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CA Utility CASE and CI Team Comments on 45-Day Express Terms

Additional submitted attachment is included below.

CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

Comments on the 2025 Title 24 45-Day Express Terms

Docket Number 24-BSTD-01

May 3, 2024

Introduction

The California Statewide Utility Codes and Standards Enhancement (CASE) Team and utility Compliance Improvement (CI) Team appreciate the opportunity to review the 2025 Building Energy Efficiency Standards, Title 24 Parts 1 and 6, Express Terms, 45-day Language (45-Day Express Terms). We commend the California Energy Commission (CEC) for encouraging public participation in the proceeding and value the opportunity to offer suggestions to refine the draft code language.

The CASE initiative presents recommendations in support of the CEC's efforts to update the Energy Code with new or updated requirements for various technologies. The three California Investor-Owned Utilities (IOUs) — Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison — and two Publicly Owned Utilities — Los Angeles Department of Water and Power and Sacramento Municipal Utility District— sponsored this effort. The program goal is to submit proposals that result in cost-effective enhancements to improve energy efficiency, energy performance, and GHG emissions reductions in California buildings.

CI Team subject matter experts work closely with the CASE proposal authors to address compliance and enforcement goals in Title 24, Part 6. The CI Team's goal is to reduce roadblocks for industry professionals in the compliance supply chain. Through the IOUs' sponsorship, the CI Team focuses on bridging the gaps between development and implementation of the energy code.

Comments on the 45-Day Express Terms

We have reviewed the 45-Day Express Terms (Part 1, Part 6, and the Reference Appendices) and appreciate that many of the code change proposals that we have worked with the CEC and other stakeholders to develop since early 2022 are incorporated into the draft language. In our review we identified 128 suggested revisions that will allow the language to be clearer, more precise, less ambiguous.

All recommended revisions are provided in *Table 1: Substantive Recommendations – 45-Day Express Terms* and *Table 2: Non-Substantive Recommendations –45-Day Express Terms* along with a justification for each change.

For the marked-up language, revisions to the 2022 code language that appear in the 45-Day Express Terms are delineated with additions in black underlining and deletions in black ~~strikeouts~~. Our proposed revisions to the 45-Day Express Terms are delineated with additions in red underlining and deletions in red ~~strikeouts~~. In some instances it was not feasible to provide marked-up code language within the body of the tables, so marked-up language is provided in the appendices.

For each suggested edit and identified the member of the CASE Team or CI Team that developed the suggested edit. We welcome collaborative discussions between CEC staff and the individuals who recommended each revision so we can offer further descriptions, help address concerns, and resolve outstanding issues. Small improvements that make language clearer and less complex, including addressing the issues identified in the tables below will allow the 2025 code to achieve high compliance, be enforceable and will lead to sustained energy savings and GHG reductions.

Highest Priority Recommendations

The highest priority recommendations are highlighted in this section. Each recommendation corresponds to a row in *Table 1: Substantive Recommendations – 45-Day Express Terms.* See the remark number to match the high priority items summarized below to the recommendations in Table1.

Highest Priority Recommendations: Single Family and Multifamily

1. **Remove mention of "three habitable stories or fewer" in Exception 4 to Section 170.2(a)3aii (Remark #5).** Table 170.2-A was updated to show unification across multifamily buildings of all heights, removing RSHGC requirements for buildings with four or more habitable stories in Climate Zones 1, 3, 5, and 16. The corresponding code language is not updated for alignment.
2. **Add language to ensure that load calculations are completed, and systems sized appropriately.**
    a. **Require load calculation be submitted to the enforcement agency (Remark #7).** While load calculations are already required by Part 6 and 11, they are not required to be submitted, and thus often not requested by jurisdictions. Adding explicit requirements for submittal of load calculations is essential to achieving full savings for the new design measures.

b. **Include sizing limits for load calculations for alterations (Remark #12).** The new limits on sizing proposed by the CASE Team were intended to apply to both additions and alterations. These limits are included in the 45-Day Express Terms for additions only and this suggested language change extends them for alterations.

3. **Change pipe insulation verification requirements from mandatory to prescriptive (Remark #15).** The Compliance Improvement Team has expressed concern that, as a new verification measure, the verification requirement could be unknown/overlooked and the walls and ceilings closed up without verification. ECC Raters may be pressured to perjure in these situations to avoid having to open up the walls and ceilings for verification. If changed to prescriptive, there is more flexibility to use the performance approach and make late adjustments to overcome the energy penalty from not doing pipe insulation verification.

4. **Add a note to Section 110.3(c)7B3v about dangers of ventilation across pressure boundaries (Remark #18).** While too late in the code cycle to make a substantive change to the code language, adding a note may prevent inadvertent back drafting as a result of this ventilation requirement.

5. **Remove "distribution" in describing application of Appendix M pipe sizing requirements (Remark #31).** Appendix M pipe sizing applies to the water heater and storage tank pipe sizing in addition to distribution pipe sizing. Energy savings and cost-effectiveness justification for this measure in the CASE Report include all hot water piping.

6. **Language revisions related to ducts in conditioned space to not exclude new cathedral ceiling prescriptive option (Remarks #35 & #36).** Language added to the 45-Day Express Terms in Section150.1(c)9B and 150.0(m)1Bii excludes cathedral ceilings because they don't have attics. Suggested language revisions clarify that cathedral ceilings may comply prescriptively.

7. **Revise 160.2-E the same way 150.0-E has been marked up (Remark #45).** The option for demand-controlled kitchen ventilation was removed for alignment with ASHRAE for single-family homes and should also be revised for multifamily dwellings.

8. **Revise Table 150.1A to present cathedral ceilings as an alternative under Option C (Remark #50).** Proposed 45-Day table revisions present cathedral ceilings as a separate option. Suggested language revisions clarify this as well as when radiant barriers are required for cathedral ceilings.

Highest Priority Recommendations: Nonresidential

1. **Concerns with applying the existing building exception for pools and spa heating to all building types (Remarks #32 and #33).** Allowing all existing buildings to be exempted from the pool heating requirements will result in a significant loss of potential energy savings. We further document this loss in savings and environmental benefits in our remarks. We believe alternative exception language options exist that address stakeholder concerns. We acknowledge that this decision has been made for the 2025 code cycle and request that CEC consider our recommendations for the 2028 code cycle.
2. **Add Mechanical Acceptance Test to Nonresidential Appendices 7.5.6.1, 7.5.4.1, and 7.5.15.1 (Remarks #28, #29, and #30).** Section 140.4 of the code adds a requirement that controller logic must be based on a sequence of operation from ASHRAE Guideline 36. These proposed changes to the requirements in the Nonresidential Appendix will ensure alignment with acceptance testing requirements.
3. **Clarify scope of new mandatory vestibule requirement.**
    a. **Add Exception 8 to Section 141.0(a) (Remark #47).** Stakeholders noted that the new requirement for vestibules was not clear in terms of scope for additions. This change provides clarification that vestibules are not required in additions unless the addition includes a public entrance door.
    b. **Add Exception 5 to Section 141.0(b) (Remark #48).** Stakeholders noted that the new requirement for vestibules was not clear in terms of scope for alterations. This change provides clarification that vestibules are not required for alterations.
4. **Improve clarity to lighting Section 130.1(b).**
    a. **Replace “multilevel lighting controls” with “dimmable lighting” (Remark #22).** Changes to this section over the past several code cycles have inadvertently changed the original intent of the requirement. This modification clarifies the requirement that the light source has to be dimmable and have at least one control that makes use of dimmability.
    b. **Delete Exception 1 (Remark #23).** Stakeholder input has indicated that this exception is confusing, and an updated cost analysis indicates that the dimmer in this condition is cost-effective.
    c. **Delete Exception 5 (Remark #24).** This exception for classrooms no longer has the installed savings benefit and the lifecycle cost benefit no longer applies for LED systems.

5. **Improve clarity to daylighting Section 130.1(d).**

   a. **Correct typographical error to Section 130.1(d)2Biii exception (Remark #25).** This change replaces the word “luminaire” with the word “segment” for clarity of the entire sentence.

   b. **Replace allowable language in Section 130.1(d)2Ci (Remark #26).** This change puts the requirement into code-appropriate mandatory language and clarifies minimum requirements for lighting that is not required to be dimmable.

   c. **Clarify requirement in Section 130.1(d)2F (Remark #27).** This change provides clarity that light levels are permitted to be temporarily increased only if the controller is a dimmer.

Table 1: Substantive Recommendations – 45-Day Express Terms

Remark #	Building Type(s)	CASE Report	CASE Measure	Section(s) of Code	Person Making Recommendation	CEC Staff Lead	Language Markup (deletions marked with red ~~strikethroughs~~; additions marked with red underlining)	Justification	Is the Change needed for both single family and multifamily?	Does the change affect energy saving, cost, or cost effectiveness?	Does the change affect HERS or ATT procedure?
1	MF	Multifamily Restructuring	Skylight Properties (Additions and Alterations)	180.2(b)1C	Taylor Taylor	Mikey Shewmaker Payam Bozorgchami	C. Fenestration alterations other than repair shall meet the requirements of Items i and ii below: **Note**: Glass replaced in an existing sash and frame or sashes replaced in an existing frame are considered repairs. In these cases, Section 180.2(b) requires that the replacement be at least equivalent to the original in performance. i. All added and replacement F~~f~~enestration products ~~installed to replace existing fenestration products of the same total area~~ shall meet either a or b: a. The maximum U-factor, RSHGC and VT requirements of Table 180.2-B, or b. The area-weighted U-factor and RSHGC of Table 170.2-A. ~~**Exception 1 to Section 180.2(b)1Ci**: In an alteration, where 150 square feet or less of the entire building's vertical fenestration is replaced, RSHGC and VT requirements of Table 180.2-B shall not apply.~~ ii. Alterations that add vertical fenestration and skylight area shall meet the total fenestration area requirements of Section 170.2(a)3. ~~and the U-factor, RSHGC and VT requirements of Table 180.2-B.~~ **Exception 1 to Section 180.2(b)1C**~~ii~~: Alterations that add vertical fenestration area of up to 50 square feet shall not be required to meet the total fenestration area requirements of Sections 170.2(a)3, nor the U-factor, RSHGC and VT requirements of Table 180.2-B, for the added vertical fenestration. **Exception 2 to Section 180.2(b)1C**: In an alteration, where 150 square feet or less of the entire building's vertical fenestration is replaced, RSHGC and VT requirements of Table 180.2-B shall not apply to the replaced vertical fenestration. **Exception 3 to Section 180.2(b)1C**: Alterations that add or replace skylight area of up to 50 square feet shall not be required to meet the total fenestration area requirements of Sections 170.2(a)3, nor the U-factor, SHGC and VT requirements of Table 180.2-B. ~~**Exception 2 to Section 180.2(b)1Cii**: Alterations that add up to 16 square feet of new skylight area per dwelling unit with a maximum U-factor of 0.55 and a maximum RSHGC of 0.30 shall not be required to meet the total fenestration area requirements of Section 170.2(a)3.~~	By not including the proposed changes, small skylight replacements will be required to meet the requirements in table 180.2-B, while small skylight additions will not be required to. For some buildings, the skylight requirements in the referenced table are not technically feasible or commercially available.	No	Yes	No
2	MF	Multifamily Restructuring	Skylight Properties (Additions and Alterations)	180.2(b)1C	Taylor Taylor	Mikey Shewmaker Payam Bozorgchami	C. Fenestration alterations other than repair shall meet the requirements of Items i and ii below: **Note**: Glass replaced in an existing sash and frame or sashes replaced in an existing frame are considered repairs. In these cases, Section 180.2(b) requires that the replacement be at least equivalent to the original in performance. i. All added and replacement F~~f~~enestration products ~~installed to replace existing fenestration products of the same total area~~ shall meet either a or b: a. The maximum U-factor, RSHGC and VT requirements of Table 180.2-B, or b. The area-weighted U-factor and RSHGC of Table 170.2-A. ~~**Exception 1 to Section 180.2(b)1Ci**: In an alteration, where 150 square feet or less of the entire building's vertical fenestration is replaced, RSHGC and VT requirements of Table 180.2-B shall not apply.~~ ii. Alterations that add vertical fenestration and skylight area shall meet the total fenestration area requirements of Section 170.2(a)3. ~~and the U-factor, RSHGC and VT requirements of Table 180.2-B.~~ **Exception 1 to Section 180.2(b)1C**~~ii~~: Alterations that add vertical fenestration area of up to 50 square feet shall not be required to meet the total fenestration area requirements of Sections 170.2(a)3, nor the U-factor, RSHGC and VT requirements of Table 180.2-B, for the added vertical fenestration. **Exception 2 to Section 180.2(b)1C**: In an alteration, where 150 square feet or less of the entire building's vertical fenestration is replaced, RSHGC and VT requirements of Table 180.2-B shall not apply to the replaced vertical fenestration. **Exception 3 to Section 180.2(b)1C**: Alterations that add or replace skylight area of up to 50 square feet shall not be required to meet the total fenestration area requirements of Sections 170.2(a)3, nor the U-factor, SHGC and VT requirements of Table 180.2-B. ~~**Exception 2 to Section 180.2(b)1Cii**: Alterations that add up to 16 square feet of new skylight area per dwelling unit with a maximum U-factor of 0.55 and a maximum RSHGC of 0.30 shall not be required to meet the total fenestration area requirements of Section 170.2(a)3.~~	By not including the proposed changes, small skylight replacements will be required to meet the requirements in table 180.2-B, while small skylight additions will not be required to. For some buildings, the skylight requirements in the referenced table are not technically feasible or commercially available.	No	Yes	No
3	MF	Multifamily Restructuring	Central Ventilation Shaft Sealing	160.2(b)2C	Lucy Albin	Mikey Shewmaker Payam Bozorgchami	Exception to Section 160.2(b)2C: Multifamily buildings with three or fewer habitable stories in Climate Zone 6 ~~7~~ 6 are not required to comply with Section 160.2(b)2C.	This exception was added because the measure was not cost-effective in CZ 6 for multifamily buildings with three or fewer habitable stories. It was cost-effective in CZ 7.	No	Yes	No
4	MF	Multifamily Envelope	Cool Roof	170.2(a)1A Table 170.2-A	Avani Goyal	Mikey Shewmaker Payam Bozorgchami	See Appendix for table mark-up	Option B Steep-Sloped-Thermal Emittance: TE values in CZ10,11,13,15 should be updated from 0.75 to 0.8. This change was found cost-effective in the CZs listed.	No	Yes	No

