DOCKETED	
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Project Title:	2022 Energy Code Update Rulemaking
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2022 Building Energy Efficiency Standards Lead Commissioner Hearing for 45-Day Language

Payam Bozorgchami, P.E.

DATE: May 27, 2021

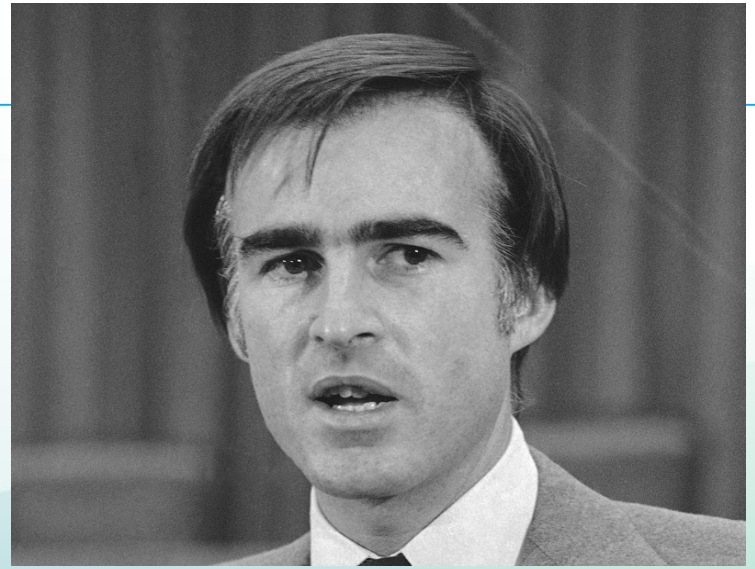
Start Time: 9:00 AM

Agenda for Todays Hearing

- **How Title 24, Part 6 is Developed**
- **Single-Family Residential Buildings**
  - **Subchapter 7**, Mandatory Features and Devices (Excluding Sections 150.0(n), and 150.0(s) Through 150.0(v))
  - **Subchapter 8,** Performance and Prescriptive Compliance Approaches (Excluding Sections 151.1(c)7, 150.1(c)8 and 150.1(c)14)
  - **Subchapter 9,** Additions and Alterations to Existing Residential Buildings
- **Multifamily Buildings**
  - **Subchapter 10**, Mandatory Requirements (Excluding Section 160.9)
  - **Subchapter 11**, Performance and Prescriptive Compliance approaches (Excluding Section 170.2(c)3A)
  - **Subchapter 12** Additions and Alterations and Repairs to Existing Multifamily Residential Buildings
- **Lunch Break (30 minutes)**

Authority & Process

- **Public Resources Code (PRC 25402):** Reduction of wasteful, uneconomic, inefficient, or unnecessary consumption of energy
  - (a)(1) Prescribe, by regulation, lighting, insulation, climate control system, and other building design and construction standards that increase the efficiency in the use of energy and water…
  - Warren Alquist Act Signed into law in 1974 by Governor Ronald Reagan and launched by Governor Jerry Brown in 1975 which mandates updates Building Efficiency Standards and requires the building departments to enforce them through the permit process.

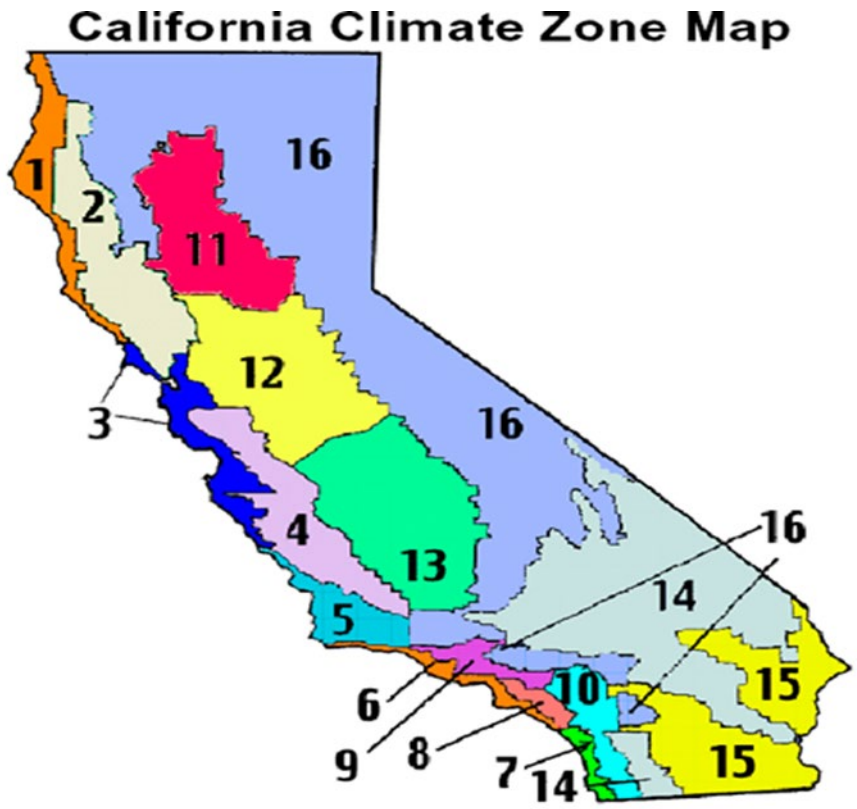


Goals of the California Energy Code

1. Increase building energy efficiency cost-effectively
2. Contribute to the state's GHG reduction goals
3. Enable pathways for all-electric buildings
4. Reduce residential building impacts on the electricity grid
5. Promote demand flexibility and self-utilization of PV generation
6. Provide tools for local government reach codes

California Standards for California Climates

- Focus on CA Climate Diversity
  - Standards set expectations for climate-specific designs
  - CA weather data captures statewide coincident peak demand climate conditions



Coastal - 1, 3, 5, 6, 7, 8

Inland - 2, 4, 9, 10

Central Valley - 11, 12, 13

Desert - 14, 15

Mountains -16

Process Used to Updated Energy Codes

CEC staff, with input from utility partners and industry stakeholders, develop the triennial standards update

Opportunities for participation

- Utility-Sponsored 25 publicly held Stakeholder Meetings
- CEC-Sponsored 18 Staff Workshops

Standards must be cost-effective

- Life-Cycle Costing Methodology
- Time Dependent Valuation (TDV)

2022 Standards Process From Here on to the Effective Date

2022 STANDARDS UPDATE SCHEDULE	
DATE	**MILESTONES**
November 2018 - November 2019	Updated Weather Files
November 2018-December 2019	Metric Development
November 2018-July 2019	Measures Identified and approval
August 2019 to January 2021	Stakeholder meeting/workshop & final staff workshop
May 2020-October 2020	CASE Reports submitted to the CEC
May 24, 27 and 28 2021	**45-day Lead Commissioner Hearings**
June 21, 2021	**Comments for the 45-Day Language due date**
August 11, 2021	Adoption of 2022 Standards at the Business Meeting
July 2021 to November 2021	Staff work on Software, Compliance Manuals, Electronic Documents Available to Industry
January of 2022	Approval of the Manuals (at CEC Business Meeting)
December of 2021	Approval of the Energy Code (at CBSC)
February 2022	Software, Compliance Manuals, Electronic Documents Available to Industry
January 1, 2023	Effective Date

2022 Energy Code Environmental Impact Report

Important Dates	Milestones
May 19	**Draft** Report posted to docket
May 20 – July 8	Public **comment period**
Late July	**Final** Report posted to docket
August	CEC **adoption** (Tentative)

DOCKET NUMBER: 21-BSTD-02

https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-BSTD-02

Key Web-Links

45-Day Rulemaking Comments to be Submitted to:

https://efiling.energy.ca.gov/EComment/EComment.aspx?docketnumber=21-BSTD-01

NOTE: For this workshop final deadline for written comments is **June 21, 2021** by 5:00 PM

Building Energy Efficiency Program
http://www.energy.ca.gov/title24/

Pre-Rulemaking Comments were submitted to:
https://efiling.energy.ca.gov/EComment/EComment.aspx?docketnumber=19-BSTD-03

2022 Title 24 Utility-Sponsored Stakeholder
http://title24stakeholders.com/

How to submit Written Comments

- **We strongly encourage submitting written comments via e-file.** Comments on the proposed 2021 Energy Code can be submitted to: https://efiling.energy.ca.gov/EComment/EComment.aspx?docketnumber= 21-BSTD-01

- Comments can also be submitted physically or by e-mail, here:

California Energy Commission
Dockets Office, MS-4
Re: Docket No. 21-BSTD-01
1516 Ninth Street
Sacramento, CA 95814-5512
Docket@energy.ca.gov

Final deadline for written comments is June 21, 2021 by 5:00 PM

Questions ?

