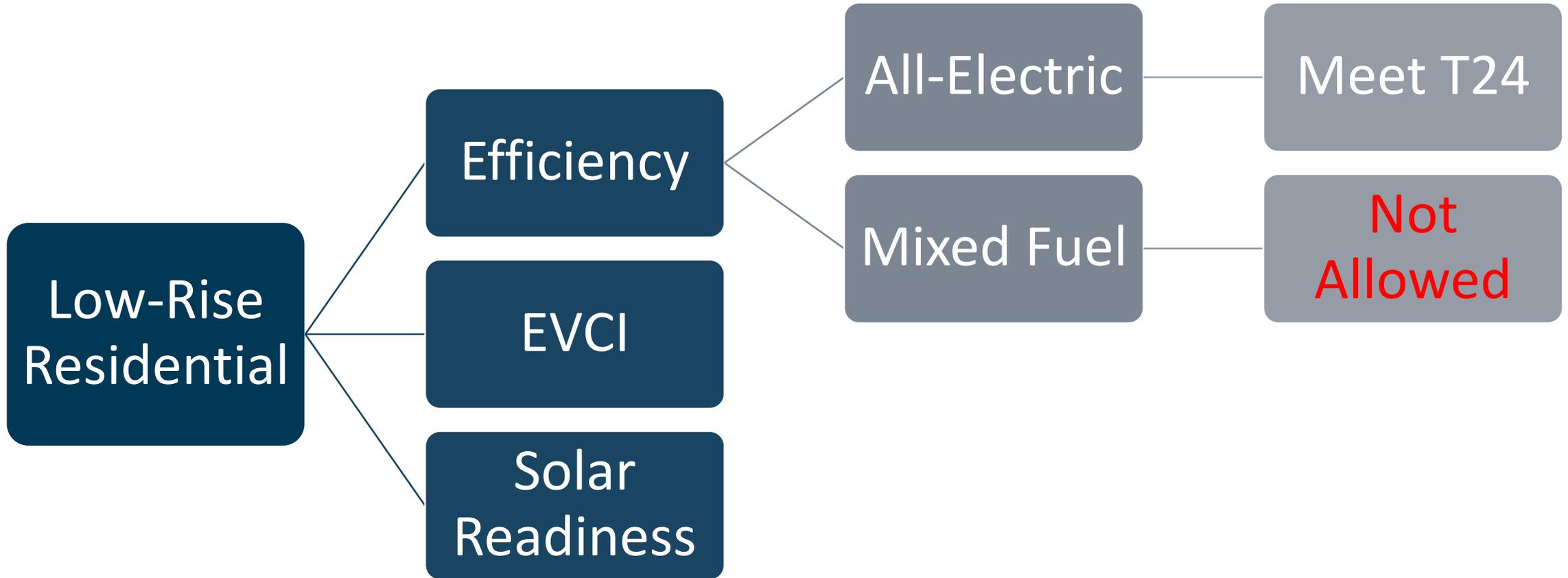


Brookwood Terrace Family Apartments



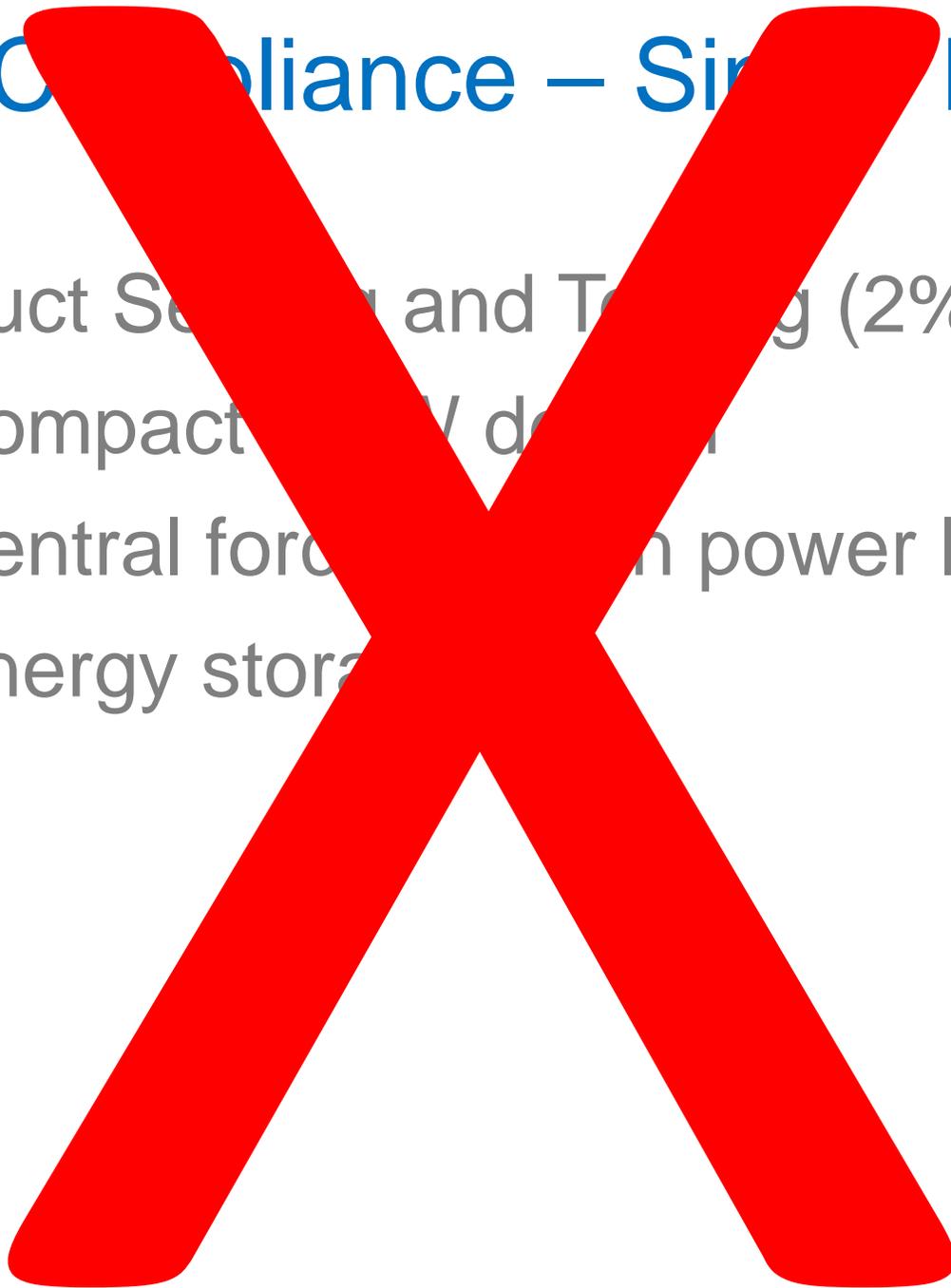
PrefabADU

Residential Efficiency Requirement



Prescriptive Compliance – Single Family

- Duct Sealing and Testing (2% leakage)
- Compact HVAC design
- Central forced air with power limits
- Energy storage