Remark #	Building Type(s)	CASE Report	CASE Measure	Section(s) of Code	Person Making Recommendation	CEC Staff Lead	Language Markup (deletions marked with red ~~strikethroughs~~; additions marked with red underlining)	Justification	Is the Change needed for both single family and multifamily?	Does the change affect energy saving, cost, or cost effectiveness?	Does the change affect HERS or ATT procedure?
5	MF	Multifamily Envelope	High Performance Windows	170.2(a)3A Table 170.2-A	Avani Goyal	Mikey Shewmaker Payam Bozorgchami	Exception 4 to Section 170.2(a)3Aii: Fenestration in dwelling units of buildings ~~that are three habitable stories or fewer~~ in Climate Zones 1, 3, 5 and 16 is not required to comply with the RSHGC requirements. [Table is okay, the exception code language needs to be updated to align with the Table.]	The CASE report proposed unification of SHGC requirements across low-rise and high-rise multifamily buildings and proposed "no requirement" in CZs 1,3,5, and 16, regardless of number of stories, after showing that higher SHGCs are beneficial in these CZs.	No	Yes	No
6	MF	Multifamily Envelope	High Performance Windows	Table 180.2-B	Avani Goyal	Mikey Shewmaker Payam Bozorgchami	See Appendix for table mark-up	CASE Team did not find the measure cost-effective in CZ 15 and hence did not propose in that CZ for alterations.	No	Yes	No
7	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.0(h)1 and 160.3(b)1	Kristin Heinemeier	Bach Tsan	Load calculations must be submitted along with the Certificate of Compliance for approval by the enforcement agency. These must include the following information: design city, indoor and outdoor design temperatures, winter heating loads for each zone/system, Sensible and latent summer cooling loads for each zone/system, load calculation software name and version. If load calculations use custom calculations based on the resources above, the report must also show all detailed algorithms, inputs and outputs.	Load calculations are critical to ensure savings for the Design measures proposed by the CASE Team. While they are already required by Part 6 and 11, they are not required to be submitted, and they are thus often not reviewed or verified by jurisdictions and are often not completed. Adding explicit requirements for submittal of load calculations is essential to achieving full savings for these measures.	Yes	All	No
8	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.0(h)5Biii	Kristin Heinemeier	Bach Tsan	Heat Pump Heating Capacity: ~~There is no limit on the minimum capacity~~.	This language about no limit on the minimum capacity contradicts the language that follows.	Yes	All	No
9	SF/MF	Residential HVAC Performance	Supplementary Heating	150.0(i)2	Kristin Heinemeier	Bach Tsan	In addition to the requirements in Section 150.0(i)1~~A~~ , thermostats controlling heat pumps with electric resistance supplementary heat or gas furnace supplementary heat shall.	This correct a typo in the section reference regarding thermostats.	Yes	All	No
10	SF/MF	Residential HVAC Performance	Variable Capacity and Zonally Controlled Systems	Exception 1 to Section 150.0(m)13C	Kristin Heinemeier	Bach Tsan	Multispeed or variable speed compressor systems, ~~or single speed compressor systems that utilize the performance compliance approach, shall~~ that incorporate controls that vary fan speed with respect to the number of zones calling as certified by the installer may demonstrate compliance...	Suggest wording change for correct grammar and to indicate that integrated controls are not required.	Yes	No	No
11	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.2(a)	Kristin Heinemeier	Bach Tsan	Note: When an addition is served by an existing HVAC system, Load Calculations per Section 150.0(h)1 shall include the entire area served by the HVAC system.	Add the suggested language following Exception 6 to clarify load calculation requirements for additions.	Yes	No	No
12	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.2(b)1O	Kristin Heinemeier	Bach Tsan	Altered Space-Conditioning System Load Calculations and System Capacity: Altered space-conditioning systems shall comply with all applicable requirements specified in 150.2(a)1E.	The new limits on sizing proposed by the CASE Team were intended to apply to both additions and alterations. These limits are included in the 45-day language for additions only and this suggested language change extends them for alterations.	Yes	No	No
13	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	160.3(b)1	Kristin Heinemeier	Bach Tsan	**Exception 1 to Section 160.3(b)1:** Block loads (the total load for all rooms combined that are served by the central equipment) may be used for the purpose of system sizing for additions.	Exception to allow block loads was intended to apply to multifamily additions as well as single family, but the 45 day language only includes it for single family. Suggest including this for consistency across single family and multifamily.	MF	No	No
14	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.0(h)2B, 160.3(b)2B and 170.2(c)2C	Kristin Heinemeier	Bach Tsan	"The outdoor design temperatures for heating shall be no lower than ~~the 99.0 percent Heating Dry Bulb or~~ the Heating Winter Median of Extremes values."	The CASE Team recommends reverting to the prior language of Heating Winter Median of Extremes to not introduce confusion about which temperature represents the allowable minimum.	Yes	No	No
15	MF	Domestic Hot Water	Pipe Insulation Enhancement	160.4(e)4 170.2(d)	Amin Delagah Brian Selby	Danny Tam	~~SECTION 160.4(e)4. Insulation Quality Verification. Insulation for hot water pipesing and plumbing appurtenances shall be field verified as specified in Residential Reference Appendix RA3.6.3.~~ SECTION 170.2(d)3 **Water Heating Systems.** Insulation Quality Verification. Insulation for hot water piping and plumbing appurtenances shall be field verified as specified in Residential Reference Appendix RA3.6.3.	The Statewide CASE Team proposes changing verification from mandatory to prescriptive, following discussion with Compliance Improvement Team. As a new verification measure, there is high likelihood that the verification requirement could be unknown/overlooked and the walls and ceilings closed up without verification. ECC Raters may be pressured to perjure in these situations to avoid having to open up the walls and ceilings for verification. If changed to prescriptive, there is more flexibility to use the performance approach and make late adjustments to overcome the energy penalty from not doing pipe insulation verification.	No	No	Yes
16	MF	Multifamily Envelope	Improved Minimum Wall Insulation	180.1(a)1Ai	Avani Goyal Brian Selby	Mikey Shewmaker Payam Bozorgchami	i. Framed Walls Extension. Extensions of existing wood-framed and metal-framed walls may retain the dimensions of the existing walls and shall install cavity insulation of R-15 in a 2x4 framing and R-21 in a 2x6 framing.	Mandatory measures also impact additions and alterations. Exceptions in this chapter do not include metal framing in the current language, though extension of metal-framed walls also have issue in matching thickness where continuous insulation in otherwise required on the new portion of wall.	No	No	No
17	SF	Multifamily Indoor Air Quality	Ventilation	150.0(o)1C	Marian Goebes	Anushka Raut Ron Balneg	See appendix of docketed comments for markup.	Section 150.0(0)1C covers single family detached dwellings and townhouses. It does not include vertically-attached single-family dwelling units such as duplexes and triplexes. Proposed changes by the CASE team adds this and rearranges the section for conciseness.	No	No	No