SUBCHAPTER 7
Single-Family Residential Buildings – Residential Buildings – Mandatory Features and Devices

Presenter: Danny Tam/Jeff Miller, PE

DATE: May 27, 2021

Lead Commissioner Hearing for 45-Day Language

Section 150.0(a) Roof Deck, Ceiling and Rafter Roof insulation

- **Section 150.0(a)1:** New mandatory requirement for roof deck insulation
  - For climate zones 4 and 8 through 16
  - U-Factor requirement of U-0.184 if there are ducts and air handler located in the attic below.

Section 150.0(j) Insulation for Piping and Tanks

- **Section 150.0(j)1: Storage tank insulation**
  - Edited for clarity. Modify existing alternative for tank insulation as an exception

- **Section 150.0(j)2: Water piping, solar water heating piping, and space conditioning system line insulation thickness and conductivity.**
  - Align pipe insulation requirement with the California Plumbing Code

Section 150.0(k) Residential Lighting Requirements

- **Section 150.0(k)1: Luminaire requirements**. Updated and revised the subsections to reflect the lighting technology adaptation changes in marketplace from legacy light sources to LED light sources. Added pointer to the California Electrical Code for the ceiling recessed down light luminaires requirement.
- **Section 150.0(k)2: Indoor Lighting Controls**. Updated the subsections with headings and revised with clarifications of the indoor lighting control requirements.
- **Table 150.0-A Classification of High Luminous Efficacy Light Sources**. Updated the Table with clarifications on inseparable SSL luminaires. Added LED tunable light sources (dim-to-warm; tunable-white; color-tunable), Title 20 general service LED lamps, and others.
  - 15-day changes require JA10 flickering test for LED tunable light sources.
  - 15-day changes remove colored light sources from item 2.

Section 150.0(m) - Air-Distribution and Ventilation System Ducts, Plenums, and Fans

Section 150.0(m)1B: Duct R-value

- Duct R-value required for duct systems located entirely in conditioned space was lowered from R-4.2 to:
  - R-1 for ducts with a surface emissivity greater than or equal to 0.8.
  - R-3 for ducts with a surface emissivity less than 0.8.

EXCEPTION 1 to Section 150.0(m)1B: was revised to clarify the types of ducts that are exempt from insulation requirements

Section 150.0(m) – Duct Leakage, and Air Filtration

- **Section 150.0(m)11: Duct System Sealing and Leakage Testing**
  - Updated to delete references to Residential Appendix Table RA3.1-2 and add reference to Section RA3.1.4.2.
  - Clarify terminology used for air handler airflow
- **Section 150.0(m)12: Air Filtration**
  - Section 150.0(m)12Aii clarifies make-up air systems must comply with the same requirements as required for other supply ventilation systems.
  - 150.0(m)12Bv - new requirement specifies air filter racks or grilles be gasketed or sealed to prevent air from bypassing the filter.

Section 150.0(o) – Ventilation and IAQ

- **Section 150.0(o):** updated to reference most recent version of ASHRAE 62.2 (2019) as specified in Standards section 100.1.
- **Section 150.0(o):** updated to specify the sections of ASHRAE 62.2-2019 that are not proposed to be referenced: ASHRAE 62.2 Sections 4.1.1, 4.1.2, 4.1.4, 4.3, 4.6, 5, 6.1.1, 6.5.2, and Normative Appendix A.
- **150.0(o)1**: All mechanical ventilation airflow rates are now specified only in 150.0(o)1.
- **Section 150.0(o)1B:** central fan integrated ventilation system requirements were updated to specify requirements for outdoor air dampers, damper control, and variable ventilation controls.

Section 150.0(o) – Ventilation and IAQ

- **Section 150.0(o)1G:** Local Mechanical Exhaust was added to incorporate the ASHRAE 62.2 section 5 requirements directly into 150.0(o)1 to also incorporate CA amendments.
- **Table 150.0-H:** prescriptive ventilation system duct sizing table is from ASHRAE 62.2-2019 and CA amendment provides footnotes to clarify compliance when Capture Efficiency is used.
- **Table 150.0-F** is from ASHRAE 62.2-2019.

Section 150.0(o) – Ventilation and IAQ

CA amendments to ASHRAE 62.2-2019 local exhaust requirements in 150.0(o)1G:

- **Table 150.0-E**: ASHRAE 62.2 table 5-1 is included as Table 150.0-E with amendments to incorporate CA proposed increased airflow rates and capture efficiency for range hoods.
- **Section 150.0(o)1G**: ASHRAE 62.2 Exception to section 5.1 (use of alternate designs) is not included in 150.0(o)1G.
- **Table 150.0-G** (new) range hood ventilation rate and ASTM E3087capture efficiency.

Section 150.0(o) – Ventilation and IAQ

Table 150.0-G Kitchen Range Hood Airflow Rates (cfm) and ASTM E3087 Capture Efficiency (CE) Ratings According to Dwelling Unit Floor Area and Kitchen Range Fuel Type

Dwelling Unit Floor Area (ft^2)	Hood Over Electric Range	Hood Over Natural Gas Range
>1500	50% CE or 110 cfm	70% CE or 180 cfm
>1000 - 1500	50% CE or 110 cfm	80% CE or 250 cfm
750 - 1000	55% CE or 130 cfm	85% CE or 280 cfm
<750	65% CE or 160 cfm	85% CE or 280 cfm

Section 150.0(o) – Ventilation and IAQ

CA amendments to ASHRAE 62.2 local exhaust requirements in 150.0(o)1G (cont):

- **Section 150.0(o)1Giv:** ASHRAE 62.2 section 5.3 reference to ASHRAE Guideline 24 is not included.
- **Section 150.0(o)1Gv:** airflow rate measurement for local exhaust by the installer was clarified:
  - Only the measurement methods specified in RA3.7 are specified.
  - Airflow rate when capture efficiency is used for compliance.
  - Table 150.0-H prescriptive duct sizing table may be used when capture efficiency is used for compliance.

Section 150.0(o) – Ventilation and IAQ

- **Sections 150.0(o)1Gvi and 150.0(o)1H:** sound ratings clarified to reference airflow rates in 150.0(o)1C and 150.0(o)1G instead of ASHRAE 62.2 sections 4 and 5.
- **150.0(o)1H:** airflow measurement of whole-dwelling unit ventilation specifies only methods in RA3.7.
- **Section 150.0(o)1J:** labeling requirement for whole-dwelling unit ventilation system on-off control in was revised to improve clarity.
- **Section 150.0(o)1K** is new.
  - References relevant combustion air and outdoor makeup air requirements in CA Mechanical Code and ASHRAE 62.2 Section 6.4.
  - Limits use of atmospherically vented or solid fuel burning appliances installed inside the pressure boundary to dwelling units greater than 1,000 sqft of floor area.

Section 150.0(o) – Ventilation and IAQ

HERS Field Verification Section 150.0(o)2

- **Section 150.0(o)2A:** whole-dwelling unit ventilation airflow measurement has included ASHRAE 62.2 specification for balanced airflow rate determination and measurement of systems with multiple operating modes.
- **Section 150.0(o)2B:** kitchen local exhaust was clarified to be applicable to vented range hoods; and specification for use of capture efficiency ratings for compliance has been added.
- **Section 150.0(o)2C:** is new – requires verification of the HRV or ERV fan efficacy ≤1.0 W/cfm to be consistent with the mandatory requirement specified for multifamily systems.

Questions?