All Electric Residential Equipment

Space Heating



Water Heating



Cooking



Clothes Drying



All Electric Residential Equipment

Space Heating



Water Heating



Cooking



Clothes Drying



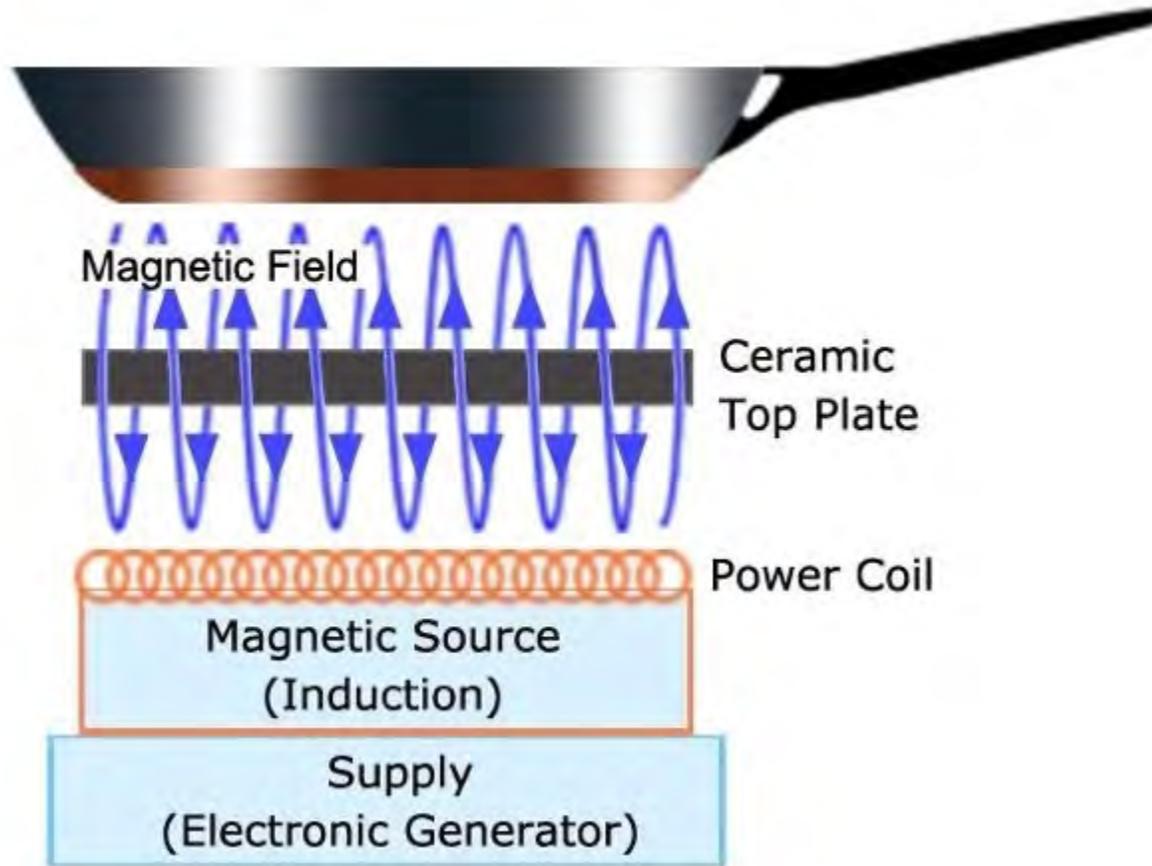


Table 1: Cooktop Heat-Up Time Results

Cooktop	Induction A (Frigidaire)	Induction B (GE)	Induction C (Samsung)	Resistance Ceramic (Whirlpool)	Resistance Coil (Frigidaire)	Gas Burner (Samsung)
Medium Hob Input Rate	2.8 kW	2.5 kW	2.3 kW	1.2 kW	1.5 kW	9.5 kBtu/h
Equivalent kBtu/h	9.5	8.5	7.8	4.0	5.1	9.5
5-lb water heat up time (min)	5.3	5.8	6.4	18.8	11.5	14.1
Efficiency	86.2%	86.8%	85.3%	70.3%	72.3%	30.6%
Large Hob Input Rate	3.6 kW	3.7 kW	3.3 kW	2.5 kW	2.4 kW	17 kBtu/h
Equivalent kBtu/h	12.3	12.6	11.3	8.5	8.2	17.0
12-lb water heat up time (min)	9.8	9.3	11.6	17.8	15.5	18.6
Efficiency	85.2%	86.1%	83.0%	75.5%	79.3%	31.9%
Production* Capacity (lb/h)	73.5	77.2	62.2	40.4	46.5	38.6

*calculated based on a single high-input element or burner heating 12 lb of water from 70 to 200°F in an 8 qt pot.

Residential Cooktop Performance and Energy Comparison Study

Table 1: Cooktop Heat-Up Time Results

Cooktop	Induction A (Frigidaire)	Induction B (GE)	Induction C (Samsung)	Resistance Ceramic (Whirlpool)	Resistance Coil (Frigidaire)	Gas Burner (Samsung)
Medium Hob Input Rate	2.8 kW	2.5 kW	2.3 kW	1.2 kW	1.5 kW	9.5 kBtu/h
Equivalent kBtu/h	9.5	8.5	7.8	4.0	5.1	9.5
5-lb water heat up time (min)	5.3	5.8	6.4	18.8	11.5	14.1
Efficiency	86.2%	86.8%	85.3%	70.3%	72.3%	30.6%
Large Hob Input Rate	3.6 kW	3.7 kW	3.3 kW	2.5 kW	2.4 kW	17 kBtu/h
Equivalent kBtu/h	12.3	12.6	11.3	8.5	8.2	17.0
12-lb water heat up time (min)	9.8	9.3	11.6	17.8	15.5	18.6
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Residential Cooktop Performance and Energy Comparison Study

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Equivalent kBtu/h	9.5	8.5	7.8	4.0	5.1	9.5
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Large Hob Input Rate	3.6 kW	3.7 kW	3.3 kW	2.5 kW	2.4 kW	17 kBtu/h
Equivalent kBtu/h	12.3	12.6	11.3	8.5	8.2	17.0
12-lb water heat up time (min)	9.8	9.3	11.6	17.8	15.5	18.6
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Residential Cooktop Performance and Energy Comparison Study



- Environmental Services

Environmental Services News

Environmental Services Calendar

+ Treatment Plant Advisory Committee (TPAC)

+ Recycling & Garbage

+ Water Utilities

- Climate Smart San José

+ Climate Smart Challenge

Climate Smart Champions

Electrify San José Rebates

Induction Cooking

[Your Government](#) » [Departments & Offices](#) » [Environmental Services](#) » [Climate Smart San José](#) »

INDUCTION COOKTOP CHECKOUT PROGRAM

Electric induction cooktops are a safer, more energy-efficient option for everyday stovetop cooking. They are superior to conventional electric and natural gas cooktops. They heat twice as fast, have better temperature control, and improve indoor air quality. Restaurants, celebrity chefs, and cooking shows have already made the switch!

Want to test the benefits of induction cooking? San José residents can check out a portable induction cooktop and cookware at no cost for up to two weeks by filling out an [interest form](#).

[Watch this video](#) from our partner agency to see how induction cooktops work.

FREQUENTLY ASKED QUESTIONS



Induction cooktops heat only the pan and [not the surrounding stove](#). Ice cubes don't melt on the cooktop even while water boils in the pan.