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18	All	Domestic Hot Water	Individual HPWH Ventilation	110.3(c)7B3v	James Haile	Danny Tam	If the inlet and outlet ducts both terminate within the same pressure boundary, airflow from the termination points shall be diverted away from each other; or NOTE: Ducting only the inlet or exhaust across the pressure boundary could interfere with balanced ventilation systems. This should be considered when specifying HPWH location and ventilation method.	Stakeholders expressed concern about allowing HPWH ventilation to move air from inside the pressure boundary of a building to outside the pressure boundary. The CASE team proposes adding a non-regulatory note following 110.3(c)7B3v and providing additional guidance in the Compliance Manuals on this issue. See appendix of docketed comments for more detail.	Yes	No	No
19	All	Domestic Hot Water	Individual HPWH Ventilation	110.3(c)7B2ii	James Haile	Danny Tam	Permanent openings shall consist of a single layer of fixed flat slat louvers or grilles, with a total minimum NFA the larger of 125 square inches plus 25 square inches per kBtu per hour of compressor capacity, or the minimum provided by the manufacturer for this method. The permanent openings shall be fully louvered doors or two openings, ~~one located within 12 inches from the enclosure top and one located within 12 inches from the enclosure bottom~~one in the upper half of the enclosure and one in the bottom half of the enclosure. The top of the upper opening must be 12 inches or less from the enclosure top and the bottom of the lower vent must be 12 inches or less from the enclosure bottom; or	Stakeholders have indicated to the CASE team that the language locating the two permanent openings is not clear. One potential interpretation is that the entirely of the upper opening must be above 1 foot from the enclosure top and that the entirety of the lower opening must be below 1 foot from the enclosure bottom. Such an install would be difficult and may impact performance.	Yes	Yes	No
20	All	Domestic Hot Water	Individual HPWH Ventilation	110.3(c)7B4	James Haile	Danny Tam	Installed using a method certified by the manufacturer to ~~meet the~~ provide at least the same performance as the other ventilation ~~requirements of~~methods in 110.3(c)7B.	There is concern that the current language allows for a loophole to ignore the requirements of the previous sections. It should be made clear that the design must provide the same or better performance as the other ventilation methods.	Yes	Yes	No
21	MF	Domestic Hot Water	N/A	180.1 and 180.2(b)3A	Brian Selby	Mikey Shewmaker Payam Bozorgchami	SECTION 180.1 – ADDITIONS Additions to existing multifamily buildings shall meet the applicable requirements of Sections 110.0 through 110.9; Sections 160.0, 160.1, and 160.2(c) and (d); Sections 160.3, 160.5 through 160.7; and either Section 180.1(a) or 180.1(b). SECTION 180.2(b)3A Hot Water Systems Pipe insulation. For newly installed piping and existing accessible piping, the insulation requirements of Section 160.4(~~f~~e) shall be met.	These requirements only apply to new construction and the language had not been updated in Section 180.1 Additions, which still require meeting Section 160.4. Also, Section 180.2(b)3A is referencing section 160.4(f), which now is 160.4(e).	No	No	No
22	NR	N/A	N/A	130.1(b)	Jon McHugh	Simon Lee	~~(b) Multilevel lighting controls. The general lighting of any space with a size of 100 square feet or larger and with a connected lighting load greater than 0.5 watts per square foot shall provide with multilevel lighting controls. The multilevel lighting controls shall provide and enable continuous dimming from 100 percent to 10 percent or lower of lighting power.~~ (b) Dimmable lighting. The general lighting of any enclosed space with floor area of 100 square feet or larger and with a connected lighting load that exceeds 0.5 watts per square foot shall be continuously dimmable between 10 percent and 100 percent of full power. General lighting shall be controlled by at least one of the following controls: i. manual dimming controls, ii. partial-OFF occupant sensing controls , or iii.. continuous dimming automatic daylighting controls	See Appendix A for more information.	Yes - Section 160.5(b)4B for MF	No	No
23	NR	N/A	N/A	130.1(b)	Jon McHugh	Simon Lee	~~Exception 1 to Section 130.1(b): An indoor space that has only one luminaire.~~	The comment from a compliance expert is that this exception is confusing to people. Additionally, the wattage threshold for where this applies is cost-effective for manual dimmers that reduce average power draw by 10%. Since the threshold general lighting power density is 0.5 W/sf and the threshold room size is 100 square feet, the single luminaire exception would apply to luminaires that are greater or equal to 50 Watts. In new construction, the cost of a dimmer is $30 and a light switch is around $5 for an incremental cost of $25. The cost of installation is the same, LED products come as dimmable as default feature. Conservatively estimating 2,000 operating hours per year at an average Nonresidential 30 year LSC cost of $5.64/kWh. The 30 year discount cost of operating 50 Watts is: PV$ = 50 Watts x 0.001 kW/W x 2,000 hours/yr x PV$5.64 = $563. If we double the incremental cost to $50 to account for switches being replaced at least once during the 30 year period, as long as the manual dimmer saves at least 10% of the energy, the dimmer is cost-effective.	Yes - Section 160.5(b)4B for MF	Yes	No

Remark #	Building Type(s)	CASE Report	CASE Measure	Section(s) of Code	Person Making Recommendation	CEC Staff Lead	Language Markup (deletions marked with red ~~strikethroughs~~; additions marked with red underlining)	Justification	Is the Change needed for both single family and multifamily?	Does the change affect energy saving, cost, or cost effectiveness?	Does the change affect HERS or ATT procedure?
24	NR	N/A	N/A	130.1(b)	Jon McHugh	Simon Lee	~~Exception 5 to Section 130.1(b): Classrooms with a connected general lighting load of 0.6 watts per square foot or less shall have a minimum of one control step between 30 and 70 percent of full rated power.~~	Typical classroom sizes are around 1,000 sf and thus this is for up to 600 watts of general lighting power. Back in 2013 when this exception was created general lighting LPD was 1.2 W/sf or twice the threshold for using this exception. In 2025, the classroom maximum LPD is 0.60 W/sf or equal to the threshold for using the exception. In 2013 a manufacturer with an efficient static fluorescent luminaire asked for the exception in return for the lower installed wattage. This exception no longer has the installed savings benefit and the lifecycle cost benefit no longer holds for LED systems. Additionally the florescent systems this was designed to benefit are now outlawed due to mercury content. In the extreme case that the classroom is lit with HID which is not able to be dimmed The CASE team contacted an electrical engineer at DSA and found they were supportive of removing the school exception. This EE from the Division of the State Architect indicated that they had reached out during 2019 and 2022 T-24 development to indicate that they recommended this exception be removed. They characterized this exceptions as an excuse for "business as usual" for some designers to continue to design two level switching systems in classrooms even though it increases first costs and operating costs. The non-classroom spaces in schools still are required to use dimming.	Yes - Section 160.5(b)4B for MF	Yes	No
25	NR	Daylighting	Revise auto daylighting control exceptions	Exception to 130.1(d)2Biii	Yao-Jung Wen	Simon Lee	Exception to Section 130.1(d)2Biii: Where a luminaire contains a factory assembled housing and light source as an integral unit in segments longer than 8 feet, the ~~luminaire~~segment is allowed to be controlled according to the type of the daylit zone in which the segment is primarily located.	This suggestion fixes a typo. The first half of the sentence is meaningless if the term luminaire is not changed to segment.	Yes - Section 160.5(b)4D for MF	Yes	No
26	NR	Daylighting	Revise auto daylighting control exceptions	130.1(d)2Ci	Yao-Jung Wen	Simon Lee	Section 130.1(d)2Ci: ~~For spaces where the installation of multilevel lighting controls is under Section 130.1(b), allow the multilevel lighting controls to adjust the light level with continuous dimming.~~ For spaces where Section 130.1(b) requires general lighting to be continuous dimming, with a daylighting control having a minimum of 10 steps and reducing power by at least 90 percent of full power per NA 7.6.1.4. Otherwise, daylighting controls shall have at least one step between 30 percent and 70 percent of full power in addition to off in response to daylight availability in the daylit zone.	The 45 day language was originally written in non-mandatory language as follows: "allow the multi-level controls to adjust light the light level with continuous dimming." The term "allow" can be interpreted as an optional or voluntary capability. Additionally Section 130.1(b) is structured to require dimming in most cases but allow multi-level switching in its exceptions. The changes indicate in mandatory language when dimming is required and the minimum requirements for lighting that is not required to be dimmable.	Yes - Section 160.5(b)4D for MF	Yes	No
27	NR	Daylighting	Revise auto daylighting control exceptions	130.1(d)2F	Yao-Jung Wen	Simon Lee	Section 130.1(d)2F: In spaces where manual controls are required, the manual controls shall be capable of turning off or decrease light levels below the light level set by the daylighting controls. Manual dimming controls shall be permitted to temporarily increase electric lighting light levels above the light level set by the daylight responsive controls if the controls are configured to reset electric lighting controls back to the Section 130.1(d)3 defaults after electric lighting have been turned off or reduced by a manual control, occupancy sensor or timeclock.	Provide clarification that overriding beyond automatic daylighting control light level should only be allowed if the control is a dimmer and not a simple on/off switch that can only turn the light full on.	Yes - Section 160.5(b)4D for MF	No	No
28	NR	Nonresidential HVAC Controls	Guideline 36	NA7.5.6.1(b)	Rupam Singla & Sally Blair	Bach Tsan	NA7.5.6 Supply Fan Variable Flow Controls NA7.5.6.1 Construction Inspection Prior to Functional Testing, verify and document the following: (a) Supply fan includes device(s) for modulating airflow, such as variable speed drive or electrically commutated motor. (b) For multiple zone systems: 1. Discharge static pressure sensors are either factory calibrated or field-calibrated. 2. The static pressure location, setpoint, and reset control meets the requirements of §140.4(c)2A and §140.4(c)2B. 3. Setpoint reset control logic originates from a programming library that has been certified to the Energy Commission as specified by Section 140.4(r).	Need to add a Mechanical Acceptance Test corresponding to the new requirements in 140.4 for an ATT to confirm that a certified programming library is used.	N/A	No	Yes
29	NR	Nonresidential HVAC Controls	Guideline 36	NA7.5.4.1	Rupam Singla & Sally Blair	Bach Tsan	NA7.5.4 Air Economizer Controls and Exhaust Air Heat Recovery NA7.5.4.1 Construction Inspection Prior to Functional Testing, verify and document the following: …. (m) Economizer control logic originates from a programming library that has been certified to the Energy Commission as specified by Section 140.4(r).	Need to add a Mechanical Acceptance Test corresponding to the new requirements in 140.4 for an ATT to confirm that a certified programming library is used.	N/A	No	Yes

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30	NR	Nonresidential HVAC Controls	Guideline 36	NA7.5.15.1	Rupam Singla & Sally Blair	Bach Tsan	NA7.5.15 Supply Air Temperature Reset Controls The following acceptance tests apply to supply air temperature reset controls. NA7.5.15.1 Construction Inspection Prior to functional testing, verify and document the following: (a) Supply air temperature reset controls are installed as specified by the requirements of the Section 140.4(f). (b) Supply air temperature reset control logic originates from a programming library that has been certified to the Energy Commission as specified by Section 140.4(r). (~~b~~c) All system air temperature sensors are factory or field calibrated within 2% of a calibrated reference temperature sensor. Attach a copy of the calibration certificate or field verification results. (~~c~~d) Document current supply air temperature.	Need to add a Mechanical Acceptance Test corresponding to the new requirements in 140.4 for an ATT to confirm that a certified programming library is used.	N/A	No	Yes
31	MF	Domestic Hot Water	CPC Appendix M	170.2(d)2	Amin Delagah	Danny Tam	C. All hot water ~~distribution~~ piping shall be sized in accordance with the California Plumbing Code Appendix M.	Appendix M pipe sizing applies to the hot water piping at the heating plant (water heater and storage tanks), not just distribution piping. The measure energy savings and cost effectiveness was calculated with Appendix M pipe sizing for both mechanical room and distribution system.	No	No	No
32	MF/NR	Swimming pool and spa heating	Swimming pool and spa heating	110.4(c) exception 2	Sean Steffensen	Danny Tam	none	With this change, the CEC has expanded an exception for pools with existing pool heaters from allowing the exception only for single family buildings, to allowing the exception for all building types. This change results in a significant loss of potential energy savings. The Statewide CASE team has provided a detailed description for why the expansion of the exception is too broad in the Appendix to the T24 45-day comment letter.	no	no	no
33	MF/NR	Swimming pool and spa heating	Swimming pool and spa heating	110.4(c) exception 2	Sean Steffensen	Danny Tam	none	CEC has expanded the exception of the pools with existing pool heaters to all buildings from the previous single family buildings. The Initial Study and Proposed Negative Declaration for the 2025 Building Energy Efficiency Standards (TN 255315-7) provides the CEC estimate for Residential Natural Gas Impacts for pool heating measure. The impact is shown as 1.26 million therms per year of natural gas. The 2025 CASE Report Swimming Pool and Spa Heating (TN 255319-4) Table 41 on page 84 shows an additional 2.8 million therms of savings per year. The savings accrue from existing pools without a heating system. Since these savings come from pool that are within the scope of the CEC proposal the savings should be added into the total savings for the proposal to net 4.1 million therms per year.	no	no	no
34	SF	Buried Ducts/Cathedral Ceilings	Cathedral Ceilings	150.1(c)1A	Nick Brown		"Roof and ceiling insulation shall be installed ~~in a ventilated attic~~ with an R-value equal to or greater than that shown in TAble 10.1-A meeting options ii or iii below."	Introductory language in Section 1A needs to be edited to cover the addition of cathedral ceilings under Option C for roof insulation.	SF	No	No
35	SF	Buried Ducts/Cathedral Ceilings	Cathedral Ceilings	150.1(c)9B	Simon Pallin	Payam Bozorgchami	Duct and air handlers located in conditioned space. Duct systems and air handlers of HVAC systems shall be located entirely in conditioned space and inside the building thermal envelope, not in an unvented attic~~space below the ceiling separating the occupiable space from the attic~~, and confirmed by field verification and diagnostic testing to meet the criterion of Reference Residential Appendix Section RA3.1.4.3.8.	New 150.1(C)1A Option C allowing for cathedral ceilings references 150.1(c)9B. 45-Day Language added to Section150.1(c)9B. will not apply to cathedral ceilings because they don't have attics. Proposed language resolves this and is more direct.	N/A	No	No
36	SF	Buried Ducts/Cathedral Ceilings	Cathedral Ceilings	150.0(m)1Bii	Simon Pallin	Payam Bozorgchami	ii.Ducts do not require insulation when the duct system is located entirely in conditioned space and inside the building thermal envelope, not in an unvented attic,~~below the ceiling separating the occupiable space from the attic~~ as confirmed through field verification and diagnostic testing in accordance with the requirements of Reference Residential Appendix RA3.1.4.3.8.	45-Day Language added to 150.0(m)1Bii. will not apply to cathedral ceilings because they don't have attics.	N/A	No	No
37	SF	High Performance Envelope	Windows	150.1(c)3A	Simon Pallin	Payam Bozorgchami	**Exception 23 to Section 150.1(c)3A:** ~~In Climate Zones 2, 4, and 6 through 15, f~~For each dwelling unit up to 16 square feet of ~~new~~ skylight area with a maximum U-factor of ~~0.55~~ 0.40 and a maximum SHGC of 0.30. In Climate Zones 1, 3, 5, and 16 there is no SHGC requirement.	Unclear requirement in Exception 3 to Section 150.1(c)3A. As currently written, it's unclear if the 16 square feet and U-factor requirements apply to all Climate Zones.	N/A	No	No
38	SF	High Performance Envelope	Windows	150.2(b)1B	Simon Pallin	Payam Bozorgchami	**Exception 1 to Section 150.2(b)1B:** Replacement of vertical fenestration, excluding glazed doors, no greater than ~~75~~16 square feet with a U-factor no greater than 0.40 ~~in Climate Zones 1-16~~. **Exception 2 to Section 150.2(b)1B:** Replacement of glazed doors no greater than 75 square feet with a U-factor no greater than 0.40. **Exception ~~23~~ to Section 150.2(b)1B:** Replaced skylights must meet a U-factor no greater than ~~0.55~~0.40, and a SHGC value no greater than 0.30. **Exception ~~34~~ to Section 150.2(b)1B:** Replacement of vertical fenestration shall have a maximum SHGC value no greater than 0.23 in Climate Zone 15.	Express terms adopted proposed change from 75 to 16ft2, while 45-Day reverted back to 2022 language. If the 75ft2 is meant to provide an exception for glass sliding door, can such be specifically pointed out in language rather than keeping the maximum square footage at 75?	N/A	No	No