Subchapter 8
Single Family Residential Buildings – Performance and Prescriptive Compliance Approaches

Staff 45-Day Lead Commissioner Hearing

Presenter: Michael Shewmaker, Energy Commission Specialist II

Date: May 27th, 2021

General Comments

Items from Section 150.1 covered at Monday's Workshop:

- Space Heating and Space Cooling(§150.1(c)7)
- Domestic Water-Heating Systems (§150.1(c)8)
- Photovoltaic (PV) Requirements (§150.1(c)14)

A copy of the presentation from Monday is available in the docket:
https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-BSTD-01

Section 150.1(b)1 – Newly Constructed Buildings

- Provide clarification of Energy Design Ratings (15-Day):
  - EDR 1 is based on source energy (Source Energy Design Rating)
  - EDR 2 is based on TDV energy and has two components:
    1. Energy Efficiency Design Rating, and the
    2. Solar Electric Generation and Demand Flexibility Design Rating
  - Total EDR accounts for both the Energy Efficiency Design Rating as well as the Solar Electric Generation and Demand Flexibility Design Rating
  - The proposed building shall separately comply with the Source Energy Design Rating, Energy Efficiency Design Rating, and the Total Energy Design Rating.

Section 150.1(b)3B – Field Verification

- **Section 150.1(b)3B** – field verification protocol references were updated to consolidate EER/SEER/CEER/HSPF references into subsection i. and add reference to the VCHP protocol in subsection ii.

Section 150.1(c)10C – Central Fan Integrated Ventilation Systems

- **Section 150.1(c)10C** – fan efficacy requirements for central fan integrated systems with small duct high velocity air-handling units
  - Note: For 15-day Express Terms we are planning to move all of 150.1(c)10 to 150.0(m)13 (a non-substantive change)

Section 150.1(c)11 – Roofing Products

- **Exceptions 1 & 2 to Section 150.1(c)11 –** clarify that “solar reflectance” is actually “aged solar reflectance”

Section 150.1(c)12 – Ventilation Cooling

- **Section 150.1(c)12 -** ventilation cooling requirements for whole house fans (WHF) were revised to reference use of the Home Ventilating Institute (HVI) Certified Products Directory instead of the CEC Title 20 Appliance Efficiency Database, MAEDBS
  - Exception added to exempt detached accessory dwelling units from the WHF requirements

Questions?

SUBCHAPTER 9
Single-Family Residential Buildings – Additions and Alterations to Existing Residential Buildings

Presenter: Cheng Moua, PE

DATE: May 27, 2021

Lead Commissioner Hearing for 45-Day Language

Section: 150.2 – Single Residential Buildings – Additions and Alterations

Section 150.2(a) EXCEPTION 5 and 150.2(b)1D

HVAC – Duct Sealing and Insulation Trigger

- Under additions, duct sealing and duct insulation requirements are triggered regardless of length of extended ducts
- Under alterations, duct sealing and duct insulation requirements are triggered when more than 25 ft of new or replacement ducts are installed

Section: 150.2 – Single Residential Buildings – Additions and Alterations

Section 150.2(b)1D and 150.2(b)1E

HVAC – Duct Sealing Leakage Target

- Demonstrate measure duct leakage equal to or less than 10 percent of system air handler airflow
- Reduce duct leakage to outside option to less than or equal to 7 percent of system air handler airflow

Section: 150.2 – Single Residential Buildings – Additions and Alterations

Table 150.2-A

HVAC – Duct Insulation

- Aligns duct insulation with new construction prescriptive requirements

Climate Zones	2019	2022
3, 5-7	R-6	R-6
1-2, 4, 8-10, 12-13	R-6	R-8
11, 14-16	R-8	R-8

Section: 150.2 – Single Residential Buildings – Additions and Alterations

Section 150.2(b)1G

HVAC – Prohibit Electric Resistance Heating

- Prohibits electric resistance when heating system is part of a new or replacement ducted cooling system
- Does not apply to non-ducted systems
- Does not apply if only the electric resistance heating equipment is being replaced
- Does not apply to single family in Climate Zone (CZ) 7 or 15

Section: 150.2 – Single Residential Buildings – Additions and Alterations

Section 150.2(a)1Cia and 150.2(a)2Cia

IAQ – Whole-Dwelling Unit Mechanical Ventilation

- Exempts whole building ventilation requirements for additions less than or equal to 1,000 square feet
- Exempts whole building ventilation requirements for junior accessory dwelling units that are additions to an existing building

Section: 150.2 – Single Residential Buildings – Additions and Alterations

Section 150.2(a)1Cii and 150.2(a)2Cii

IAQ – Local Mechanical Exhaust

- Clarifies that additions must comply with local mechanical exhaust requirements

Section: 150.2 – Single Residential Buildings – Additions and Alterations

Section 150.2(b)1L

IAQ – Entirely New or Complete Replacement Ventilation Systems

- Defines an entirely new or complete replacement ventilation system
- Must comply with mandatory ventilation requirements

Section: 150.2 – Single Residential Buildings – Additions and Alterations

Section 150.2(b)1M

IAQ – Altered Ventilation Systems

- Specifies when whole-dwelling ventilation fans need to comply with airflow requirements and be HERS verified
- Specifies when kitchen exhaust systems need to comply with local ventilation requirements and what requirement applies if not
- Bathroom fans must comply with local ventilation requirements
- Fans must be rated for airflow and sound
- Fans must be rated at no less than the required airflow rate required for compliance

Section: 150.2 – Single Residential Buildings – Additions and Alterations

Section 150.2(b)2A

IAQ – Performance Approach for Alterations

- Entirely new or complete replacement ventilation systems must comply with Section 150.2(b)1L
- Altered ventilation systems must comply with Section 150.2(b)1M

Section: 150.2 – Single Residential Buildings – Additions and Alterations

Section 150.2(b)1I

Envelope – Roof Replacements and Recover

- Expands current cool roof requirements for steep-sloped and low-sloped roofs to additional climate zones and revises exceptions
- Adds requirement for above deck roof insulation for low-sloped roofs

		Climate Zones															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Low-Sloped	Aged Solar Reflectance	NR	NR	NR	0.63	NR	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	NR
	Thermal Emittance	NR	NR	NR	0.75	NR	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	NR
Steep-Sloped	Aged Solar Reflectance	NR	NR	NR	0.20	NR	NR	NR	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	NR
	Thermal Emittance	NR	NR	NR	0.75	NR	NR	NR	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	NR

Section: 150.2 – Single Residential Buildings – Additions and Alterations

Section 150.2(a)1B

Envelope – Attic Insulation for Additions

- Revises attic insulation for additions less than or equal to 700 square feet to align with prescriptive new construction

	Climate Zone															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Ceiling Insulation	R-38	R-38	R-30	R-38	R-30	R-30	R-30	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38

Section: 150.2 – Single Residential Buildings – Additions and Alterations

Section 150.2(b)1D, and 150.2(b)1J

Envelope – Attic Insulation for Alterations

- Entirely new ducts trigger attic insulation requirements
- Increases attic insulation for alterations
- Adds requirement to air seal all accessible areas of the ceiling plane
- Recessed luminaires must be insulated

Climate Zones	2019	2022 Building with < R-19 existing attic insulation	2022 Building with ≥ R-19 existing attic insulation
5, 7	R-19	R-19	R-19
6	R-19	R-49	R-19
1, 3	R-19	R-49 & recessed cans	R-19
2, 4, 8-10	R-19	R-49 & recessed cans & air sealing	R-49
11-16	R-19	R-49 & recessed cans & air sealing	R-49 & recessed cans

Questions?

SUBCHAPTER 10
Multifamily Buildings – Mandatory Requirements

Presenter: Javier Perez

DATE: May 27, 2021

Lead Commissioner Hearing for 45-Day Language

Restructuring Summary

Submeasures pertaining to multifamily restructuring

- Relocate language pertaining to multifamily buildings from high-rise residential and low-rise residential subchapters to newly created multifamily subchapters.

Submeasures pertaining to multifamily efficiency requirements

- Where appropriate and cost effective, apply more stringent/efficient requirements across low- and high-rise multifamily buildings, increasing uniformity and simplicity.