Santana Row, San Jose

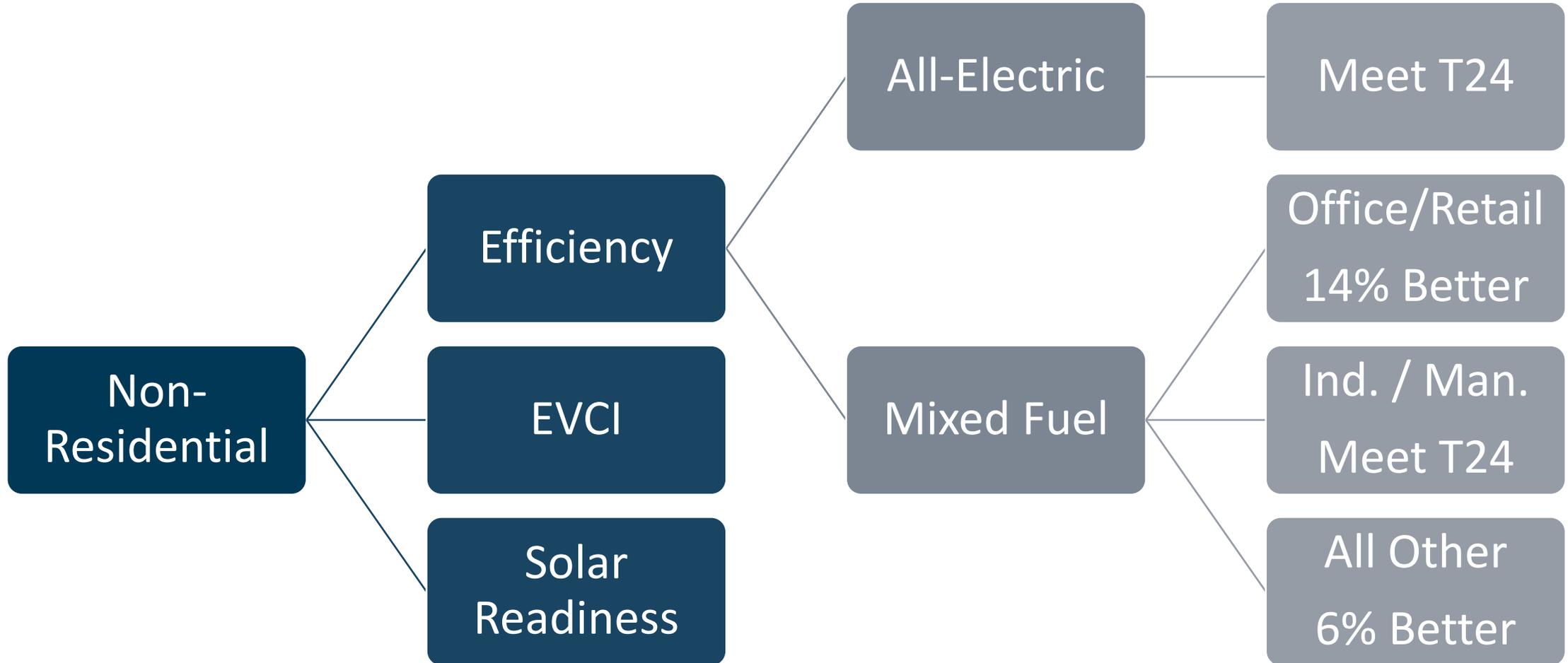


George V. Leyva Middle School, San Jose (Credit: KaraGeorge Studios)

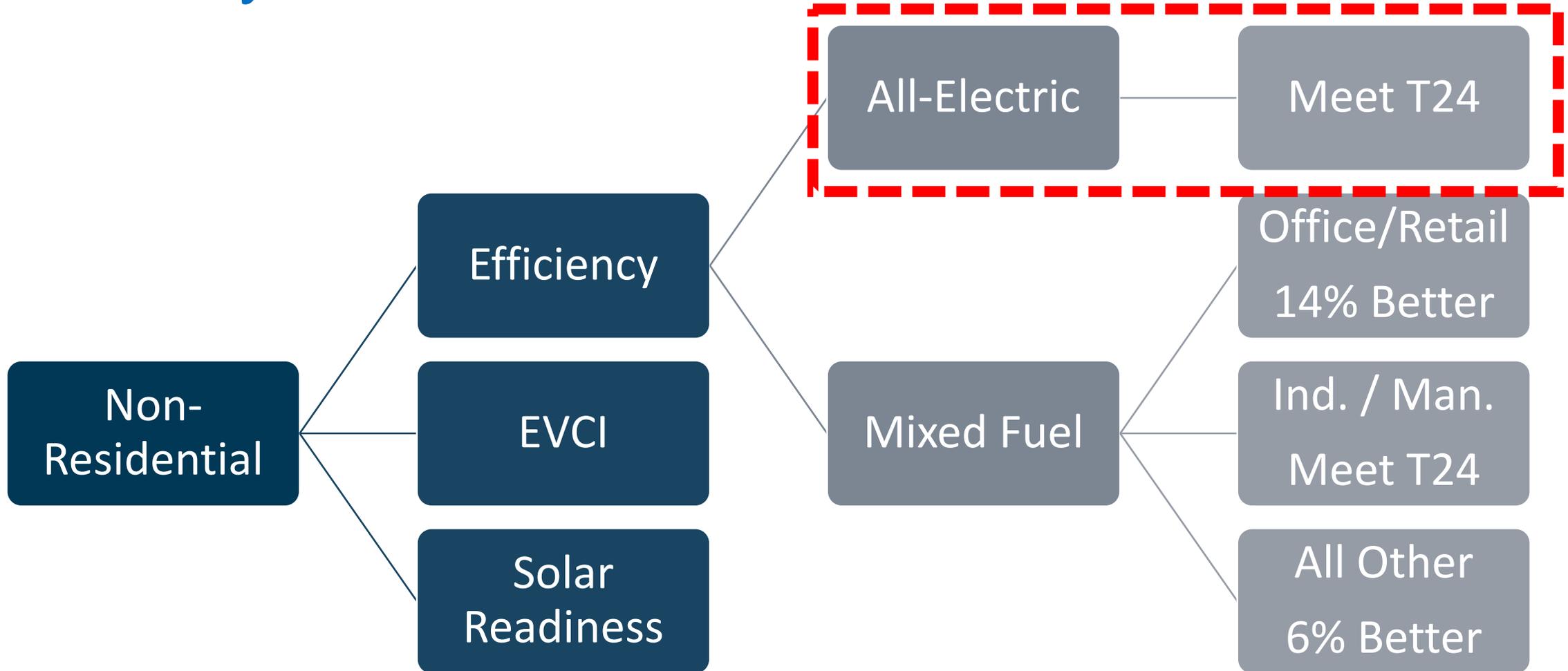


iDeAs Z2 Design Facility, San Jose (Credit: David Wakely)

Efficiency



Efficiency





**CALIFORNIA
ENERGY**
CODES & STANDARDS

A STATEWIDE UTILITY PROGRAM

Title 24, Parts 6 and 11
Local Energy Efficiency Ordinances

**2019 Nonresidential New Construction
Reach Code Cost Effectiveness Study
DRAFT**



**CALIFORNIA
ENERGY**
CODES & STANDARDS

A STATEWIDE UTILITY PROGRAM

Title 24, Parts 6 and 11
Local Energy Efficiency Ordinances

**Nonresidential New Construction
Code Cost Effectiveness Study
DRAFT**

Prepared for:
Christopher Kuch
Codes and Standards Program
Southern California Edison Company