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39	SF	High Performance Envelope	Windows	150.2(a)1A	Simon Pallin	Payam Bozorgchami	iii ~~**Exception 1 to Section 150.2(b)1Aii:**~~ Additions~~Iterations~~ that add~~s~~ fenestration ~~area of~~ shall have a Maximum SHGC value of 0.23 in Climate Zone 15.	150.2(a)1Aii covers requirements for fenestration area, not performance. Suggest adding a new modification item under 150.2(b)1A. This should also be added as a modification to 150.2(b)1B to additions 700 ft2 or less. 150.2(b)1Aii should read (a) and not (b) if kept as is.	N/A	No	No
40	SF	High Performance Envelope	Windows	150.2(b)1B	Simon Pallin	Payam Bozorgchami	**Exception 1 to Section 150.2(b)1A**~~: Alterations that add fenestration area of up to 75 square feet shall not be required to meet the total fenestration area and west-facing fenestration area requirements of Sections 150.1(c)3B and C.~~: Alterations that add~~s~~ fenestration ~~area of~~ shall have a Maximum SHGC value of 0.23 in Climate Zone 15.	150.2(b)1A covers requirements for fenestration area, not performance. Suggest adding a new modification item under 150.2(b)1A.	N/A	No	No
41	MF	Multifamily Indoor Air Quality	Balanced or supply-only ventilation	JA1	Marian Goebes	Anushka Raut	**ASHRAE STANDARD 62.2** is the American Society of Heating, Refrigerating and Air-Conditioning Engineers document titled ~~"Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings," 2019 (ANSI/ASHRAE Standard 62.2-2019 including ANSI/ASHRAE Addenda v and published in the 2020)~~"Ventilation and Acceptable Indoor Air Quality in Residential Buildings", 2022 (ANSI/ASHRAE Standard 62.2-2022).	Reference to 2022 ASHRAE 62.2 was updated in the standards, but not in the Reference Appendix. (left it as 62.2-2019). Also the name of 62.2 is incorrect in the Reference Appendix, because it says "Low-rise Residential Buildings", implying high-rise residential is outside of the scope, instead of just "Residential Buildings".	Yes	No	No
42	MF	Multifamily Indoor Air Quality	Compartmentalization	JA1, RA2.2, RA2.3, NA2.3	Marian Goebes	Anushka Raut	JA1: AIR LEAKAGE is a measure of how much ~~outside~~ air comes into a home or building through a manufactured fenestration or ~~exterior~~ door products RA2.2 Table RA2-5 Measure Title: Building Envelope Air Leakage and Dwelling Unit Compartmentalization RA2.2 Table RA2-5 Description: Compliance credit can be taken for reduced building envelope air leakage in single-family homes. Field verification and diagnostic testing is required. All ~~M~~multifamily dwelling units are required to have compartmentalization (dwelling unit enclosure leakage) verified ~~when supply or exhaust ventilation systems are installed~~. Table NA1-1 - Summary of Measures Requiring Field Verification and Diagnostic Testing...[6th row] ~~Building Envelope~~ Dwelling Unit Enclosure Air Leakage (Compartmentalization) NA2.3 Field Verification and Diagnostic Testing of Multifamily Dwelling Unit Enclosures (Compartmentalization) NA2.3.1 Purpose and Scope. The purpose of this test procedure is to measure multifamily dwelling unit compartmentalization: the air leakage rate through a dwelling unit enclosure.	Several areas of the Reference Appendix should be updated to reflect that "air leakage testing" covers compartmentalization (not just whole-building testing). Update definition of "air leakage" in JA1 to strike through that air must come from exterior. In the table with the measure description in RA2 and NA2.3, the CEC should update the name of and the description for the measure "Building Envelope Air Leakage" to a) rename the section "Building Envelope Air Leakage and Dwelling Unit Compartmentalization" to indicate that this section covers compartmentalization for multifamily units, b) state that the compartmentalization test is required in all multifamily units, and c) show that compliance credit for reduced building air leakage can only be earned in single-family homes. We did not recommend these changes in the CASE report, due to an oversight (focusing on the Standards not Reference Appendices language) . These changes should be made in both RA2 (for low rise MF) and NA2.3 (for high rise MF)	Yes	No	No
43	MF	Multifamily Indoor Air Quality	Compartmentalization	NA1.9.1	Tharanga Jayarathne	Anushka Raut	Systems verified under this procedure are not eligible for use of the sampling procedures described in NA1.6, with the exception of NA2.3, Field Verification and Diagnostic Testing of Multifamily Dwelling Unit Enclosures, for which ATTs may use sampling.	In 160.2(b)2Aivb2, CEC has added new language in Express terms and 45-day language to allow Certified Acceptance Test Technician (ATT) to perform compartmentalization in multifamily buildings with four or more habitable stories. However, NA 1.9.1 states Certified Acceptance Test Technician (ATT) are not eligible to use sampling procedures for field verification and diagnostics. For buildings with large number of dwelling units, this restriction makes testing by ATTs impractical (time consuming and expensive), thus making the addition to section 160.2(b)2Aivb2 unusable. The CASE team proposes to allow ATTs to use sampling similar to ECC-Raters.	No	No	Yes
44	MF	Multifamily Indoor Air Quality	Compartmentalization	170.1(b)2F	Tharanga Jayarathne	Anushka Raut	~~HF. Dwelling unit enclosure air leakage. When performance compliance requires a building enclosure leakage rate that is lower than the standard design, the building enclosure shall be field verified in accordance with the procedures specified in Reference Residential Appendix RA3.8.~~	This allows energy savings credit in the performance path for lower dwelling unit enclosure leakage rate in multifamily buildings. The CASE team proposes to remove 170.1(b)2F. It's not possible to determine the fraction of leakage from the exterior vs interior, without complicated blower testing. And our energy modeling found little savings in most climate zones from compartmentalization that is tighter than the mandatory requirement.	No	No	Yes
45	MF	Multifamily Indoor Air Quality	Demand-controlled kitchen-room ventilation	Table 160.2-E	Marian Goebes	Anushka Raut	Enclosed Kitchen or Nonenclosed Kitchen Other kitchen exhaust fans, including downdraft: 300 cfm (150 L/s) ~~or a capacity of 5 ACH~~ ~~Nonenclosed Kitchen Other kitchen exhaust fans, including downdraft: 300 cfm (150 L/s)~~	The CEC, in consultation with the CASE Team, decided to remove the option for demand-controlled kitchen-room level (5ACH) ventilation, to align with an ASHRAE 62.2 proposal. The option for demand-controlled range hoods and downdraft fans, and for continuous kitchen-room level (5ACH) ventilation would remain intact. The CEC removed the option for demand-controlled room-level (kitchen 5ACH) ventilation for single family homes in Table 150.0-E, but did not remove that for multifamily homes in Table 160.2-E. Table 160.2-E should be marked up the same way as Table 150.0-E	No	No	No
46	NR	Nonresidential Envelope	Opaque Assemblies	Table 140.3-B	Maureen Guttman	Payam Bozorgchami	Last row of Table 140.3-B under Fenestration - Vertical: ~~Glazed Doors~~ Fenestration (Max WWR%)	The formatting in 45-Day Language is different from published version of 2022 T24, Part 6. This might be a resulting typo, but we are pointing it out in case the new format is intended to be used.	N/A	No	No
47	NR	Nonresidential Envelope	Vestibules	141.0(a)	Maureen Guttman	Payam Bozorgchami	**Exception 8 to Section 141.0(a):** The requirements of Section 120.7(e) shall not apply to additions that do not include a *public entrance* door.	Clarification of scope for additions for a new mandatory provision.	N/A	No	No
48	NR	Nonresidential Envelope	Vestibules	141.0(b)	Maureen Guttman	Payam Bozorgchami	**Exception 5 to Section 141.0(b):** The requirements of Section 120.7(e) shall not apply to alterations.	Clarification of scope for alterations for a new mandatory provision.	N/A	No	No

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49	MF	Multifamily Restructuring	Slab Edge Insulation	Table 170.2-A	Elizabeth McCollum	Mikey Shewmaker Payam Bozorgchami	See appendix of docketed comment letter for markup.	"Three habitable" should be stricken to show it applies to all multifamily buildings.	No	Yes	No
50	SF	Buried Ducts	Cathedral Ceiling	Table 150.1-A	Simon Pallin	Payam Bozorgchami	See appendix of docketed comment letter for markup.	The proposed prescriptive path for cathedral ceiling is an alternative under Option C. Proposed table revisions present cathedral ceilings as a separate option and whether any radiant barrier requirement exists is not clear.	N/A	No	No