2022 Code Update Sections Affected

Restructuring of Multifamily Mandatory Requirements

Relocate mandatory language pertaining to multifamily buildings (including low- and high-rise)

2019 Subchapters

- High-Rise Residential Subchapters (§120.0-§130.5)
  - Subchapter 3 – Mandatory Requirements
  - Subchapters 4 – Mandatory Requirements for Lighting Systems and Equipment, and Electrical Power Distribution Systems
- Low-rise Residential Subchapters (§150.0)
  - Subchapter 7 – Mandatory Features and Devices

2022 Newly Created Subchapter

- Newly Created Subchapter (§160.0-§160.9)
  - Subchapter 10 – Multifamily Buildings – Mandatory Measures

Section 160.1 – Mandatory Requirements for Building Envelopes

§160.1(a) – Ceiling and Roof Insulation - Merged

- Separate insulation requirements for buildings with attics and buildings without attics
  - With attics – Mandatory R-22 between wood framing members, or max U-factor of 0.043.
    - Follows low-rise residential mandatory requirements (found in §150.0).
  - Without attics – Requirements vary by assembly type
    - Follows high-rise residential mandatory requirements (previously found in §120.7)

Section 160.1 – Mandatory Requirements for Building Envelopes

§160.1(b) – Wall Insulation – Merged Requirements

- Wood framed assemblies
  - 2x4, R-13, or max U-factor of 0.102
  - 2x6, R-19, or max U-factor of 0.071
  - Follows low-rise residential requirements (found in §150.0)
- All other assembly types – Varies by type (e.g. metal building, metal framed, light mass, etc.)
  - Follows high-rise residential mandatory requirements (previously found in §120.7)

Section 160.1 – Mandatory Requirements for Building Envelopes

§160.1(c) – Raised Floor and Soffit Insulation – Merged Requirements

- Wood framed assemblies – 2x6 inch, R-19, or max U-factor of 0.037
  - Follows low-rise residential requirements (found in §150.0)
- All other assembly types – Varies by type (e.g. raised mass, Heated slab, etc.)
  - Follows high-rise residential mandatory requirements (previously found in §120.7)

Section 160.1 – Mandatory Requirements for Building Envelopes

§160.1(d) – (f): Vapor Retarder, Fenestration Products, and Fireplaces, Decorative Gas Appliances, and Gas Logs		
2019 Previous Low-Rise Residential Requirements	**Requirements**	**2022 Multifamily Building Applicability**
Vapor Retarder Requirements	Class 1 or II Vapor Retarder 1. Apply to unvented and controlled-ventilation crawl spaces 2. Apply to all insulated assemblies with air-permeable insulation in CZs 14 & 16	§160.1(d) - Applies to all multifamily buildings
Fenestration Products	Max Area weighted average U-factor of 0.58	§160.1(e) – Applies to all multifamily buildings
Fireplaces, Decorative Gas Appliances, and Gas Logs	Closeable doors, air intake, and flue damper	§160.1(f) – Applies to all multifamily buildings

Section 160.2 – Mandatory Requirements for Ventilation and Indoor Air

§160.2(b) – Dwelling Unit Filtration and IAQ Requirements

- §160.2(b) – Dwelling unit filtration and indoor air quality (IAQ) requirements follow single-family IAQ requirements in 150.0(m)12 and 150.0(o), except:
  - §160.2(b)2Aiv has specific ventilation airflow rates required for all multifamily dwelling units
    - This matches 2019 multifamily airflow rate requirements.
  - §160.2(b)2Aivb – Clarifies terminology for balanced and supply or exhaust with compartmentalization
    - Introduces new maximum 1.0 W/cfm fan efficacy requirements for systems with heat recovery ventilation (HRV) or energy recovery ventilation (ERV) serving single dwelling units.
  - §160.2(b)2Aivb2 – 15-day language will be modified to identify RA testing protocols for multifamily buildings with less 3 or fewer habitable stories, and NA testing protocols for multifamily buildings with 4 or more habitable stories.

Section 160.2 – Mandatory Requirements for Ventilation and Indoor Air

§160.2(b) – Dwelling Unit Filtration and IAQ Requirements

- **§160.2(b)2Av – Multifamily Building Central Ventilation System Airflow Rate Tolerance**
  - Language reworded to clarify requirements for design airflow rates
- **§160.2(b)2Biii – HRV and ERV System Fan Efficacy**
  - Prescriptively, §170.2(c)3Biv requires an ERV or HRV for balance systems serving individual dwelling units in CZs 1, 2, and 11-16.
    - Also establishes minimum sensible recovery efficiency and fan efficacy requirements
  - §160.2(b)2Biii incorporates HERS verification requirements for fan efficacy and sensible heat recovery efficiency requirements
- **§160.2(b) – Central Ventilation System Duct Sealing**
  - New leakage testing requirements for central ventilation systems serving multiple dwellings.

Section 160.2 – Mandatory Requirements for Ventilation and Indoor Air

§160.2(c) – Common Areas: Air Filtration and Ventilation Requirements

- Follows the nonresidential ventilation requirements of §120.1(c)
- 15-day language will be modified to clearly identify that common areas in multifamily buildings must follow nonresidential ventilation requirements

§160.2(d) – Parking Garages

- Ventilation systems serving parking garages must meet covered process requirements of Section 120.6(c)

Section 160.3 – Mandatory Requirements for Space Conditioning Systems in Multifamily Buildings

§160.3(a) – HVAC Controls

- **§160.3(a)1 – Dwelling Unit and Common Living Area Thermostats**
  - Follows the single-family setback thermostat control requirements.
    - No change from 2019
- **§160.3(a)2 – Common Service Area Controls**
  - Follows nonresidential control requirements.

Section 160.3 – Mandatory Requirements for Space Conditioning Systems in Multifamily Buildings

§160.3(b) – Dwelling Unit Space Conditioning and Air Distribution Systems

- Follows the single-family requirements.
- **§160.3(b)5Aiib – Dwelling Unit Duct Insulation for Ducts in Conditioned Space***
  - 45-Day language requires R-4.2.
    - 15-day language will be modified to match low-rise residential insulation requirement reduction
      - R-1 for ducts with a surface emissivity greater than or equal to 0.8.
      - R-3 for ducts with a surface emissivity less than 0.8.

Section 160.3 – Mandatory Requirements for Space Conditioning Systems in Multifamily Buildings

§160.3(b) – Dwelling Unit Space Conditioning and Air Distribution Systems

- **§160.3(b)5K – Duct System Sealing and Leakage Testing**
  - Language updated to match single-family requirements where applicable.
  - Leakage targets unchanged from 2019 Code.
  - Extended mandatory leakage testing from low-rise residential buildings to all systems serving individual dwelling units, whether in low- or high-rise multifamily buildings.
    - HERS verification is only applicable for systems in buildings with 3 or fewer habitable stories.
    - Leakage testing not required for newly constructed multifamily buildings with 4 or more habitable stories in CZs 1, 3, 5, and 7.

Section 160.3 – Mandatory Requirements for Space Conditioning Systems in Multifamily Buildings

§160.3(b) – Dwelling Unit Space Conditioning and Air Distribution Systems

- **§160.3(b)5L – Airflow Rate and Fan Efficacy Requirements for Systems Serving Individual Dwelling Units**
  - Extended mandatory airflow rate and fan efficacy requirements from low-rise residential buildings to all systems serving individual dwelling units, whether in low- or high-rise multifamily buildings
    - Same efficiency targets from 2019 Energy Code
    - HERS verification is only applicable for systems serving multifamily dwellings in buildings with 3 or fewer habitable stories

Section 160.4 – Mandatory Requirements for Water Heating Systems in Multifamily Buildings

§160.4 – Water Heating Mandatory Requirements

- Low-rise residential heat-pump-water-heater ready requirements
  - Expanded to apply to all multifamily buildings
    - Applicable when gas or propane water heaters are installed to serve individual dwelling units
- All other mandatory water heating requirements merged

Section 160.4 – Mandatory Requirements for Water Heating Systems in Multifamily Buildings

§160.4(f)2 – Water Heating Mandatory Requirements, Insulation for Pipes and Tanks, Multifamily Domestic Hot Water Systems

- For pipes with nominal pipe diameter of 1.5 inches or greater, the minimum insulation thickness was increased to 2 inches

TABLE 160.4-A PIPE INSULATION THICKNESS – Multifamily Domestic Hot Water

Fluid Operating Temperature Range (°F)	Insulation Conductivity			Nominal Pipe Diameter (in inches)				
	Conductivity (in Btu·in/h·ft², °F)	Mean Rating Temperature (°F)		< 1	1 to <1.5	1.5 to < 4	4 to < 8	8 and larger
Multifamily Domestic Hot Water Systems				Minimum Pipe Insulation Required (Thickness in inches or R-value)				
105-140[2]	0.22-0.28	100	Inches	1.0	1.5	2.0	2.0	2.0
			R-value	R 7.7	R 12.5	R 16	R 12.5	R 11

Footnote to TABLE 160.4-A:

1. Multifamily and hotel/motel domestic hot water systems with water temperature above 140°F shall use the row in table 120.3-A for the applicable water temperature.