Prepared by:
TRC Advanced Energy
EnergySoft

Last Modified: March 18, 2019

Space Heating

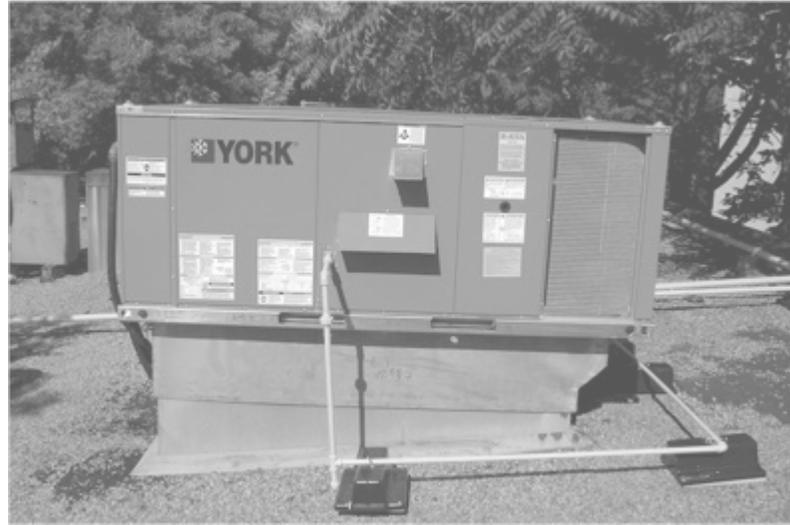
Water Heating

Cooking

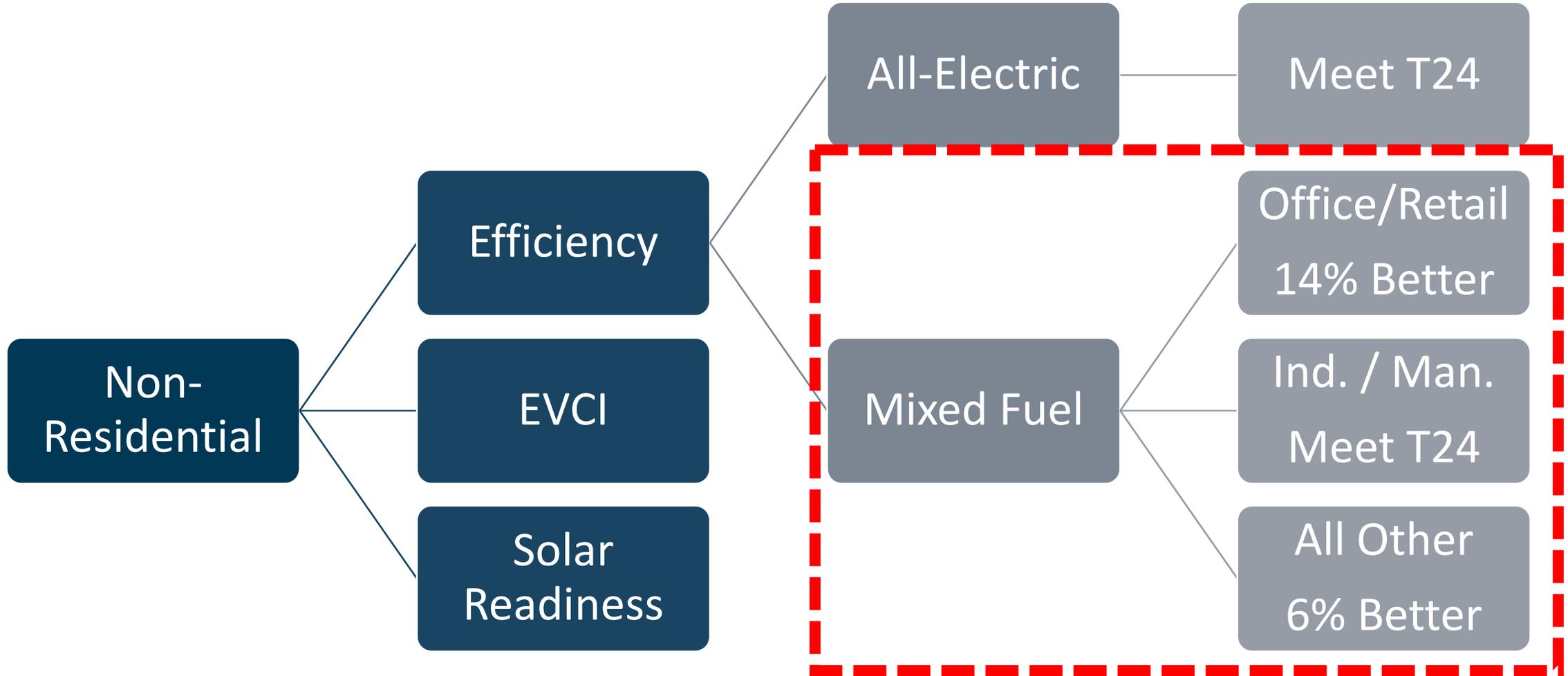
Clothes Drying







Efficiency



Modeled Performance

Project Name: Large Office
 Project Address: San Jose
 Input File Name: Prototype_Office_Large_Reach.cdd28

NRCC-PHF-01-E Page 1 of 30
 Calculation Date/Time: 23:50, Mon, Nov 18, 2019

A. GENERAL INFORMATION

1. Project Location (city)	San Jose	8. Standards Version	Compliance2019
2. CA Zip Code	4	9. Compliance Software (version)	CRECC-Com 2019 1.0
3. Climate Zone	498.589 ft ²	10. Weather File	(N) 0 deg
4. Total Conditioned Floor Area in Scope	0 ft ²	11. Building Orientation (deg)	NoneComplete
5. Total Unconditioned Floor Area	1.2	12. Permitted Scope of Work	Nonresidential
6. Total # of Stories (Habitable Above Grade)	0	13. Building Type(s)	NaturalGas
7. Total # of dwelling units		14. Gas Type	

B. PROJECT SUMMARY

Table Instructions: Table B shows which building components are included in the performance calculation. If indicated as not included, the project must show compliance prescriptively if within permit application.