Table 2: Non-Substantive Recommendations – 45-Day Express Terms

Remark #	Building Type(s)	CASE Report	CASE Measure	Section(s) of Code	Person Making Recommendation	CEC Staff Lead	Language Markup (deletions marked with red ~~strikethroughs~~; additions marked with red underlining)	Justification	Is the Change needed for both single family and multifamily?	Does the language change affect energy saving cost or cost effectiveness?	Does the change to language affect HERS or ATT procedure?
1	NR	Nonresidential HVAC Space Heating	Heat Recovery	100.1	Ben Lalor	Ron Balneg	SIMULTANEOUS MECHANICAL HEAT RECOVERY is an operational mode of equipment that uses the vapor compression cycle whereby both the cooling and heating effect are used to serve the building's space conditioning and/or service hot water loads.	Add definition to 100.1 to support new "simultaneous mechanical heat recovery" requirements of 140.4(s)	No	No	No
2	MF	Domestic Hot Water	Central DHW Electric-Ready	160.9(f)	Jose Garcia	Danny Tam	(f) **Central Heat Pump Water Heater Ready**. ~~Central wW~~ater heating systems using gas or propane to serve multiple dwelling units shall include the following:	This change aligns with other similar requirements language in the energy code, such as in Section 170.2(d)2 and improves consistency and clarity.	No	No	No
3	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.2.1(a), JA15.2.1(b), JA15.2.2(a), JA15.2.2(b), JA15.2.3(a), JA15.2.3(b), JA15.2.4(a), JA15.2.4(b), JA15.2.5(a), JA15.2.5(b), JA15.2.5(c), JA15.2.5(d),	Jose Garcia	Danny Tam	~~Btu per hour~~ Btu/hr	This change aligns with other similar language in the energy code (multiple definitions use Btu/hr), and this modification would improve code language clarity. Note these changes are found in JA15 but in the 45-Day Language Reference Appendices incorrectly lists these sections as JA14.x (instead of JA15.x)	No	No	No
4	NR	Cooling Towers	Blowdown Controls	110.2(e)	Meg Waltner	Ron Balneg	See Appendix B of docketed comments for markup.	Ensure clarity that the only requirement is for conductivity controls, even though cooling towers typically control to multiple properties, which are largely covered by the list of parameters. The intent of the language is for the controls to be programmed to not allow blowdown until at least one of the parameters meets the threshold value identified. Additionally, CaCO23 is a typo. Based on the IECC requirement that these are based on, both alkalinity parameters are using CaCO3.	No	No	No
5	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.1, JA15.2, JA15.2.1, JA15.2.2, JA15.2.3, JA15.2.4, JA15.2.5	Jose Garcia	Danny Tam	~~JA14.X~~ JA15.X	The Title is JA15, but all the subheadings are JA14. The change is needed since multiple references in the code reference JA15, and the requirements are not legible as written.	No	No	No
6	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.2, JA15.3	Jose Garcia	Danny Tam	~~JA14.2 Electric Ready Requirements~~ **JA15.2 Definitions** Reserved **~~JA15.3~~ JA15.3 Electric Ready Requirements**	JA15.2 should be reserved for future edits in order to maintain clear and consistent numbering with other JA sections and future proof the JA. Even though definitions are not currently required, future addition of definitions will result in inconsistency with the structure of other JAs if JA15.2 is removed.	No	No	No
7	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.1	Jose Garcia	Danny Tam	Joint Appendix JA15 provides sizing requirements, for electric ready infrastructure installed with gas or propane water heating systems to meet the requirement for electric readiness specified in Title 24, Part 6, Section 160.9(~~e~~f)	The code section was updated to 160.9(f). This reference was not updated and no longer works	No	No	No
8	NR	Commercial Kitchens	Electrification Readiness	120.6(k)1b	Kiri Coakley	Haile Bucaneg	The electrical service capacity shall have no less than 800 connected amps. ~~for~~	Corrected for grammar and clarity.	No	No	No
9	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.2.1	Jose Garcia	Danny Tam	~~Space shall be reserved for future installation of central heat pump water heaters.~~ The space reserved shall meet the following requirements:	When read together with the code language that references this JA section, the language is redundant. No other requirements (i.e. ventilation, condensate) have this additional language, which negatively affects code language consistency.	No	No	No
10	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.2.2	Jose Garcia	Danny Tam	~~Space shall be reserved for future installation of hot water storage tanks.~~ The space reserved shall meet the following requirements:	When read together with the code language that references this JA section, the language is redundant. No other requirements (i.e. ventilation, condensate) have this additional language, which negatively affects code language consistency.	No	No	No
11	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.2.1(a), JA15.2.1(b), JA15.2.2(a), JA15.2.2(b), JA15.2.3(a), JA15.2.3(b), JA15.2.4(a), JA15.2.4(b), JA15.2.5(a), JA15.2.5(b), JA15.2.5(c), JA15.2.5(d),	Jose Garcia	Danny Tam	If the input capacity of the gas or propane water heating system is less than 200,000 Btu per hour …	This change improves language clarity since the code language intends to apply to gas or propane water heating systems.	No	No	No

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12	NR	Laboratories	Unoccupied Setback	140.9(c)1	DJ Joh	Haile Bucaneg	A. Occupied Minimum Exhaust Airflow. When occupant sensing controls sense occupants in the space, the minimum exhaust and makeup airflow rates shall not exceed ~~be~~ the greater of: i.~~Not to exceed~~ 1.0 cfm/ft2 (equivalent to 6 air changes per hour for a 10-foot high ceiling), or ... B. Unoccupied Minimum Exhaust Airflow. Within 20 minutes of no occupancy being detected by any occupant sensors covering the space, the minimum exhaust and makeup airflow rates shall not exceed ~~be~~ the greater of: i. ~~Not to exceed~~ 0.67 cfm/ft2 (equivalent to 4 air changes per hours for a 10-foot high ceiling), or	Per the CASE Report, this should say "the minimum shall not exceed 1 cfm/ft2, or the regulated…" The minimum must be allowed to be less than 1 cfm/ft2. Many labs currently use minimums that are less than 6 ACH occupied and less than 4 ACH unoccupied. If you leave it as "be" then you are requiring these labs to raise their minimums and waste energy.	No	No	No
13	SF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.2(a)1Eii	Luke Morton	Bach Tsan	a. In situations where airflow ~~would be~~ is field verified to be at least 350 cfm/ton, there is no maximum capacity limit. b. In situations where airflow ~~would NOT be~~ is NOT field verified to be at least 350 cfm/ton, the system capacities shall be no larger than indicated in Table 150.2-A for heating and Table 150.2-B for cooling.	The 45 day language uses the phrase 'would be' which is not definitive, mandatory language. We suggest changing this to 'is' and 'is not'.	No	No	No
14	NR	Refrigeration	Evaporator Specific Efficiency Proposal	100.1	DJ Joh	Haile Bucaneg	AHRI 1250 is the Air-Conditioning, Heating, And Refrigeration Institute document titled "2020 Standard for Performance Rating of Walk-in Coolers and Freezers," 2020 (AHRI Standard 1250-2020).	AHRI 1250 is a standard that is referenced, and thus should be defined.	No	No	No
15	NR	Refrigeration	Evaporator Specific Efficiency Proposal	120.6(a) Table 120.6-A-2	DJ Joh	Haile Bucaneg	Table 120.6-A-2: water ~~state~~ static pressure	Grammar / spelling correction, "static pressure" was incorrectly written out as "state pressure" in the table. Replace all references of "state" to "static".	No	No	No
16	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.2.1(a)	Jose Garcia	Danny Tam	If the ~~gas water heating system has an~~ input capacity of the gas or propane water heating system is less than 200,000 Btu per hour,the minimum space reserved for the heat pump shall be 2.0 square feet per 10,000 ~~Btu per hour~~ Btu/hr input ~~of the gas or propane water heating system.~~ and the minimum linear dimension of the space reserved shall be 48 ~~linear~~ inches.	The existing system water heater types that the code applies to are gas or propane and should be stated first. The second instance of the word linear is redundant and can be deleted. These edits are needed for consistency with other sections of JA15.	No	No	No
17	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.2.1(b)	Jose Garcia	Danny Tam	If the ~~gas water heating system has an~~ input capacity of the gas or propane water heating system is greater than or equal to 200,000 Btu per hour,the minimum space reserved for the heat pump shall be 3.6 square feet per 10,000 ~~Btu per hour~~ Btu/hr input of the gas or propane water heating system, and the minimum linear dimension of the space reserved shall be 84 ~~linear~~ inches.	The existing system water heater types that the code applies to are gas or propane and should be stated first. The second instance of the word linear is redundant and can be deleted. These edits are needed for consistency with other sections of JA15.	No	No	No
18	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.2.2	Jose Garcia	Danny Tam	**JA15~~14~~.2.2 ~~Storage~~ Tank Space Requirements**	The proposed language is more clear since the tank space requirements apply to storage AND temperature maintenance tanks.	No	No	No
19	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.2.3(a) JA15.2.3(b)	Jose Garcia	Danny Tam	0.17 inches water column	The change is needed for clarity as inch is not an appropriate unit for static pressure.	No	No	No
20	MF	Domestic Hot Water	Central HPWH Clean-up	170.2(d)2	Dove Feng	Danny Tam	(d) **Domestic Hot Water Systems~~Water heating systems~~**. Water-heating systems shall meet the applicable requirements of ~~either~~ 1, or 2, ~~3 or 4~~ below: .... 2. **Central Systems.** For systems serving multiple dwelling units, the water-heating system shall meet the applicable requirement of A through FE, or shall meet the performance compliance requirements of Section 170.1:	The description of requirement is not aligned with new section numbering.	No	No	No
21	MF	Domestic Hot Water	Master Mixing Valve	170.2(d)2D	Amin Delagah	Danny Tam	D. The central system shall have a recirculation system with mechanical or digital thermostatic master mixing valve on each distribution supply and return loop, and meet the requirements specified in the Residential Reference Appendix RA4.4 ~~2019~~.	The incorrect RA section was referenced.	No	No	No
22	MF	Domestic Hot Water	Individual DHW Electric-Ready Cleanup	160.9(a)	Jose Garcia	Danny Tam	(a) **General Requirements.** Multifamily buildings shall comply with the applicable requirements of subsection 160.9. The building electrical system shall be sized to meet the future electric requirements of the electric ready equipment specified in sections 160.9(~~a~~b) through (~~e~~f).	This change is needed to make sure the correct code sections are referenced.	No	No	No
23	MF	Domestic Hot Water	Individual DHW Electric-Ready Cleanup	160.9(e)	Jose Garcia	Danny Tam	(e) Individual Heat Pump Water Heater Ready. Systems using gas or propane water heaters to serve individual dwelling units shall include the following components ~~and shall meet the requirements of Section 160.9(f):~~	Due to other structural changes to Section 160.9, this reference is no longer required and now references the wrong language.	No	No	No
24	MF	Domestic Hot Water	Individual DHW Electric-Ready Cleanup	160.9(e)4.B.i	Jose Garcia	Danny Tam	i. Fully louvered doors with fixed louvers consisting of a single layer of fixed flat slats; or ii. Two permanent ~~fixed~~ openings, located within 12 inches from the enclosure top and bottom;	In coordination with the HPWH ventilation measure per James Haile's meeting with CEC	No	No	No
25	All	Domestic Hot Water	Individual HPWH Ventilation	110.3(c)7B	James Haile	Danny Tam	B. Ventilation. Consumer integrated HPWHs shall meet one of the ventilation requirements below. Minimum volume and opening size requirements shall be the sum of all HPWHs installed within the same space. Compressor capacity shall be determined using AHRI 540 Table 4 reference conditions for refrigeration with the "High" rating test point.	This corrects a typo where there is a missing period after "Ventilation" making the subsection name/heading part of the sentence.	Yes, section is mandatory all occupancies.	No	No
26	All	Domestic Hot Water	Individual HPWH Ventilation	110.3(c)7B3iv	James Haile	Danny Tam	iv. If only the HPWH inlet or outlet is ducted, installation space shall include permanent openings ~~which~~ consist of a single layer of fixed flat slat louvers or grilles in the bottom half of the room, and/or a door undercut. With a ducted inlet, the minimum NFA shall be equal to the cross-sectional area of the duct. With a ducted exhaust, the minimum NFA shall be the larger of 20 square inches or the minimum NFA provided by the manufacturer for this method; and	This corrects a typo in the first sentence of this subsection, the correct grammar would be "which consist" or "consisting".	Yes, section is mandatory all occupancies.	No	No