Section 160.5 – Mandatory Lighting Requirements for Indoor and Outdoor Spaces

§160.5(a) – Dwelling Unit and Common Living Area Lighting

- Follows single-family lighting requirements
- This follows same convention of 2019 Energy Code

§160.5(b) – Common Service Area Lighting

- Follows nonresidential lighting requirements
- Removed 80%/20% common-area-to-dwelling-area delineation which previously applied to only low-rise multifamily buildings

§160.5(c) – Outdoor Lighting and Controls Equipment

- When not controlled from within dwelling unit, follows nonresidential lighting requirements
- This generally follows 2019 Energy Code

Section 160.5 – Mandatory Lighting Requirements for Indoor and Outdoor Spaces

§160.5(d) – Sign Lighting Controls

- Follows nonresidential lighting requirements
- This follows 2019 Energy Code

§160.5(e) – Lighting Control Acceptance Requirements

- Applicable to controls for lighting installed in common service areas
- Follows nonresidential lighting requirements
- This follows same convention of 2019 Energy Code

Section 160.6 – Mandatory Requirements for Electric Power Distribution System

§160.6(a) – Service Electrical Metering

- Follows nonresidential metering requirements (Section 130.5).
- Applies only to electrical service or feeder providing power to common use areas (whether interior or exterior).

§160.6(b) – Separation of Electrical Circuits for Electrical Energy Monitoring

- Follows nonresidential separation requirements.
- Exception added to exclude submetered electrical power distribution systems that provide power to dwelling units or common living areas.

Section 160.6 – Mandatory Requirements for Electric Power Distribution System

§160.6(c) – Voltage Drop

- Follows nonresidential voltage drop requirements.

§160.6(d) – Circuit Controls for 120-Volt Receptacles and Controlled Receptacles

- Apply to common service areas
  - Spaces include office areas, lobbies, conference rooms, kitchen areas in office spaces, and copy rooms
- Follows nonresidential circuit and 120-volt receptacle control requirements

Section 160.7 – Mandatory Requirements for Covered Processes

§160.7(a) and (b) – Elevators and Pool and Spa Systems

- Elevators in multifamily buildings must meet covered process requirements of Section 120.6(f).
- Pool and spa systems in multifamily buildings must meet applicable requirements of 110.4, and
  - Pool and spa systems installed for exclusive use by single tenant must meet requirements of Section 150.0(p).

Section 160.8 – Mandatory Requirements for Solar Ready Buildings

§160.8(a) – Solar Ready Buildings

- Newly constructed multifamily buildings must meet solar ready requirements of Section 110.10.
  - Minor changes to organization of Section 110.10
  - No significant changes

Section 160.9 – Mandatory Requirements for Electric Ready Buildings

§160.9 – Electric-Ready Requirements Where Gas or Propane Appliances Are Installed*

- Where gas or propane space heaters serving individual dwelling units, cooktops, or clothes dryers are installed:
  - Infrastructure must be installed to facilitate the switch to electric appliances*
    - Branch Circuits must be installed within 3 feet of appliance location*
    - Reserved space at main electrical service panel for future electric appliances*
    - Clothes dryer systems in common areas have tailored requirements*

*Material discussed during Monday's hearing

Questions?

SUBCHAPTER 11
Multifamily Buildings – Performance and Prescriptive Compliance Approaches

Presenter: Javier Perez

DATE: May 27, 2021

Lead Commissioner Hearing for 45-Day Language

2022 Code Update Sections Affected

Restructuring of Multifamily Prescriptive and Performance Requirements

Relocate performance and prescriptive language pertaining to multifamily buildings (including low- and high-rise)

2019 Subchapters	2022 Newly Created Subchapter

• High-Rise Residential Subchapters (§140.0-§140.8)
  ○ Subchapter 5 – Performance and Prescriptive Compliance Approaches
• Low-rise Residential Subchapters (§150.1)
  ○ Subchapter 8 – Low-Rise Residential Buildings – Performance and Prescriptive Compliance Approaches
	• Newly Created Subchapter (§170.0-§170.2)
	  ○ Subchapter 11 – Multifamily Buildings – Performance and Prescriptive Compliance Approaches

Section 170.1 – Performance Approach

§170.1(a) and (b) – Energy Budgets for Standard and Proposed Design Buildings

- Language will be updated to reflect source energy and TDV as performance baseline

(a) **Energy Budget for the Standard Design Building.** The energy budget for the Standard Design Building is expressed in terms of source energy and time-dependent valuation (TDV) energy, and they are determined by applying the mandatory and prescriptive requirements to the Proposed Design Building. The source energy budget and the TDV energy budget is the sum of the TDV energy for space-conditioning, indoor lighting, mechanical ventilation, photovoltaic (PV) and battery storage system, service water heating, and covered process loads.

(b) **Energy Budget for the Proposed Design Building**. The energy budget for a Proposed Design Building is expressed in terms of source energy and time-dependent valuation (TDV) energy, and they are determined by calculating the source energy and TDV energy for the Proposed Design Building. The source energy budget are the TDV energy budget is the sum of the ~~TDV~~ energy for space-conditioning, indoor lighting, mechanical ventilation, photovoltaic (PV) and battery storage system, and service water heating and covered process loads. The Proposed Building shall separately comply with the source energy budget and the TDV energy budget.

Section 170.1 – Performance Approach

§170.1(d) – Compliance Demonstration Requirements for Performance Standards

- EDR references will be updated to reflect source energy budget and TDV energy budget for 15-day language
- Low-rise residential HERS verified performance options still exist, and will still only apply to low-rise multifamily buildings, not high-rise multifamily buildings
- §170.1(d)2 – Field verification protocol references will be updated for 15-day language to consolidate EER/SEER/CEER/HSPF to match single-family language, and reference VCHP HERS protocol where applicable (§150.1(b)3B)

Section 170.2 – Prescriptive Approach

§170.2(a) – Envelope Component Requirements

- **§170.2(a)1A – Exterior Roofs and Ceilings – Roofing Products**
  - Unified roofing product requirements across low- and high-rise multifamily buildings

Roofing Product Requirements					
Attic Insulation Type	**Roof Slope**	**Climate Zone Applicability**	**Aged Solar Reflectance (ASR)**	**Thermal Emittance (TE)**	**SRI**
Ceiling Insulation + Insulation Between Roof Rafters + Ducts in Attic + Vented Attic	Low Slope	13, 15	0.63	0.75	75
	Steep Slope	10-15	0.20	0.75	16
Ceiling Insulation + Ducts in Conditioned Space	Low Slope	13, 15	0.63	0.75	75
	Steep Slope	10-15	0.20	0.75	16
No Attic	Low Slope	9-11, 13-15	0.63	0.75	75
	Steep Slope	2-15	0.20	0.75	16

Section 170.2 – Prescriptive Approach

§170.2(a) – Envelope Component Requirements

- **§170.2(a)1B – Exterior Roofs and Ceilings – Roof (and/or Ceiling) Insulation**
  - Unified roof insulation requirements across low- and high-rise
  - Applied high-performance attic requirements
  - Created prescriptive option for buildings without attics
    - From Table 170.2-A
      - Metal Building max U-factor:
        - 0.041
      - Wood-framed and other max U-factor:
        - CZs 1, 2, 4, 8-16: 0.028
        - CZs 3, 5, 6: 0.034
        - CZ 7: 0.039

Section 170.2 – Prescriptive Approach

§170.2(a) – Envelope Component Requirements

- **§170.2(a)1C – Exterior Roofs and Ceilings – Radiant Barriers**
  - Unified radiant barrier requirements across low-and high-rise multifamily buildings that have attics.
  - For buildings with vented attics and ducts and air handlers located in the attic:
    - Radiant barrier required in climate zones 2-7
  - For buildings with vented attics and ducts and air handlers located inside of conditioned spaces:
    - Radiant barrier required in climate zones 2-15

Section 170.2 – Prescriptive Approach

§170.2(a) – Envelope Component Requirements

- **§170.2(a)2 – Wall Insulation**
  - Unified requirements across low- and high-rise multifamily buildings
  - Differentiated assembly types by fire rating for select wall assemblies
    - Allows high-fire rating wall types to adhere to less stringent U-factor requirements
      - Variances in insulation by assembly include:
        - Metal Buildings
        - Heavy Mass (>15 btu/ft^2-F)
        - Light mass (7-15 btu/ft^2-F)
        - Framed (wood/metal), high fire rating (2 or 3 hour)
        - Framed (wood/metal), low fire rating (0 or 1 hour), and other wall types