Building Components Complying via Performance	Building Components Complying Prescriptively
Envelope: <ul style="list-style-type: none"> Performance <input checked="" type="checkbox"/> (Covered Process: Commercial Kitchens) Not Included <input type="checkbox"/> 	The following building components are ONLY eligible for prescriptive compliance and should be documented on the NRCC form listed if within the scope of the permit application (i.e. compliance will not be shown on the NRCC-PHF-E): <ul style="list-style-type: none"> Indoor Lighting (Unconditioned) \$140.6 Outdoor Lighting \$140.3 Sign Lighting \$140.8
Mechanical: <ul style="list-style-type: none"> Performance <input checked="" type="checkbox"/> (Covered Process: Computer Rooms) Not Included <input type="checkbox"/> 	Mandatory Measures: <ul style="list-style-type: none"> Electrical power systems, commissioning and solar ready requirements are mandatory and should be documented on the NRCC form listed if applicable (i.e. compliance will not be shown on the NRCC-PHF-E.) NRCC-LT-E is required NRCC-LTD-E is required NRCC-LTS-E is required
Domestic Hot Water: <ul style="list-style-type: none"> Performance <input checked="" type="checkbox"/> (Covered Process: Laboratory Exhaust) Not Included <input type="checkbox"/> 	<ul style="list-style-type: none"> Electrical Power Distribution \$110.11 Commissioning \$120.8 Solar Ready \$110.10
Lighting (Indoor Conditioned): <ul style="list-style-type: none"> Performance <input checked="" type="checkbox"/> Not Included <input type="checkbox"/> 	<ul style="list-style-type: none"> NRCC-EL-E is required NRCC-CXR-E is required NRCC-SRA-E is required
Solar Thermal Water Heating: <ul style="list-style-type: none"> Performance <input type="checkbox"/> Not Included <input checked="" type="checkbox"/> 	

Report Generated at: 2019-11-18 23:13:10

Report Version: NRCC-PHF-01-E-09112019-1982

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance

(TDV)	Compliance Margin (TDV) ¹
9.64	0.45
17.15	0.42
16.66	-0.93
7.50	-1.48
7.49	5.30
2.08	-
38.24	-
88.76	4.36 (4.7%)

Report Generated at: 2019-11-18 23:13:10

Report Version: NRCC-PHF-01-E-09112019-1982

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance

Area ft ²	Overall U-factor	Overall SHGC	Overall VT	Number
48129	0.36	0.25	0.42	N

Report Generated at: 2019-11-18 23:13:10

Report Version: NRCC-PHF-01-E-09112019-1982

CA Building Energy Efficiency Standards - 2019 Nonresidential Compliance



Modeled Performance

Page 2

Project Name:	LargeOffice	NRCC-PRE-01-E	Page 2 of 20
Project Address:	San Jose	Calculation Date/Time:	23:10, Mon, Nov 13, 2019
Input File Name:	Prototype_Office_Large - Beach.cibd19		

C1. COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft ² -yr)			
COMPLIES			
Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV) ¹
Space Heating	10.09	9.64	0.45
Space Cooling	17.15	17.15	—
Indoor Fans	17.08	16.66	0.42
Heat Rejection	2.17	2.50	-0.33
Pumps & Misc.	6.01	7.49	-1.48
Domestic Hot Water	7.38	1.08	6.30
Indoor Lighting	33.24	33.24	—
ENERGY STANDARDS COMPLIANCE TOTAL	93.12	88.76	4.36 (4.7%)

¹ Notes: The number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.

C2. RESULTS FOR 'ABOVE CODE' QUALIFICATIONS ¹			
<input type="checkbox"/> This project is pursuing CalGreen Tier 1		<input type="checkbox"/> This project is pursuing CalGreen Tier 2	
Miscellaneous Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV) ²
Receptacle	119.41	119.41	0.0
Process	3.21	3.21	0.0
Other Ltg.	—	—	—
Process Motors	—	—	—
COMPLIANCE TOTAL PLUS MISCELLANEOUS COMPONENTS	215.74	211.38	4.4 (2.0%)

¹ Notes: This table is used to document compliance with programs OTHER THAN Title 24 Part 6, if applicable.

D. EXCEPTIONAL CONDITIONS
The aged solar reflectance and aged thermal emittance must be listed in the Cool Roof Rating Council database of certified products. For projects where initial reflectance is used, the initial reflectance must be listed, and the aged reflectance is calculated by the software program and used in the compliance model.
This project includes Domestic Hot Water in the analysis. Please verify that Domestic Hot Water is included in the design for the permitted scope of work.

Modeled Performance

All-Electric

Project Name:	LargeOffice	NRCC-PRE-01-E	Page 2 of 20
Project Address:	San Jose	Calculation Date/Time:	23:10, Mon, Nov 13, 2019
Input File Name:	Prototype_Office_Large - Beach.cibd19		

C1. COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kWh/ft²-yr)

COMPLIES

Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV) ¹
Space Heating	10.09	9.64	0.45
Space Cooling	17.15	17.15	—
Indoor Fans	17.08	16.66	0.42
Heat Rejection	2.17	2.50	-0.33
Pumps & Misc.	6.01	7.49	-1.48
Domestic Hot Water	7.38	1.08	6.30
Indoor Lighting	33.24	33.24	—
ENERGY STANDARDS COMPLIANCE TOTAL	93.12	88.76	4.36 (4.7%)

¹ Notes: The number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.

C2. RESULTS FOR 'ABOVE CODE' QUALIFICATIONS¹

This project is pursuing CalGreen Tier 1 This project is pursuing CalGreen Tier 2

Miscellaneous Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV) ¹
Recaptacle	119.41	119.41	0.0
Process	3.21	3.21	0.0
Other Ltg.	—	—	—
Process Motors	—	—	—
COMPLIANCE TOTAL PLUS MISCELLANEOUS COMPONENTS	215.74	211.38	4.4 (2.0%)

¹ Notes: This table is used to document compliance with programs OTHER THAN Title 24 Part 6, if applicable.

D. EXCEPTIONAL CONDITIONS

The aged solar reflectance and aged thermal emittance must be listed in the Cool Roof Rating Council database of certified products. For projects where initial reflectance is used, the initial reflectance must be listed, and the aged reflectance is calculated by the software program and used in the compliance model.

This project includes Domestic Hot Water in the analysis. Please verify that Domestic Hot Water is included in the design for the permitted scope of work.

Modeled Performance

Mixed-Fuel

Project Name:	LargeOffice	NRCC-PRE-01-E	Page 2 of 20
Project Address:	San Jose	Calculation Date/Time:	23:10, Mon, Nov 18, 2019
Input File Name:	Prototype_Office_Large - Beach.cibd19		

C1. COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft ² -yr)			
COMPLIES			
Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV) ¹
Space Heating	10.09	9.64	0.45
Space Cooling	17.15	17.15	—
Indoor Fans	17.08	16.66	0.42
Heat Rejection	2.17	2.50	-0.33
Pumps & Misc.	6.01	7.49	-1.48
Domestic Hot Water	7.38	1.08	6.30
Indirect Lighting	31.34	31.34	—
ENERGY STANDARDS COMPLIANCE TOTAL	93.12	88.76	4.36 (4.7%)

C2. RESULTS FOR 'ABOVE CODE' QUALIFICATIONS ¹			
<input type="checkbox"/> This project is pursuing CalGreen Tier 1		<input type="checkbox"/> This project is pursuing CalGreen Tier 2	
Miscellaneous Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV) ¹
Recaptacle	119.41	119.41	0.0
Process	3.21	3.21	0.0
Other Ltg.	—	—	—
Process Motors	—	—	—
COMPLIANCE TOTAL PLUS MISCELLANEOUS COMPONENTS	215.74	211.38	4.4 (2.0%)

¹ Notes: This table is used to document compliance with programs OTHER THAN Title 24 Part 6, if applicable.

D. EXCEPTIONAL CONDITIONS
The aged solar reflectance and aged thermal emittance must be listed in the Cool Roof Rating Council database of certified products. For projects where initial reflectance is used, the initial reflectance must be listed, and the aged reflectance is calculated by the software program and used in the compliance model.
This project includes Domestic Hot Water in the analysis. Please verify that Domestic Hot Water is included in the design for the permitted scope of work.