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27	MF	Domestic Hot Water	Pipe Insulation Enhancement	160.4(e)	Amin Delagah	Danny Tam	(de) Commercial boilers 1.Combustion air positive shut-off shall be provided on all newly installed boilers as follows: A.All boilers with an input capacity of 2.5 MMBtu/h (2,500,000 Btu/h) and above, in which the boiler is designed to operate with a nonpositive vent static pressure. B.All boilers where one stack serves two or more boilers with a total combined input capacity per stack of 2.5 MMBtu/h (2,500,000 Btu/h). 2.Boiler combustion air fans with motors 10 horsepower or larger shall meet one of the following for newly installed boilers: A. AThe fan motor shall be driven by a variable speed drive, or B.The fan motor shall include controls that limit the fan motor demand to no more than 30 percent of the total design wattage at 50 percent of design air volume. SECTION 160.4(e)3A. Pipe and appurtenance insulation exposed to weather shall be protected by a cover suitable for outdoor service. The cover shall be water retardant and provide shielding from solar radiation that can cause degradation of the material. Appurtenance insulation covers shall be removable and re-installalbere-installable. Adhesive tape shall not be used to provide this protection. (ed) **Pipe Insulation ~~for piping and tanks~~** 2. ~~2.~~ **Insulation Thickness.** All Ppiping for multifamily domestic hot water systems shall be insulated to meet the insulation thickness requirements specified in ~~of~~ Table 160.4-A.	These are corrections of formatting, grammar and spelling. SECTION 160.4(e)2B Equation 160.4-A is not being displayed correctly SECTION 160.4(e)3A spelling error. SECTION 160.4(e)2 Font size on 2 is small.	No	No	No
28	NR	Commercial Kitchens	Electrification Readiness	120.6(k)2	Kiri Coakley	Haile Bucaneg	Main electrical service panel shall be sized to accommodate at least two additional 2-pole 50-amp breakers.	Additional text for clarity	No	No	No
29	NR	Commercial Kitchens	Electrification Readiness	120.6(k)1b	Kiri Coakley	Haile Bucaneg	**EXCEPTION 1 to Section 120.6(k):** healthcare facilities. **EXCEPTION 2 to Section 120.6(k):** commercial kitchens with all-electric designs.	Additional exception for kitchens already designed to be all-electric as requested by Compliance Improvement Team (Gina Rodda).	No	No	No
30	SF/MF	Residential HVAC Performance	Refrigerant Charge Verification (Mandatory, Applicable to all non-packaged HVAC)	RA3.2.3.1.5	Kristin Heinemeier	Bach Tsan	Weigh-in Procedure Last sentence: The HVAC Installer shall certify on the Certificate of Installation that the manufacturer's specifications for these procedures have been met. This shall be verified ~~either~~ through on-site observation using procedures in RA 3.2.3.2.	Language clean-up to clarify that RA3.2.3.2 is the only option.	Yes	No	No
31	SF/MF	Residential HVAC Performance	Refrigerant Charge Verification (Mandatory, Applicable to all non-packaged HVAC)	JA 6.1 and RA 3.4.2	Kristin Heinemeier	Bach Tsan		These sections should be removed from the appendices, as the option to use FID as an alternative to charge verification has been removed from Part 6. These sections are long, have been unused, and this will be a useful cleanup.	Yes	No	No
32	MF	Multifamily Envelope	Improved Minimum Wall Insulation	160.1(b)	Avani Goyal	Mikey Shewmaker Payam Bozorgchami	(b) Wall insulation. Opaque portions of above grade walls separating conditioned spaces from unconditioned spaces or ambient air shall meet the following applicable requirements: 1. Metal building—The area-weighted average U-factor of the wall assembly shall not exceed 0.113. 2. Metal framed—The area-weighted average U-factor of the wall assembly shall not exceed ~~0.1510~~0.148. 3. Wood framed and others— A. Nominal 2x4 inch framing shall have an area-weighted average U-factor of the wall assembly not exceeding ~~0.1020~~0.095. B. Nominal 2x6 inch framing shall have an area-weighted average U-factor of the wall assembly not exceeding ~~0.0710~~0.069. C. Other wall assemblies shall have an area-weighted average U-factor of the wall assembly not exceeding 0.102.	Some of the zeros before the decimal points in the updated values were mistakenly stricken in the draft language.	No	No	No
33	MF	Residential HVAC Performance		160.3(b)8B	Brian Selby	Bach Tsan	The installer shall certify on the Certificate of Installation that the control configuration has been tested in accordance with the testing procedure found ~~in~~on the ~~CF2R~~Certificate of Installation	There are no CF2Rs for multifamily buildings. I suggest changing this to "The installer shall certify that the control configuration has been tested in accordance with the testing procedure found on the Certificate of Installation"	No	No	No
34	MF	N/A	N/A	170.2(d)2Bii	Brian Selby		A solar water-heating system meeting the installation criteria specified in Reference Residential Appendix RA4 and with a minimum solar savings fraction of either a or b ~~i or ii~~ below: ~~i~~a. A minimum solar savings fraction of 0.20 in Climate Zones 1 through 9 or a minimum solar savings fraction of 0.35 in Climate Zones 10 through 16; or ~~ii~~b. A minimum solar savings fraction of 0.15 in Climate Zones 1 through 9 or a minimum solar savings fraction of 0.30 in Climate Zones 10 through 16. In addition, a drain water heat recovery system that is field verified as specified in the Reference Appendix RA3.6.9.	The sub-section numbering under Section 170.2(d)2Bii seems to be an incorrect structure. Should start with "a." (i.e. a., b. etc.) Should be 170.2(d)2Biia	No	No	No

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35	MF	Multifamily Envelope	N/A	Table 170.2-A	Nick Brown		Footnote requirements to TABLE 170.2-A: 1. Install the specified R-value with an air space present between the roofing and the roof deck. Such as standard installation of concrete or clay tile. 2. R-values shown for below roof deck insulation are for wood-frame construction with insulation installed between the framing members. Alternatives including insulation above rafters or above roof deck shall comply with the performance standards. 3. Assembly U-factors for exterior framed walls can be met with cavity insulation alone or with continuous insulation alone, or with both cavity and continuous insulation that results in an assembly U-factor equal to or less than the U-factor shown. Use Reference Joint Appendices JA4 Table 4.3.1, 4.3.1(a), or Table 4.3.4 to determine alternative insulation products to be less than or equal to the required maximum U-factor. 4. Mass wall has a heat capacity greater than or equal to 7.0 Btu/h-ft2. 5. Product must be certified to meet the North American Fenestration Standard/Specification for an Architectural Window (AW). 6. Glazed doors must meet the fenestration requirements. 7. Requirements apply to doors included in the Curtainwall/Storefront construction assembly. 8. If using F-factor to comply, use Reference Joint Appendices JA4, Table 4.4.7 to determine alternate depth and R-value to be less than or equal to the required maximum F- factor. 9. Option B meets §170.2(a)1Bii 10. Option C meets §170.2(a)1B~~i~~iii 11. Option D meets §170.2(a)1Biv	Remove footnote 5 on "Walls-Mass Light" (now Footnote 5 applies to AW windows) For consistency, add a footnote to link Roof Option D to 170.2A1Biv (the way we do for Options B and C).	No	No	No
36	NR	Nonresidential HVAC Controls	Guideline 36	100.1(b)	Rupam Singla & Sally Blair	Bach Tsan	Section 100.1(b): The new definition for "Programming Library" is under Lighting Definitions and should not be. Move definition after "PROCESS SPACE" and before "PROPOSED DESIGN BUILDING" and use all CAPS.	Newly added definition for "Programming Library" was misplaced under Lighting Definitions.	No	No	No
37	NR	Nonresidential HVAC Controls	Guideline 36	140.4(r)3, Exception 1	Rupam Singla & Sally Blair	Bach Tsan	Exception 1 to Section 140.4(r)3: Non-programmable (configurable-only) controllers for zone terminal units shall follow applicable ASHRAE Guideline 36 zone sequences referenced in ~~JA15 Table 15.3-1~~ JA18 Table JA18.4-1 but are not subject to programming library requirement in Section 140.4(r)3.	The JA reference was to the incorrect section.	No	No	No
38	NR	Nonresidential HVAC Controls	Guideline 36	Joint Appendix JA1: APPENDIX JA1 – Definitions	Rupam Singla & Sally Blair	Bach Tsan	Joint Appendix JA1: APPENDIX JA1 – Definitions: **ASHRAE GUIDELINE 36** is the American Society of Heating, Refrigerating and Air-Conditioning Engineers document titled "High-Performance Sequences of Operation for HVAC Systems", 2021 (ASHRAE Guideline 36-2021). **PROGRAMMING LIBRARY** is a collection of programming logic used for controlling HVAC equipment with direct digital control systems.	New terms added in new JA18 needed to be defined. Definitions added here, which match the new definitions in Section 100.1(b).	No	No	No
39	NR	Nonresidential HVAC Controls	Guideline 36	JA.18.1	Rupam Singla & Sally Blair	Bach Tsan	**JA~~.~~18.1 Purpose and Scope** Title 24, Part 6, Section 140.4(r) requires that HVAC control systems with DDC use programming originating from a certified programming library based on control sequences of operation described in ASHRAE Guideline 36-~~2023~~2021. This section describes the requirements of the Guideline 36 programming library.	The publication year of the standard was incorrect. To be consistent with the numbering convention throughout the appendices, there should not be a period between JA and 18 (this change should occur throughout the entire JA18 appendix).	No	No	No
40	NR	Nonresidential HVAC Controls	Guideline 36	JA.18.2	Rupam Singla & Sally Blair	Bach Tsan	**JA~~.~~18.2 Certification Submittal Requirements** Each company wishing to certify that their Guideline 36 programming library conforms to the Guideline 36 library requirements of Title 24, Part 6, may do so in a written declaration. This requires that a letter be sent to the California Energy Commission declaring that the Guideline 36 library is complete and conforms to the requirements listed in ~~JA15.3~~JA18.3. The declaration at the end of this section shall be used to submit to the California Energy Commission.	The reference was incorrect. To be consistent with the numbering convention throughout the appendices, there should not be a period between JA and 18 (this change should occur throughout the entire JA18 appendix).	No	No	No
41	NR	Nonresidential HVAC Controls	Guideline 36	JA.18.4	Rupam Singla & Sally Blair	Bach Tsan	**JA~~.~~18.4 Programming Library Requirements** The programming library to be certified shall include complete control logic for all sections from ASHRAE Guideline 36 listed in Table ~~JA15.3-1~~JA18.4-1, and shall meet the minimum validation requirements listed. Table ~~JA15.3-1~~JA18.4-1 Required Guideline 36 Logic for Certified Programming Library	The table number referenced the incorrect section. To be consistent with the numbering convention throughout the appendices, there should not be a period between JA and 18 (this change should occur throughout the entire JA18 appendix).	No	No	No
42	NR	Nonresidential HVAC Controls	Guideline 36	Table JA15.3-1	Rupam Singla	Bach Tsan	*Table ~~JA15.3-1~~ JA18.4-1 Required Guideline 36 Logic for Certified Programming Library* row with Guideline 36 Logic Section "Section 5.16 Multiple-Zone VAV Air-Handling Unit ... ": Update the Minimum Velidation Requirements cell as follows *Fan speed control and duct static pressure setpoint reset using trim and respond logic per 5.16.1* *Supply air temperature control, temperature setpoint reset based on outdoor air temperature and trim and respond logic, and air economizer high limits per 5.16.2* *System outdoor airflow requirements dynamically calculated for Zone Groups in Occupied Mode in accordance with Title 24 ventilation requirements, per 5.16.3.2 Minimum outdoor air control for multiple supported equipment configurations per 5.16.4, 5.16.5, and 5.16.6, using Title 24 ventilation logic ~~Building relief per 5.16.8 and 5.16.9 Return fan control, per 5.16.10 and 5.16.11 Fan, filter, and pressure alarms per 5.16.13~~* *Building relief per 5.16.8 and 5.16.9* *Return fan control, per 5.16.10 and 5.16.11* *Fan, filter, and pressure alarms per 5.16.13* *Automatic FDD based on equipment operating state, including diagnostics based on fault conditions per 5.16.14 Plant Requests per 5.16.16Building relief per 5.16.8 and 5.16.9 Return fan control, per 5.16.10 and 5.16.11 Fan, filter, and pressure alarms per 5.16.13*	Update incorrect table number. Put building relief, return fan control, and fan/filter/pressure alarms criteria on separate lines for clarity.	No	No	No