Section 170.2 – Prescriptive Approach

§170.2(a)2 – Envelope Component Requirements – Wall Insulation

170.2(a)2 – Prescriptive Wall Insulation Requirements (1 of 2)		
Wall Type	**Climate Zones**	**Prescriptive U-factor**
Metal Buildings	1-10	0.061
	11-16	0.057
Framed (wood or metal), high fire rating (2- or 3-hour)	2-5, 8-10, 12, 13	0.059
	6, 7	0.065
	11, 14-16	0.051
Framed (wood or metal) low fire rating (0- or 1-hour), and other wall types	1-5, 14-16	0.051
	6, 7	0.065

Section 170.2 – Prescriptive Approach

§170.2(a)2 – Envelope Component Requirements – Wall Insulation

170.2(a)2 – Prescriptive Wall Insulation Requirements (2 of 2)		
Wall Type	**Climate Zones**	**Prescriptive U-factor**
Heavy Mass (>15 btu/ft^2-F)	1-3, 16	0.160
	4, 11, 14, 15	0.184
	5, 13	0.211
	6-10	0.690
	12	0.253
Light Mass (7-16 btu/ft^2-F)	1-15	0.077
	16	0.059

Section 170.2 – Prescriptive Approach

§170.2(a) – Envelope Component Requirements

- **§170.2(a)3Ai – Fenestration Area Limitation**
  - Unified fenestration area limitations across low- and high-rise multifamily buildings
  - Low-rise residential 20% window-to-conditioned-floor-area (CFA) limit applies across all multifamily buildings
  - High-rise residential 40% window-to wall area limit and 5% skylight-to-roof ratio limit applies across all multifamily buildings
  - Removed 5% window to CFA limit for west-facing glazing

Section 170.2 – Prescriptive Approach

§170.2(a) – Envelope Component Requirements

- **§170.2(a)3Aii – Fenestration Properties**
  - Unified fenestration efficiency requirements across low- and high-rise multifamily buildings, creating 3 categories for fenestration products
    1. Curtain wall and storefront windows
    2. Performance Class Architectural Window (AW) rated as per NASF-2017, AAMA/WDMA/CSA/ 101/I.S.2/A440
    3. All other windows

Section 170.2 – Prescriptive Approach

§170.2(a) – Envelope Component Requirements

- §170.2(a)3Aii through iv – Fenestration Properties

Window Type	Climate Zones	Max U-Factor	Max SHGC	Min VT
Curtainwall / Storefront	1	0.38	0.35	0.46
	2-15	0.41	0.26	0.46
	16	0.38	0.25	0.46
Class AW	1	0.38	0.35	0.37
	2-15	0.40	0.24	0.37
	16	0.38	0.24	0.37
All Other	1	0.30	0.35*	No Requirement
	2-5, 8-16	0.30	0.23*	No Requirement
	6, 7	0.34	0.23	No Requirement

*Low-rise multifamily buildings (3 habitable stories or less) in climate zones 1, 3, 5, and 16, will continue to have no max SHGC requirements.

Section 170.2 – Prescriptive Approach

§170.2(a) – Envelope Component Requirements

- **§170.2(a)3Aiii – Shading**
  - Unified shading recognition across low- and high-rise multifamily buildings
    - 2019 Energy Code has different methods for determining effects of shading on fenestration products
    - Now using RSHGC (formerly only for high-rise residential) methodology across all multifamily buildings

Section 170.2 – Prescriptive Approach

§170.2(a) – Envelope Component Requirements

- **§170.2(a)4 – Exterior Doors Separating Conditioned Space from Unconditioned Space or Ambient Air (not glazed doors)**
  - Dwelling unit entry doors follow low-rise requirements
    - 0.20 max U-factor
  - Common use area entry doors follow high-rise requirements

Door Type	Climate Zone	Max U-Factor
Entry Non-Swinging	1, 16	0.50
	2-15	1.45
Entry Swinging	1-16	0.70

- **§170.2(a)6 – Quality Insulation Installation (QII) Requirements**
  - QII requirements continue to only apply to low-rise residential buildings, including low-rise multifamily buildings

Section 170.2 – Prescriptive Approach

§170.2(b) – Minimum Daylighting Requirement for Large Enclosed Spaces

- Minimum daylit area requirement applied to all multifamily buildings.

§170.2(c) – Space Conditioning Systems

- **§170.2(c)1, 2 – Common Area Space Conditioning Systems – Sizing, Equipment Selection, and Calculations**
  - Follows nonresidential requirements
    - Smallest size of available options to satisfy load
    - Loads determined in accordance with 2017 ASHRAE Handbook, Fundamentals Volume

Section 170.2 – Prescriptive Approach

§170.2(c) – Space Conditioning Systems

- **§170.2(c)3A – Dwelling Unit Space Conditioning Systems – Heating System Type**
  - 15-day edits will reflect that space conditioning systems serving dwelling units shall:
    - For multifamily buildings with 3 or fewer habitable stories:
      - CZs 1-15: Must be heat pump space conditioning systems*
      - CZ 16: AC/Furnace is acceptable*
      - CZs 4-10: Balanced ventilation systems without HRV or ERV must have fan efficacy of 0.4 W/cfm or less*
    - For multifamily buildings with 4 or more habitable stories:
      - CZs 2-15: Must be heat pump*
      - CZs 1, 16: Must be dual-fuel heat pump*

*Material discussed during Monday's hearing

Section 170.2 – Prescriptive Approach

§170.2(c) – Space Conditioning Systems

- **§170.2(c)3Bi – Dwelling Unit Space Conditioning Systems – Refrigerant Charge**
  - Continue to apply to CZs 2 and 8-15
  - Expanded to apply to systems serving individual dwelling units across all multifamily buildings, regardless of stories
  - HERS verification component of measure is only applicable for systems in buildings with 3 or fewer habitable stories
- **§170.2(c)3Biii – Dwelling Unit Space Conditioning Systems – Central Fan Integrated Ventilation Systems**
  - Proposed to be moved to 160.3(b)5L for 15-day language

Section 170.2 – Prescriptive Approach

§170.2(c) – Space Conditioning Systems

- **§170.2(c)3Biv – Dwelling Unit Space Conditioning Systems – HRV/ERV**
  - In CZs 1, 2, and 11-16, when balanced ventilation systems are used to meet whole building ventilation requirements of 160.2(b)2, HRV or ERV must be installed, and:
    - ERV/HRV systems serving individual dwelling units:
      - Must have sensible recovery efficiency of 67% rated at 32°F, and 0.6 W/CFM fan efficacy
        - Must be HERS verified for buildings with 3 habitable stories or less
        - Acceptance testing for buildings with 4 or more habitable stories
    - ERV/HRV systems serving multiple dwelling units in buildings with 4 or more habitable stories shall:
      - Have minimum sensible recovery efficiency or effectiveness of 67% rated at 32°F
      - Meet additional fan power and bypass/free cooling control requirements
  - This language may be moved to new subsection specific to IAQ ventilation systems for 15-day language

Section 170.2 – Prescriptive Approach

§170.2(c) – Space Conditioning Systems

- **§170.2(c)4 – Common Use Area Space Conditioning Systems**
  - Nonresidential space conditioning requirements reproduced in this section
  - New measures discussed during Monday's hearing

Section 170.2 – Prescriptive Approach

§170.2(d) – Water Heating Systems

- If recirculating systems serving individual dwelling units are specified, they must be manual demand-controlled systems
  - No change
- **§170.2(d)1 – Systems Serving Individual Dwelling Units, 3 Options:**
  1. Single 240V Heat Pump Water Heater (HPWH), and the following:
     - CZs 1, 16: Compact hot water distribution system
     - CZ 16: Drain water heat recovery system
  2. NEEA Tier 3 (minimum) HPWH, and:
     - CZ 16: Drain water heat recovery system
  3. A gas or propane instantaneous water heater with max input of 200,000 btu/hr, and no storage tank

Section 170.2 – Prescriptive Approach

§170.2(d) – Water Heating Systems

- **§170.2(d)2 – Systems Serving Multiple Dwelling Units, Central HPWH Option**
  - Recirculation loop tank required
  - Loop tank heater must be electric and capable of multipass operation
  - Minimum primary storage tank temp of 135°F
  - Additional measures
  - Design documentation must be provided in accordance with JA14.4.