CA Building Energy Efficiency Standards- 2019 Nonresidential Compliance	Report Version: NRCC-PRE-01-E-09E12019-5962	Report Generated at: 2019-11-18 23:13:10
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Modeled Performance

Project Name:	LargeOffice	NRCC-PRE-01-E	Page 2 of 20
Project Address:	San Jose	Calculation Date/Time:	23:10, Mon, Nov 18, 2019
Input File Name:	Prototype_Office_Large - Beach.cibd19		

C1. COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft ² -yr)			
COMPLIES			
Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV) ¹
Space Heating	10.09	9.64	0.45
Space Cooling	17.15	17.15	---
Indoor Fans	17.08	16.66	0.42
Heat Rejection	2.17	2.50	-0.33
Pumps & Misc.	6.01	7.49	-1.48
Domestic Hot Water	7.38	1.08	6.30
Indoor Lighting	33.24	33.24	---
ENERGY STANDARDS COMPLIANCE TOTAL	93.12	88.76	4.36 (4.7%)

¹ Notes: The number in parenthesis following the Compliance Margin in column 4 represents the Percent Better than Standard.

C2. RESULTS FOR 'ABOVE CODE' QUALIFICATIONS ²			
<input type="checkbox"/> This project is pursuing CalGreen Tier 1		<input type="checkbox"/> This project is pursuing CalGreen Tier 2	
Miscellaneous Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV) ²
		119.41	0.0
		3.21	0.0
		---	---
		---	---
		21.38	4.4 (2.0%)

4.36 (4.7%)

² For projects where initial reflectance is used, the initial reflectance shall be as specified in the approved permit scope of work.

Modeled Performance

Project Name:	Medium Office	NRCC-PRF-01-E	Page 2 of 19
Project Address:	San Jose	Calculation Date/Time:	19:32, Tue, Nov 19, 2019
Input File Name:	Prototype_Office_Medium - reach.cbld19		

C1. COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft ² -yr)			
COMPLIES			
Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV) ¹
Space Heating	10.96	8.98	1.98
Space Cooling	43.11	29.82	13.19
Indoor Fans	15.57	15.23	0.34
Heat Rejection	—	—	—
Pumps & Misc.	0.03	0.82	-0.79
Domestic Hot Water	7.45	1.63	5.82
Indoor Lighting	30.98	30.98	—
ENERGY STANDARDS COMPLIANCE TOTAL	108.10	87.56	20.54 (19.0%)

¹ Notes: The number in parenthesis following the Compliance Margin in column 4 represents the Percent Better than Standard.

C2. RESULTS FOR 'ABOVE CODE' QUALIFICATIONS ²			
<input type="checkbox"/> This project is pursuing CalGreen Tier 1		<input checked="" type="checkbox"/> (This project is pursuing CalGreen Tier 2)	
Miscellaneous Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV) ²
		119.41	0.0
		21.53	0.0
		—	—
		—	—
		—	—
		—	—
		228.50	20.5 (8.2%)

20.54 (19.0%)

² The aged solar reflectance and aged thermal emittance must be listed in the Cool Roof Rating Council database of certified products. For projects where initial reflectance is used, the initial reflectance must be listed, and the aged reflectance is calculated by the software program and used in the compliance model.

This project includes Domestic Hot Water in the analysis. Please verify that Domestic Hot Water is included in the design for the permitted scope of work.

Prescriptive Compliance – Hotel/Motel

- SHGC ≤ 0.22
- Efficient VAV airflow design
- Economizer ($\geq 33,000$ Btu/h cooling)
- 10% LPD reduction
- Drain water heat recovery
- Improved Daylighting Controls
- Institutional Lighting Controls Tuning

Prescriptive Compliance – Other Non-Res

- SHGC ≤ 0.22
- 50% reduction of East & West fenestration area
- Efficient VAV airflow design
- Economizer ($\geq 33,000$ Btu/h cooling)
- 10% LPD reduction
- Drain water heat recovery
- Improved Daylighting Controls
- Institutional Lighting Controls Tuning
- Occupancy Controls in open area offices

Compliance Summary CO2 Emissions Energy Design Rating Energy Use Details CO2 Details							
End Use	Standard Design Site (kWh)	Standard Design Site (therms)	Standard Design (kTDV/ft ² -yr)	Proposed Design Site (kWh)	Proposed Design Site (therms)	Proposed Design (kTDV/ft ² -yr)	Compliance Margin (kTDV/ft ² -yr)
Space Heating	5,898		22.94	6,028		23.43	-0.49
Space Cooling			0.00			0.00	0.00
IAQ Ventilation	786		3.16	786		3.16	0.00
Water Heating	9,317		37.22	9,317		37.22	0.00
Self Utilization Credit						0.00	0.00
Compliance Total			63.32			63.81	-0.49
Photovoltaics	-21,314		-72.12	-21,314 *		-72.12	-0.8 %
Battery Flexibility						0.00	
Inside Lighting	2,034		9.66	2,034		9.66	
Appl. & Cooking	11,774		47.07	11,774		47.07	
Plug Loads	12,062		50.84	12,062		50.84	
Exterior	434		1.90	434		1.90	
TOTAL	20,991		100.67	21,122		101.16	
Generation Coincident Peak Demand (kW): Standard Design: 3.97 Proposed Design: 3.97 Reduction: 0.00							
* PV System resized to 15.93 kWdc (a factor of 15.927) to achieve 'Standard Design PV' PV scaling							

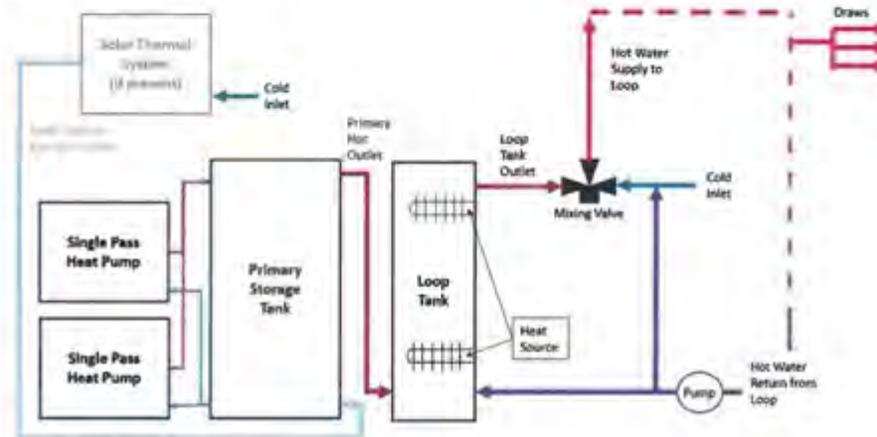
Done



Attachment 1

Prescriptive Sizing and Layout Requirements for Central Heat Pump Water Heaters for Multifamily Buildings

System Schematic



Minimum Requirements

1. Piping (Equipment and Storage)
 - a. The primary heating load shall be separated from the temperature maintenance load (also known as a loop tank). The primary storage and loop tank shall be piped in series. The primary storage shall precede the loop tank.
 - b. The primary storage shall be in series arrangement if multiple tanks are used (See Attachment 2). In a series configuration, the hot outlet (top of tank) shall be connected to cold inlet (bottom of tank) of next tank.
 - c. Loop tank piping connections
 - i. The primary storage hot outlet shall be piped to the bottom of the loop tank.
 - ii. The return from hot water circulation loop shall be piped to the bottom of the loop tank.
 - iii. Hot water delivered to the mixing valve (described below) shall be piped from the top of the loop tank.