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43	NR	Nonresidential HVAC Controls	Guideline 36	JA.18.5	Rupam Singla	Bach Tsan	**JA~~.~~18.5 Declaration** Consistent with the requirements of Title 24, Part 6, Sections 100.0(h) and ~~120.2(i)~~ 140.4(r), companies wishing to certify to the California Energy Commission shall execute a declaration under penalty of perjury attesting that all information provided is true, complete, accurate, and in compliance with the applicable provisions of Part 6. Companies may fulfill this requirement by providing the information, signing the declaration below and submitting to the California Energy Commission as as specified by the instructions in JA18.6.	Reference to "120.2(i)" is irrelevant and should be revised to "140.4(r)"	No	No	No
44	NR	Nonresidential HVAC Controls	Guideline 36	JA.18.5, first table	Rupam Singla	Bach Tsan	JA~~.~~18.5: Revise table title to: ICompany Product Line, and Version Number of all libraries being certified ~~Company, Model Name and Number of all devices being certified~~ Revise column headings to: Company, Product Line, Guideline 36 Version, and Library Version.	Revise table and table heading to adequately capture libraries being certified.	No	No	No
45	NR	Nonresidential HVAC Controls	Guideline 36	JA.18.5, third table	Rupam Singla	Bach Tsan	JA~~.~~18.5: Table ~~Manufacturer~~ Company Responsible for Library Development (if different from Certifying Company)	Revise table heading to allow any company to certify library.	No	No	No
46	NR	Nonresidential HVAC Controls	Guideline 36	JA.18.5, Declaration	Rupam Singla	Bach Tsan	JA~~.~~18.5: Declaration: Reference Section I40.4(r) instead of Section 120.2(i). I declare under penalty of perjury under the laws of the State of California that: (1) All the information in this statement is true, complete, accurate, and in compliance with all applicable provisions of ~~Section 120.2(i)~~ 140.4(r) of Title 24, Part 6 of the California Code of Regulations.	The declaration referenced the incorrect section.	No	No	No
47	NR	Nonresidential HVAC Controls	Guideline 36	JA18 footer	Rupam Singla	Bach Tsan	~~Appendix JA6 – HVAC System Fault Detection and Diagnostic Technology~~ Appendix JA18 – Guideline 36 Programming Library Requirements	Incorrect footer.	No	No	No
48	MF	Multifamily Indoor Air Quality	Compartmentalization	RA 3.8, NA 2.3	Marian Goebes	Anushka Raut	Note: the compartmentalization boundary area is the total dwelling unit enclosure area including its walls, ceilings, and floors shared with exterior spaces or adjacent spaces in the building (neighboring units, corridors, elevator shafts, etc.). ~~the interior surface areas of the dwelling unit enclosure walls between dwelling units, exterior walls, ceiling, and floor~~	The original language could be interpreted to include ceilings and floors within a dwelling unit (potentially double counting them). The proposed revision makes it less ambiguous.	No	No	Yes
49	MF	Swimming pool and spa heating	Swimming pool and spa heating	160.7(b)	Sean Steffensen	Danny Tam	(b) Pool and spa systems. Pool and spa systems available to multiple tenants or to the public shall comply with the applicable requirements of Section 110.4. Pool and spa systems installed for exclusive use by a single tenant shall comply with the applicable requirements of Section 150.0(p). Pool and spa systems installed for public use shall comply with Section 150.0(p)2, Section 150.0(p)3, and Section 150.0(p)4.	Correct a typo in the proposed language by the CEC	no	no	no
50	SF	Swimming pool and spa heating	Swimming pool and spa heating	110.4(c) exception 3	Sean Steffensen	Danny Tam	Exception 3 to Section 110.4(c): A pool and/or spa that is heated solely by a solar spool heating system without any backup heater.	There is a typo in this exception s/b pool. Is spool. The intent otherwise is the same as before.	no	no	no
51	SF	Swimming pool and spa heating	Swimming pool and spa heating	110.4(c) exception 5	Sean Steffensen	Danny Tam	Exception 5 to Section 110.4(c): Heating systems which are used exclusively for permanent spa applications where there is inadequate solar access roof area to meet the requirements of section 110.4(c)1 for a solar pool heating system to be installed.	CEC needs to provide specific solar access threshold rather than "adequate" threshold for clarity and to aid enforceability of building standard. Use the existing framework in JA11.4 to calculate solar access roof area. There is also a need to clarify that the exception applies to an evaluation of the roof space only and that no area on the ground surrounding the pool is expected to participate in the solar access determination.	no	no	no
52	NR	Swimming pool and spa heating	Swimming pool and spa heating	JA16.3	Sean Steffensen	Danny Tam	A heat pump pool heater (HPPH) shall be sized using the HPPH manufacturer's specifications. For indoor pools, the HPPH shall be sized per the ASHRAE Handbook, Equipment Volume, Applications Volume and Fundamentals Volume. The following sizing provisions shall be applicable if the HPPH manufacturer's specifications do not include information on HPPH sizing for an outdoor pool:	Add an alternative calculation method based on the ASHRAE applications Handbook for indoor pools. Text for the indoor pool HPPH sizing modeled after 150.0(h)1. space conditioning equipment.	no	no	no
53	SF	Swimming pool and spa heating	Swimming pool and spa heating	110.4(b)3.	Sean Steffensen	Danny Tam	3~~2~~. Covers. Outdoor pools and/or spa with heating equipment that uses electricity or natural gas shall be installed with a pool cover ~~A cover for outdoor pools and/or outdoor spas that have a heat pump or gas heater., and~~	The existing requirement only applies to outdoor pools that have a heat pump or gas heater, a heater that uses utility energy. The CEC has proposed that pool covers be required for any outdoor pool with pool heating equipment. This would include pools with solar heating equipment that are specifically exempted from other requirements in the CEC's proposal. Some solar systems may be sized to adequately heat the pool without use of a pool cover as a convenience to the owner. No utility energy savings would be gained for a pool with only a solar pool heating system that would now be required to have a cover. Also there is no exception for new vs. existing pools for this expansion in scope so there may be difficulty in meeting requirement on the existing pools.	no	no	no
54	SF	Swimming pool and spa heating	Swimming pool and spa heating	150(p)1.A.	Sean Steffensen	Danny Tam	None	The US DOE set standards for dedicated-purpose pool pump motors on November 27, 2023. The CEC should examine requirements for pool pumps and pool pump motors for alignment with the federal standards.	no	no	no

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55	MF	Multifamily Indoor Air Quality	Ventilation	150.0(o),150.0(o)1D,160.2(b)2A,160.2(b)2Aiii , 150.2(b)1Mib, 160.2(b)2Avif, 180.2(b)5Bib,150.0(o)1Gvi, 150.0(o)1l and 160.2(b)2Aviii	Marian Goebes	Anushka Raut	See Appendix B of docketed comments for markup.	Section references when moving from ASHRAE 62.2-2019 to 62.2-2022 need correction. In 150.0(o) ASHRAE 62.2-2019 Section 6.5.2 is a requirement for duct blaster testing. In 62.2-2022, this requirement has moved to Section 6.1.3. Section 6.7 is the filtration requirements (requires MERV 11). Title 24 Part 6 has its own filtration requirements (MERV 13) in Section 150.0(m)12. In 150.0(o)1D: Strike through since exception is added earlier. In 160.2(b)2A: See explanation above for the change of 6.5.2 to 6.1.3, and the addition of 6.7. Also exempt Section 4.2, because that specifies the ventilation system type, and 160.2(b)2Aivb covers that and is slightly different from the 62.2 Section 4.2 requirements. Note that 62.2 Section 4.2 is still applicable to single family units, so no need to exempt 4.2 in T24 P6 Section 150.0(o). In 160.2(b)2Aiii: Strike through since exception is added earlier. In 150.2(b)1Mib, 160.2(b)2Avif, 180.2(b)5Bib,150.0(o)1Gvi, 150.0(o)1l and 160.2(b)2Aviii: This is referring to the same requirement in 62.2-2022 as was referred to in 62.2-2019, but the sound requirement for fans has moved from Section 7.2 to Section 7.3 in the 2022 version of 62.2.	Yes	No	No
56	SF	Multifamily Indoor Air Quality	Ventilation systems	150.1(c)15 Table 150.1-A (continued on the third page)	Marian Goebes	Anushka Raut	See Appendix B of docketed comments for markup.	Table entry is potentially confusing. At first blush, it implies that HRV/ERV IAQ systems are required for Prescriptive compliance, and only upon reading the referenced section (150.1(c)15) is it apparent that it's really only that FID equipped HRV/ERVs are required when they're used to provide ventilation to satisfy 150.0(o). Adding a foot note to clarify HRV/ERV systems are not required in all CZs. To correct a typo: moving footnote 16 relevant to Table 150.1-A from Table 170.2-K. This footnote is about allowing supplemental heating that uses gas less than the specified thermal capacity so belongs in Table 150.1-A.	No	No	No
57	MF	Multifamily Indoor Air Quality	Ventilation systems	Table 170.2-K	Tharanga Jayarathne	Anushka Raut	See Appendix B of docketed comments for markup.	Table 170.2-K and footnotes need updates for consistency with other changes (balanced or supply ventilation, HRV/ERV FID). To correct a typo: moving footnote 2 from Table 170.2-K to 150.1-A. This footnote is about allowing supplemental heating that uses gas less than the specified thermal capacity.	No	No	No
58	NR	Daylighting	Revise auto daylighting control exceptions	130.1(d)	Yao-Jung Wen	Simon Lee	See Appendix B of docketed comments for markup.	See Appendix B for more information.	Yes - Section 160.5(b)4D for MF	No	No
59	NR	Daylighting	Revise auto daylighting control exceptions	130.1(d)	Yao-Jung Wen	Simon Lee	~~Automatic Daylighting~~~~Daylight Responsive~~ Automatic Daylighting Controls	In Section 130.1(d) the term “automatic daylighting controls” has been changed to “daylight responsive controls.” The rationale is to better match the nomenclatures of ASHRAE 90.1 and IECC. However, ASHRAE 90.1 does not have a requirement for demand responsive controls – they have a credit for “load management systems” which do respond to a utility demand response signal. We have a concern that the term “daylight responsive controls” may be confused with Title 24’s pre-existing term “demand responsive controls” (see Section 110.12). Our primary recommendation is to revert "automatic daylighting controls". If the term "daylight responsive controls" is going to be used, we recommend that the term be “daylight responsive lighting controls” to differentiate these controls from the controls that modify the transmittance of chromogenic glazing in response to daylight as described in item i of **Exception 4 to Section 150.1(c)3A** “i. The lower -rated labeled U-factor and SHGC shall be used with **automatic controls** to modulate the amount of solar gain and light into the space transmitted in multiple steps **in response to daylight levels** or solar intensity;…”	Yes - Section 160.5(b)4D for MF	No	No
60	NR	Daylighting	Revise auto daylighting control exceptions	100.1	Yao-Jung Wen	Simon Lee		If the term "daylight responsive controls" is to be used to describe photocontrols for the control of electric lighting, the definitions section needs to be updated. Currently, in **Section 100.1 Definitions and Rules of Construction,** there are definitions for daylight control which should be updated with the exact terminology to reflect whatever term is going to be used in Section 130.1(d) for: **Automatic Daylight Control** adjusts the luminous flux of the electric lighting system in either a series of steps or by continuous dimming in response to available daylight. This kind of control uses one or more photosensors to detect changes in daylight illumination and then automatically adjusts the electric lighting levels in response. **Daylight Continuous Dimming Controls** are a continuous dimming controls that vary the luminous flux in response to available daylight.	Yes - Section 160.5(b)4D for MF	No	No