Section 170.2 – Prescriptive Approach

§170.2(d) – Water Heating Systems

- **§170.2(d)3 – Systems Serving Multiple Dwelling Units, Gas or Propane Water Heating Option**
  - Central water heating system that includes:
    - In CZs 1-9, systems with total installed gas water heating input capacity of 1MMBtu/h or greater shall have minimum thermal efficiency of 90%
      - Weighted average allowed when system is comprised of multiple units
      - Exception: Individual gas water heaters with input capacity at or below 100,000 btu/h can be excluded from total system efficiency calculation
      - Exception: if at least 25% of annual water heating requirement is provided by site-solar energy or site-recovered energy

Section 170.2 – Prescriptive Approach

§170.2(d) – Water Heating Systems

- **§170.2(d)3 – Systems Serving Multiple Dwelling Units, Gas or Propane Water Heating Option (continued)**
  - Central water heating system that includes:
    - A recirculation system
      - Exception: Buildings with 8 or fewer dwelling units
    - A solar water heating system meeting criteria in Reference Residential Appendix RA4, and either 1 or 2 below:
      1. CZs 1-9: Minimum solar savings fraction of 0.20
         CZs 10-16: Minimum solar savings fraction of 0.35
      2. Drain water heat recovery system, and
         - CZs 1-9: Minimum solar savings fraction of 0.15
         - CZs 10-16: Minimum solar savings fraction of 0.30

Section 170.2 – Prescriptive Approach

§170.2(e) – Lighting

- Dwelling unit and common living area lighting must meet mandatory lighting requirements of Section 160.5(a)
  - Follows single-family lighting requirements
- Common service area lighting follows nonresidential lighting requirements
  - Lighting power limitations
  - Control requirements
- Outdoor lighting not controlled from within a dwelling unit follows nonresidential outdoor lighting requirements
- Sign lighting follows nonresidential sign lighting requirements

Section 170.2 – Prescriptive Approach

§170.2(f), (g), and (h) – Photovoltaic (PV) System and Battery Storage System Requirements*

- Multifamily buildings with 3 or fewer habitable stories follow the single-family PV system requirements*
- Multifamily buildings with 4 or more habitable stories follow nonresidential PV/battery storage system requirements*
- This language will be reproduced in Section 170.2 for 15-day language

*Material discussed during Monday's hearing

Questions?

SUBCHAPTER 12
Multifamily Buildings – Additions, Alterations, and Repairs to Existing Multifamily Buildings

Presenter: Javier Perez

DATE: May 27, 2021

Lead Commissioner Hearing for 45-Day Language

2022 Code Update Sections Affected

Restructuring of Multifamily Addition, Alteration, and Repair Requirements

Relocate language pertaining to multifamily buildings (including low- and high-rise)

2019 Subchapters	2022 Newly Created Subchapter

• High-Rise Residential Subchapters (§141.0)
  ○ Subchapter 6 – High-Rise Residential Additions, Alterations, and Repairs
• Low-rise Residential Subchapters (§150.2)
  ○ Subchapter 9 – Low-Rise Residential Buildings – Additions and Alterations to Existing Low-Rise Residential Buildings
	• Newly Created Subchapter (§180.0-§180.4)
	  ○ Subchapter 12 – Multifamily Buildings – Additions, Alterations, and Repairs to Existing Multifamily Buildings

Section 180.1 – Additions

§180.1 – Exceptions

- Exception for mechanical ventilation airflow for additions under 1,000 ft^2 applies to all multifamily buildings
- Exception for roofing product requirements for additions 300 ft^2 or less applies to all multifamily buildings
- Exception for pipe insulation requirements for existing inaccessible piping applies to all multifamily buildings
- Exception for space conditioning system extensions applies to all multifamily buildings
- Exception for duct extensions of any length, rerouting requirements to alterations section applies to all multifamily buildings
- Exception: PV and battery storage system requirements are not applicable to additions
- 15-day edit will be added to clarify that new systems serving additions can be a heat pump or a gas heating system

Section 180.1 – Additions

§180.1(a)1 – Envelope

- Envelope requirements follow single-family addition requirements
  - Variants for additions greater than 700 ft^2, and less than or equal to 700 ft^2
    - Prescriptive requirements apply, with alternatives for wall extensions, fenestration area limits, and existing assemblies
  - Added exception from solar ready area requirements when increase of roof area is 2,000 ft^2 or less

Section 180.1 – Additions

§180.1(a)2 and (b)3 – Mechanical Ventilation for Indoor Air Quality

- Dwelling unit ventilation requirements match requirements in 150.2 for single-family dwelling units.
  - Consistent with all ventilation requirements in Subchapter 12

§180.1(b) – Performance Approach

- Options for compliance by modeling the addition alone, and existing + addition + alteration

Section 180.2 – Alterations

§180.2 – Alterations – Exceptions

- Exception for mechanical space conditioning or water heating expansions applies to all multifamily buildings
  - Previously existed only in high-rise residential section
- Exception for relocated space conditioning or water heating systems applies to all multifamily buildings
  - Previously existed only in high-rise residential section
- Exception for VAV expansions with electric reheat applies to all multifamily buildings
  - Previously existed only in high-rise residential section
- Economizer fault detection diagnostics exception added, mirroring exception in previous high-rise residential section

Section 180.2 – Alterations

§180.2(a) – Mandatory Requirements – Envelope

- Envelope requirements follow 2019 high-rise residential mandatory insulation requirements
  - Exception added for light and heavy mass walls

Section 180.2 – Alterations

§180.2(b)1A – Prescriptive Approach – Envelope, Roofs

- Roofing product (or cool roof) requirement triggered when more than 50% of roof area or more than 2,000 ft^2 is altered
  - **Low-sloped roofs** in CZs 2, 4, 6-15:
    - Minimum aged solar reflectance of 0.63
    - Minimum thermal emittance of 0.75
    - Or minimum SRI of 64

Table 180.2-A Roof/Ceiling Insulation Tradeoff for Low-Sloped Aged Solar Reflectance

Minimum Aged Solar Reflectance	Roof Deck Continuous Insulation R-value (Climate Zones 6-7)	Roof Deck Continuous Insulation R-value (Climate Zones 2, 4, 8-15)
0.60	2	16
0.55	4	18
0.50	6	20
0.45	8	22
No requirement	10	24

Section 180.2 – Alterations

§180.2(b)1A – Prescriptive Approach – Envelope Requirements, Roofs

- Roofing product (or cool roof) requirement triggered when more than 50% of roof area or more than 2,000 ft^2 is altered (continued)
  - **Steep-sloped roofs** in CZs 4, 8-15:
    - Minimum aged solar reflectance of 0.20
    - Minimum thermal emittance of 0.75
    - Or minimum SRI of 16
    - Exceptions (or alternatives) to steep-sloped roofing product requirements:
      - Buildings with ceiling assemblies with max U-factor of 0.025, or R-38 ceiling insulation in attic
      - Buildings with radiant barriers in attic
        - Cannot be installed directly above spaced sheathing
      - Buildings with no ducts in attic in CZs 2, 4, 9, 10, 12, and 14
      - Buildings with R-2 or greater continuous insulation above or below roof deck

Section 180.2 – Alterations

§180.2(b)1Bi – Prescriptive Approach – Envelope Requirements, Roof/Ceiling Insulation

- When (1) duct systems are entirely new or completely replaced as part of an alteration, and (2) the air handler and ducts are located within a vented attic:
  - CZs 1-4, 8-16: R-49 insulation, or max U-factor of 0.020
    - CZs 1, 3, 4, 9: Exception for dwelling units with R-19 existing
  - CZs 2, 11-16: air seal all accessible areas of ceiling plane between attic and conditioned space
    - Exception for dwelling units with at least R-19 existing
    - Exception for dwelling units with atmospherically vented space or water heating combustion appliances within pressure boundary
- 15-day language will be modified to more clearly articulate these requirements

Section 180.2 – Alterations

§180.2(b)1Bi – Prescriptive Approach – Envelope Requirements, Roof/Ceiling Insulation