Building Electrification Components

1. Gas Infrastructure Moratorium in Low-Rise Residential
2. Increased efficiency in other Mixed-Fuel Buildings
3. **Electrification Readiness in Mixed-Fuel Buildings**

Electrification Readiness – Non-Residential

- **Water Heater:** 240V 30A circuit, condensate drain, 700 CF of air
- **Clothes Dryer:** 240V 30A circuit
- **Cooking:** 240V 50A circuit
- **All Other:** Designated Raceway + equivalent electrical capacity

Electrification Readiness



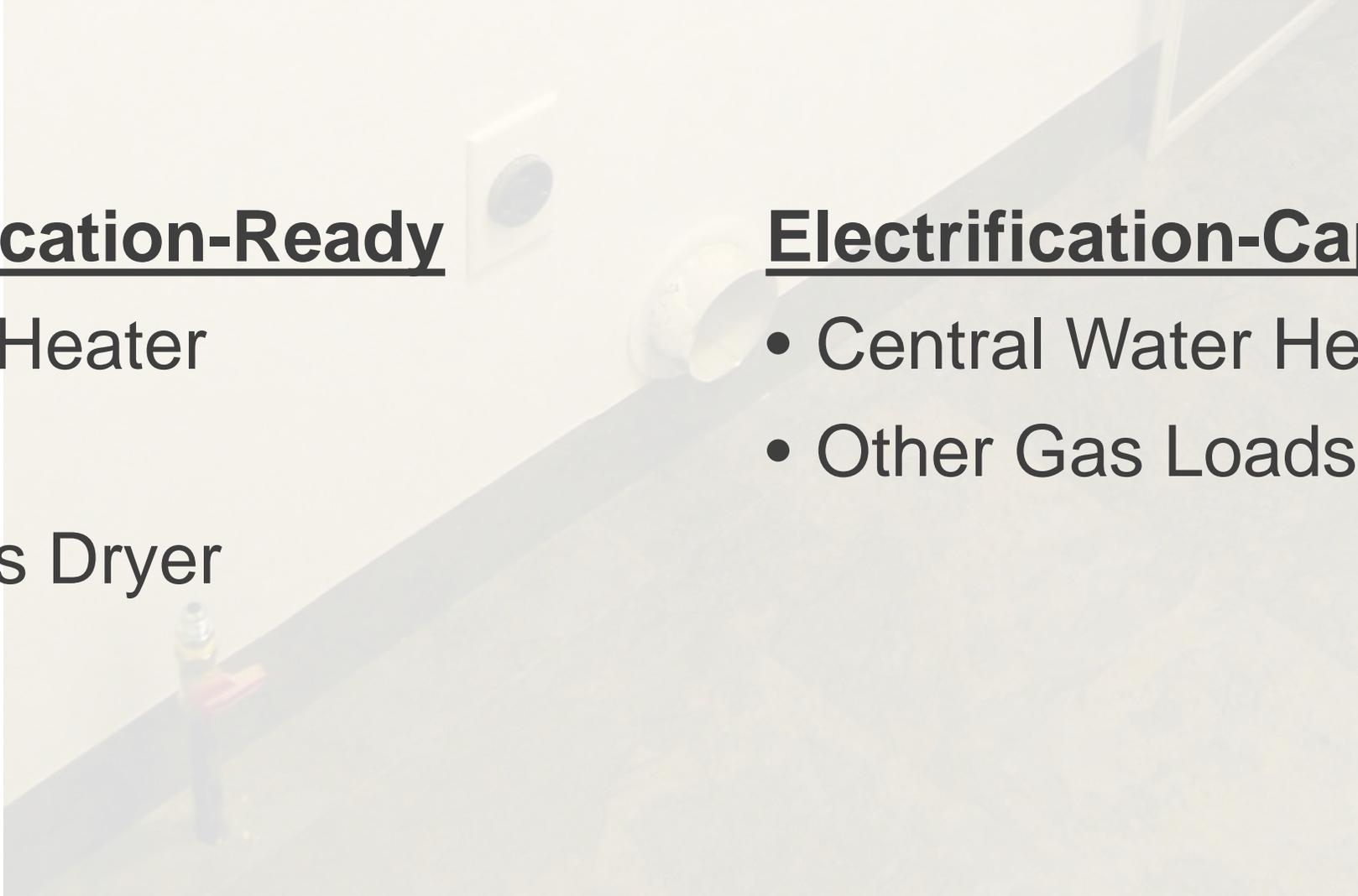
Electrification Readiness

Electrification-Ready

- Water Heater
- Range
- Clothes Dryer

Electrification-Capable

- Central Water Heating
- Other Gas Loads



Electrification Capable



- **All Other:** Designated Raceway + equivalent electrical capacity

	All-Electric	Mixed-Fuel	Code Reference
Single Family	Meet Title 24 - 2019	Not Permitted	Gas Ban Ordinance
Low-Rise Multifamily	Meet Title 24 - 2019	Not Permitted	Gas Ban Ordinance
Office / Retail	Meet Title 24 - 2019	14% better than T24 + Electrification Readiness	Section 150.1
Industrial / Manufacturing	Meet Title 24 - 2019	Electrification Readiness	Section 150.1
Other Non-Res	Meet Title 24 - 2019	6% better than T24 + Electrification Readiness	Section 150.1

Questions?

nbi new buildings
institute



Wayne Aspinall Federal Building & Courthouse, Grand Junction, CO

Thank you!

2019 CALGreen and California Energy Codes

Presented by: Ron Davis, Building Inspection Manager

SIGNIFICANT CHANGES TO 2019 CALGREEN AND CALIFORNIA ENERGY CODES

Ron Davis, Building Inspection Manager



*Planning, Building and
Code Enforcement*

Mandatory Measures - Residential

Pilot lights prohibited for Natural gas Central Furnaces, Cooking Equipment, Pool Spa Heater, Fireplaces (110.5) Decorative gas appliances and gas logs (150.0)

Thermostats: Heating and Cooling systems not controlled by a central energy management control system must have a setback thermostat. (150.0(I))

Air Filter Efficiency: MERV13, Design must accommodate clean filter pressure drop. Permanent label stating design airflow rate required at filter location.

Mandatory Measures - Residential

Future Heat pump option: 125v, 20amp receptacle on dedicated 10-3 AWG copper branch circuit within 3' of water heater. Reserved breaker space labeled "Future 240v Use", both ends of unused conductors to be isolated.

ASHRAE 62.2 Indoor air quality: Balanced or continuously operating supply or exhaust ventilation system required. Home Energy Rating System (HERS) verification required when kitchen range hoods are installed. § 150.0(o)

Fan efficacy requirements: are 0.45 watts/cubic feet per minute (CFM) or less for gas furnace air-handling units; or 0.58 watts/CFM or less for air-handling units that are not gas furnaces (150.0(m)13B, C, D)

Envelope – Residential–Prescriptive Approach

Exterior wall in new structures will have not more than .048 U-factor in 1-5, 8-16 Climate Zones (Table 150.1-A) and Table JA4.3.1

Spacing	Cavity Insulation	Nominal Framing Size	Rated R-value of Continuous Insulation ²									
			R-0	R-2	R-4	R-5	R-6	R-7	R-8	R-10		
			A	B	C	D	E	F	G	H		
16 in. OC	None	Any	1	0.356	0.209	0.146	0.127	0.113	0.101	0.092	0.078	
	R-11	2x4	2	0.110	0.088	0.074	0.068	0.064	0.060	0.056	0.050	
	R-13	2x4	3	0.102	0.082	0.069	0.064	0.060	0.056	0.053	0.047	
	R-15 ¹	2x4	4	0.095	0.077	0.065	0.060	0.056	0.053	0.050	0.045	
	R-19	2x6	5	0.074	0.063	0.055	0.051	0.049	0.046	0.044	0.040	
	<u>R-20</u>	<u>2x6</u>	<u>6</u>	<u>0.071</u>	<u>0.060</u>	<u>0.052</u>	<u>0.049</u>	<u>0.047</u>	<u>0.044</u>	<u>0.042</u>	<u>0.039</u>	
	R-21 ¹	2x6	7	0.069	0.059	0.051	0.048	0.046	0.043	0.041	0.038	

Envelope – Residential–Prescriptive Approach

Quality insulation installation (QII) for all single-family buildings, and addition greater than 700sf in all climate zones, and multifamily buildings in all climate zones except climate zone 7.

Fenestration: Max U-factor .30, Maximum SHGC .23 (except CZ 1, 3, 5, 16)

Walls with 2x6 framing require R-20 minimum insulation for wood-framed; or 0.071 maximum Ufactor. (150.0(c)2) per mandatory measures. Newly conditioned space with existing walls without removing siding must use R15 in 2x4 walls, and R21 in 2x6 walls.

Solar Ready/PV/Battery Storage - RESIDENTIAL

- New Low-rise Residential Buildings shall meet PV solar electric generation requirement in (150.1(c)14 2) System Annual Electrical Output equal to or greater than the dwelling's annual electrical usage.
- Buildings that meet the exception for PV solar generation shall be PV ready with minimum total of 250sf of Solar zone, dedicated space for inverter and circuit. (110.10(b))
- Community Shared Solar Electric Generation or Battery Storage System can be used to meet the "Solar Electric Generation and Demand Flexibility Design Rating" only if the system has been approved by the Energy Commission.

Hot Water Piping Insulation Requirements

Hot Water Piping Insulation Requirements for the City of San Jose

Goal: to be consistent and less confusing regarding the insulation of hot water piping in all building types.

Solution: Use the 2019 California Energy Code Table 120.3-A for all hot water piping insulation applications.

Hot Water Piping Insulation Requirements

2019 California Energy Code

Table 120.3-A Pipe Insulation Thickness

FLUID TEMPERATURE RANGE (°F)	CONDUCTIVITY RANGE (in Btu-inch per hour per square foot per °F)	INSULATION MEAN RATING TEMPERATURE (°F)	NOMINAL PIPE DIAMETER (in inches)					
			< 1	1 to <1.5	1.5 to < 4	4 to 8	> 8 and larger	
			INSULATION THICKNESS REQUIRED (in inches)					
Space heating, Hot Water systems (steam, steam condensate and hot water) and Service Water Heating Systems (recirculating sections, all piping in electric trace tape systems, and the first 8 feet of piping from the storage tank for nonrecirculating systems)								
Above 350	0.32-0.34	250	4.5	5.0	5.0	5.0	5.0	
251-350	0.29-0.31	200	3.0	4.0	4.5	4.5	4.5	
201-250	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0	
141-200	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0	
105-140	0.22-0.28	100	1.0	1.5	1.5	1.5	1.5	
Space cooling systems (chilled water, refrigerant and brine)								
40-60	0.21-0.27	75	Nonres 0.5	Res 0.75	Nonres 0.5	Res 0.75	1.0	1.0
Below 40	0.20-0.26	50	1.0	1.5	1.5	1.5	1.5	

NonResidential and High-Rise Residential - Electrical

Clarified and streamlined manual area controls, multi-level lighting controls, and automatic daylighting controls requirements. (130.1(b))
Restrooms to comply with occupancy sensor control requirements.

New section for indoor lighting control interactions. (130.1(f))

Changed indoor and outdoor lighting power allowances based on LED lighting technologies.

Revised lighting power density values in Tables 140.6-B to 140.6-G, and Table 140.7-B. § 140.6, § 140.7 4.

NonResidential and High-Rise Residential - Mechanical

MERV 13 air filters are required for heating and cooling systems, supply-only ventilation systems, and the supply side of balanced ventilation systems. 120.1(b), (c)

Hi-rise residential dwelling ventilation system must be a balanced system or a continuously operating supply or exhaust system. HERS blower door test required for continuously operating ventilation systems. § 120.1(b)

NonResidential and High-Rise Residential - Mechanical

Kitchen range hoods in high-rise residential dwelling units require HERS verification and acceptance complying with ASHRAE 62.2 minimum airflow and sound rating requirements. 120.1(b)

Incorporated natural and exhaust ventilation procedures of ASHRAE 62.1. Updated Table 120.1-A to include minimum ventilation rate for more spaces. Table 120.1-B added for minimum exhaust rate for certain spaces.

Expanded economizer fault detection and diagnostics requirements to all cooling systems over 54,000 Btuh with an air economizer. 120.2(i)

NonResidential and High-Rise Residential - Envelope

Exception for the site-built fenestration default calculations reduced from 1,000 square feet to 200 square feet. § 110.6

Exterior doors now included in NFRC rating and labeling requirements.
§ 110.6

NonResidential and High-Rise Residential

Covered Processes 140.9(c)1, 4 - New fan efficiency and automatic sash closure requirements, includes acceptance testing, for laboratory fume hoods.

New efficiency and system control requirements for adiabatic condensers serving refrigerated warehouses and supermarkets. §120.6(b)

Healthcare Facilities overseen by the California Office of Statewide Health Planning and Development (OSHPD) are now included in the scope of the Energy Code. Exceptions are incorporated to ensure appropriate application.

Cal Green Definitions

New Definitions have been added to Cal Green

- Accessory Dwelling Unit
- Accessory Occupancies
- Accessory Structures
- Junior Accessory Dwelling Unit

Cal Green Residential Mandatory Measures

Indoor Water Use

- Water conserving plumbing fixtures and fittings
- All noncompliant plumbing fixtures in any residential real property shall be replaced with water-conserving plumbing fixtures
- Plumbing fixture replacement is required **prior** to issuance of a certificate of occupancy or final permit approval by the local building department

Cal Green Nonresidential Mandatory Measures

Outdoor Water Use

- Outdoor potable water use in landscape areas
- Nonresidential developments shall comply with a local water efficient landscape ordinance or the current California Department of Water Resources' Model Water Efficient Landscape ordinance (MWELO), whichever is more stringent

Hot Water Piping Insulation Requirements

Hot Water Piping Insulation Requirements for the City of San Jose

Goal: to be consistent and less confusing regarding the insulation of hot water piping in all building types.

Solution: Use the 2019 California Energy Code Table 120.3-A for all applications.

Questions?

Thank you!