- When (1) duct systems are entirely new or completely replaced as part of an alteration, and (2) the air handler and ducts are located within a vented attic (continued):
  - CZs 1-4, 8-16: Recessed downlight luminaires in ceiling shall be covered with insulation to same depth as rest of ceiling
    - Non-IC rated cans must be replaced or fitted with fire-proof cover
    - CZs 1-4, 8-10: exception for dwelling units with at least R-19 existing

- 15-day language will be modified to more clearly articulate these requirements

Section 180.2 – Alterations

§180.2(b)1Bi – Prescriptive Approach – Envelope Requirements, Roof/Ceiling Insulation

- When (1) duct systems are entirely new or completely replaced as part of an alteration, and (2) the air handler and ducts are located within a vented attic (continued):
  - Exceptions to all requirements of §180.2(b)1Bi include:
    - Dwelling units with at least R-38 existing insulation
    - Asbestos
    - Knob and tube wiring
    - Where accessible space in attic is not large enough to accommodate required R-value, space must be filled
      - Must still meet attic ventilation requirements of other parts of Title 24
    - Where attic space above altered dwelling is shared with other dwellings, and requirements not triggered for other dwellings

Section 180.2 – Alterations

§180.2(b)1Bii – Prescriptive Approach – Envelope Requirements, Roof/Ceiling Insulation

- When more than 50% of roof area or more than 2,000 ft^2 of roof is being replaced, recovered, or recoated, non-attic roofs shall:
  - CZs 1, 2, 4, 8-16: Install R-14 continuous insulation or 0.055 max U-factor
    - Exception: Roof recovers with R-10 above roof deck
    - Exception: Mechanical equipment limitations
    - Exception: Insulation tapering at drains and other low points allowed if average equates to at least R-14

- 15-day language will be modified to more clearly articulate these requirements

Section 180.2 – Alterations

§180.2(b)1C – Prescriptive Approach – Envelope Requirements, Fenestration Alterations

- Follow previous high-rise residential language
- Same-size replacements must:
  - Meet max U-factor, RSHGC, and VT requirements of Table 180.2-B (next slide), **or**
  - Meet newly constructed area-weighted U-factor and RSHGC of Table 170.2-A
  - Exception: Replacements of $\leq$ 150 ft^2 are only subject to max U-factor requirements
- Alterations that add fenestration area must meet area limitations for newly constructed buildings (20% CFA, 40% WWR), and U-factor, RSHGC, VT requirements of Table 180.2-B
  - Exception: Alterations that increase fenestration area by $\leq$ 50 ft^2
  - Exception: 16 ft^2 of skylight area, Max U-factor of 0.55, RSHGC of 0.30

Section 180.2 – Alterations

Table 180.2-~~A~~B Altered Fenestration Maximum U-Factor and Maximum SHGC

Climate Zone		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Curtainwall / Storefront / Window Wall and Glazed Doors[1]	U-factor	0.384 ±	0.413	0.41	0.413	0.41	0.417	0.417	0.413	0.41	0.413	0.41	0.41	0.41	0.41	0.41	0.384 ±
	RSHGC	0.35	0.26	0.26	0.26	0.26	0.2631	0.2631	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.256
	VT[2]	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
NAFS 2017 Performance Class AW Window – Fixed[1]	U-factor	0.38	0.38	0.38	0.38	0.38	0.47	0.47	0.41	0.41	0.38	0.38	0.38	0.38	0.38	0.38	0.38
	RSHGC	0.35	0.25	0.25	0.25	0.25	0.31	0.31	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	VT[2]	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
NAFS 2017 Performance Class AW Window – Operable[1]	U-factor	0.43	0.43	0.43	0.43	0.43	0.47	0.47	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
	RSHGC	0.35	0.24	0.24	0.24	0.24	0.31	0.31	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
	VT[2]	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
All Other Windows and Glazed Doors[1]	U-factor	0.30	0.30	0.30	0.30	0.30	0.30	0.34	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	RSHGC	0.35	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Skylights, 3 habitable stories and fewer	U-factor	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	RSHGC	NA	0.23	NA	0.23	NA	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	NA
Skylights, 4 habitable stories and greater	U-factor	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
	RSHGC	0.35	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	VT[2]	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49

Foot note to Table 180.2-~~A~~B:

1. For fenestration installed in buildings with three or fewer habitable stories, there is no SHGC requirement in Climate Zones 1, 3, 5, and 16.
2. Minimum VT requirements to not apply to multifamily buildings 3 habitable stories or less.

Section 180.2 – Alterations

§180.2(b)2A – Prescriptive Approach – Space Conditioning Systems, Systems Serving Dwelling Units

- Follows previous low-rise residential requirements
- §180.2(b)2Ai – Complete Replacements
  - Meet all requirements as for newly constructed buildings, except for heat pump requirement
- §180.2(b)2Aii – Altered Duct Systems – Duct Sealing
  - Activation threshold reduced to 25 ft of new or replacement space conditioning ducts
    - Previously 40 ft.
    - HERS verification only applies to buildings with 3 or fewer habitable stories
  - Altered Duct Systems – Duct Insulation

Climate Zones	2019	2022
3, 5-7	R-6	R-6
1, 2, 4, 8-10, 12-13	R-6	R-8
11, 14-16	R-8	R-8

Section 180.2 – Alterations

§180.2(b)2A – Prescriptive Approach – Space Conditioning Systems, Systems Serving Dwelling Units

- §180.2(b)2Aiii – Altered Space Conditioning System
  - Leakage testing requirement follows previous low-rise residential requirements
  - HERS verification only applicable to buildings with 3 or fewer habitable stories
- §180.2(b)2Aiii – Altered Space Conditioning System - Mechanical Cooling
  - Refrigerant charge and airflow requirements follow previous low-rise residential requirements
    - HERS verification only applicable to buildings with 3 or fewer habitable stories

Section 180.2 – Alterations

§180.2(b)2Av – Prescriptive Approach – Space Conditioning Systems, Systems Serving Dwelling Units, Prohibit Electric Resistance Heating

- Prohibits electric resistance space heating systems
  - Does not apply to replacements of non-ducted electric resistance systems
  - Does not apply to ducted electric resistance systems if only electric resistance heating equipment is being replaced, and ducted cooling not being replaced/installed
  - Does not apply if existing space heating system is electric and building is in CZs 6, 7, 8, or 15

- 15-day language will be modified to more clearly articulate these requirements

Section 180.2 – Alterations

§180.2(b)2B – Prescriptive Approach – Space Conditioning Systems, Systems Serving Common Use Areas

- Follow nonresidential alteration requirements
  - Changes covered in Monday's hearing

§180.2(b)3 – Prescriptive Approach – Hot Water Systems

- Altered or replacement systems/components **serving individual dwelling units** shall meet:
  - Mandatory pipe insulation requirements of 160.4(f)
  - If recirculating system, manual demand recirculation control requirements

Section 180.2 – Alterations

§180.2(b)3 – Prescriptive Approach – Hot Water Systems

- Altered or replacement systems/components **serving individual dwelling units** shall meet (continued):
  - Replacement/new water heating systems shall meet one of following:
    1. Natural gas or propane water heating system
    2. Heat pump water heater with tank located indoors
       - Must be placed on rigid R-10 insulated surface
    3. Heat pump water heater that meets NEEA Tier 3 or higher
    4. If existing water heater is electric resistance, a consumer electric water heater

Section 180.2 – Alterations

§180.2(b)4 – Prescriptive Approach – Lighting

- Dwelling unit lighting follows previous low-rise residential lighting requirements
- Common area lighting, sign lighting, and electrical power distribution systems follow nonresidential requirements

§180.2(b)5 – Prescriptive Approach – Dwelling Unit Mechanical Ventilation and Indoor Air Quality

- Language matches single-family ventilation alteration requirements

Questions?

How to submit Written Comments

- **We strongly encourage submitting written comments via e-file.** Comments on the proposed 2021 Energy Code can be submitted to: https://efiling.energy.ca.gov/EComment/EComment.aspx?docketnumber= 21-BSTD-01

- Comments can also be submitted physically or by e-mail, here:

California Energy Commission
Dockets Office, MS-4
Re: Docket No. 21-BSTD-01
1516 Ninth Street
Sacramento, CA 95814-5512
Docket@energy.ca.gov

Final deadline for written comments is June 21, 2021 by 5:00 PM

Thank You!