Remark #	Building Type(s)	CASE Report	CASE Measure	Section(s) of Code	Person Making Recommendation	CEC Staff Lead	Language Markup (deletions marked with red ~~strikethroughs~~; additions marked with red underlining)	Justification	Is the Change needed for both single family and multifamily?	Does the language change affect energy saving cost or cost effectiveness?	Does the change to language affect HERS or ATT procedure?
61	NR	Daylighting	Revise auto daylighting control exceptions	Reference Appendices NA 7.6.1	Yao-Jung Wen	Simon Lee		If the term "daylight responsive controls" is to be used to describe photocontrols for the control of electric lighting, all the instances in the Reference Appendices NA7.6.1 need to be updated according to reflect the change in the standard.	No	No	No
62	NR	Daylighting	Revise auto daylighting control exceptions	130.1(d)2	Yao-Jung Wen	Simon Lee	Add the following new item D to 130.1(d)2 and renumber the subsequent items. D. Daylit zones are considered to be controlled independently if they are controlled by separate automatic daylight controls or with a multiple zone automatic daylight control with separate settings for different zones.	This clarification would address the ongoing questions Title 24 receives.	Yes - Section 160.5(b)4D for MF	No	No
63	NR	Nonresidential Envelope	Vestibules	120.7(e)	Maureen Guttman	Payam Bozorgchami	(e) Vestibules. *Public entrances* in buildings....	Italicize defined term (T24, Part 2, Chapter 2)	N/A	No	No
64	NR	Nonresidential Envelope	Vestibules	120.7(e)1	Maureen Guttman	Payam Bozorgchami	The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any ~~main~~ *public entrance* doors adjacent to revolving doors.	Use and italicize defined term (T24, Part 2, Chapter 2)	N/A	No	No
65	SF	High Performance Envelope	Windows	150.1(c)3A	Simon Pallin	Payam Bozorgchami	**Exception 1 to Section 150.1(c)3A:** New dwelling units with a conditioned floor area of 500 square feet or less in Climate Zones 5 ~~through 10 and Climate Zone 15~~ may comply with a maximum U-factor of 0.30.	Exception 1 to Section 150.1(c)3A is redundant and should only apply to Climate Zone 5. Also note a type-of in the word "or" (it shows as "orf" after the word 'feet').	No	No	No
66	MF	Multifamily Indoor Air Quality	Ventilation systems	160.2(b)2Biii, 160.3(b)5K	Marian Goebes	Anushka Raut	In 160.2(b)2Biii: At a minimum, systems with heat or energy recovery serving a single dwelling unit shall have a fan efficacy of ≤1.0 W/cfm as confirmed by ~~HERS~~ ECC-Rater or ATT field verification in accordance with Reference Appendix RA3.7.4.4 or NA2.2.4.1.5 as applicable. In 160.3(b)5K: Duct system sealing and leakage testing. When space-conditioning systems utilize forced air duct systems to supply conditioned air to an individual dwelling unit, the ducts shall be sealed, as confirmed through ECC-Rater or ATT field verification and diagnostic testing, in accordance with all applicable procedures specified in Reference Residential Appendix RA3.1	ECC-Rater or ATT terminology should be consistent with other field verification requirements.	No	No	Yes
67	MF	Multifamily Indoor Air Quality		Various including 120.6(c)4 and 150.0(m)12Biib	Marian Goebes	Anushka Raut	In Section 120.6(c)4. CO concentration at all sensors is maintained at ~~≤~~£ 25 ppm or less at all times. In Section 150.0(m)12Biib: Vface = air filter face velocity ~~≤~~£150, ft/min.	There are a few places where the British pound symbol (£) seems to be used instead of the less than or equal to symbol (≤). Here are a few locations, but the CASE team recommend the Energy Commission do a search for £ to see if there are others.	Yes	No	No
68	MF	Multifamily Restructuring	Central Ventilation Shaft Sealing	160.3(d)2A	Lucy Albin	Mikey Shewmaker Payam Bozorgchami	Multifamily building central ventilation ducts ~~in multifamily buildings with four or more habitable stories~~ subject to Section 160.2(b)2C shall be leak tested in accordance with NA7.18.3.	This language needs to be updated to expand the scope of the central ventilation acceptance test to multifamily buildings with three or fewer habitable stories.	No	No	No
69	SF	N/A	N/A	150.0(k)1A	Jon McHugh	Simon Lee	Modified 5/1/24: A. Luminaire efficacy. All installed luminaires and light sources shall ~~meet the requirements in Table 150.0-A~~ comply with Reference Joint Appendix JA8~~, and shall be certified and marked as required by JA8~~ . Compliant luminaires or light sources shall be marked by the manufacturer "JA8-20xx" or for elevated temperature products "JA8-20xx-E." The "20xx" portion of the marking shall be refers to the version of JA8 requirements that the product complies. Products complying with 2016, 2019, 2022, and 2025 versions of JA8 shall be deemed compliant.	See Appendix B for justification and additional explanation.	No	No	No
70	SF	N/A	N/A	150.0(k)1D	Jon McHugh	Simon Lee	D. Light sources in enclosed or recessed luminaires. Lamps and other separable light sources in enclosed or recessed luminaires shall be in ~~that are not compliant~~ compliance with the JA8 elevated temperature requirements, including marking requirements~~, shall not be installed in enclosed or recessed luminaires~~. Compliant elevated temperature luminaires or light sources shall be marked "JA8-20xx-E." The "20xx" portion of the marking shall be refers to the version of JA8 requirements that the product complies. Products complying with 2016, 2019, 2022, and 2025 versions of JA8 shall be deemed compliant.	Modify 150.0(k)1D as follows to simplify and clarify compliance without having to send the code user to Reference Appendix JA8. See the justification provided for the recommendation made to 150.0(k)1A if one would prefer to have the marking detail covered in JA8 instead of the text of the standard. A significant portion of residential luminaires are recessed or enclosed. This includes light engines in recessed cans, and decorative luminaires with lamps inside of enclosed fixtures.	No	No	No
71	NR	N/A	N/A	130.1(c)7	Jon McHugh	Simon Lee	7. Partial-OFF occupant sensing controls. Partial-OFF occupant sensing controls are required to control lighting in the following spaces when they are sensed as unoccupied but the building is scheduled as occupied: in specified stairwells and common area corridors, parking garages, parking areas, and loading and unloading areas. A. In corridors and stairwells, lighting shall be controlled by occupant sensing controls that separately reduce the lighting power in each space by at least 50 percent when the space is unoccupied. The occupant sensing controls shall be capable of automatically turning the lighting fully ON only in the separately controlled space and shall be automatically activated from all designed paths of egress. Lighting in stairwells and common area corridors that provide access to guestrooms of hotel/motels shall meet requirements of this section instead of complying with Section 130.1(c)1. B. In parking garages, parking areas and loading and unloading areas, general lighting shall be controlled by occupant sensing controls that meet the requirements below instead of complying with Section 130.1(c)1: i. The occupant sensing controls shall uniformly reduce lighting power in the control zone to between 20 percent and 50 percent of full power and with at least one control step; and. ii. No more than 500 watts of rated lighting power shall be controlled together as a single zone; and. iii. The occupant sensing controls shall be capable of automatically turning the lighting fully ON only in the separately controlled space, and shall be automatically activated from all designed paths of egress. Interior areas of parking garages are under the classification of indoor lighting and shall comply with Section 130.1(c)7B. Parking areas on the roof of a parking structure are under the classification of outdoor hardscape and shall comply with Section 130.2.	Recommendation to restore part of 130.1(c)7 as follows and delete the corresponding language from Section 130.1(c)6. This does not change the requirements only makes it easier to quickly understand the main requirement.	Yes - Section 160.5(b)4Cvii for MF	No	No

Remark #	Building Type(s)	CASE Report	CASE Measure	Section(s) of Code	Person Making Recommendation	CEC Staff Lead	Language Markup (deletions marked with red ~~strikethroughs~~; additions marked with red underlining)	Justification	Is the Change needed for both single family and multifamily?	Does the language change affect energy saving cost or cost effectiveness?	Does the change to language affect HERS or ATT procedure?
72	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.0(h)1 and 160.3(b)1	Kristin Heinemeier	Bach Tsan	**Building cooling and heating loads**. Room-by-room ~~Building~~ heating and cooling loads shall be determined using a method based on any one of the following:	This suggested language addition resolves confusion introduced from new Exception 1. The exception allows block Loads for additions. This raised the question about whether block loads are specifically not allowed for other cases. The recommended edit clarifies this. Also see substantive item #13 for related edits to 160.3(b)1.	Yes	No	No
73	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.0(h)2B, 160.3(b)2B and 170.2(c)2C	Kristin Heinemeier	Bach Tsan	Outdoor design conditions shall be selected from ~~one of the following:~~ ~~i.~~ Reference Joint Appendix JA2, which is based on data from the ~~2021~~ ASHRAE Climatic Data for Region X~~,~~ ~~or~~ ~~ii. The ASHRAE Handbook, Equipment Volume, Applications Volume and Fundamentals Volume; or~~ ~~iii. The SMACNA Residential Comfort System Installation Standards Manual; or~~ ~~iv. The ACCA Manual J. "~~	Suggest removing the proposed modification as ii and iii do not have design conditions listed in them and ACCA Manual J has a much shorter list of California cities than JA2.	Yes	No	No
74	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.0(h)5B	Kristin Heinemeier	Bach Tsan	No change recommended.	The CASE Team is providing feedback on a comment raised at Lead Commissioner Workshop regarding sizing requirements and whether they are in conflict with ENERGY STAR, particularly the prohibition on undersizing heat pump heating which can lead to oversized cooling. The CASE Team does not think there are conflicts, see the Appendix for further details.	Yes	No	No
75	MF	Domestic Hot Water	Pipe Insulation Enhancement	160.4(e)1B 100.1(b)	Amin Delagah	Danny Tam	160.4(e)1B Insulation on the piping and domestic hot water system appurtenances shall be continuous. Section 100.1(b) **DOMESTIC HOT WATER SYSTEM APPURTENANCE** are all elements that are in series in a domestic hot water distribution system, including fittings (elbows, tees, flanges, etc.), pumps, valves (isolation, mixing, balancing, check, etc.), ~~pipe supports and hangers,~~ strainers, hose bibs, coil u-bends, meters, sensors, heat exchangers and air separators.	Language markup to SECTION 160.4(e)1B. is intended to make lookup easier in SECTION 100.1 since this is the first time DHW system appurtenance is mentioned in section 160.4(e). It's difficult to locate it in section 100.1, if looking for a term that begins with A instead of D. Pipe hangers and supports are not installed inline with piping, which is the CPC definition for plumbing appurtenance. There is already language in 160.4(e)C that calls out pipe supports, hangers, and pipe clamps and that rigid insulation shall be installed inside of the clamp or hanger so this definition revision doesn't omit them from the code measure.	No	No	No
76	NR	Nonresidential Envelope	N/A	141.0(b)2Q	Jon McHugh	Payam Bozorgchami	Existing building envelope wall where at least 25% or more of the wall area is being altered must comply with Section 140.3(a)9. Where the building is tested in accordance with the procedures for whole building air leakage in NA5 ~~NA2.4~~ and the tested leakage rate exceeds 0.4 cfm/ft^2 of building shell at 75 pa. A Visual Inspection and Diagnostic Evaluation shall be done in accordance with NA5.7 ~~NA2.4.7~~ and all observed leaks shall be sealed where such sealing can be made without destruction of existing building components.	There is no NA2.4 or NA2.4.7	No	No	No
77	MF	Multifamily Indoor Air Quality		JA17	Marian Goebes	Anushka Raut	**Appendix JA17 – Qualification Requirements for ~~Heat/Energy Recovery~~ Ventilation System ~~(HRV/ERV)~~ Fault Indicator Displays (FIDs)** JA17.1 Introduction Joint Appendix JA17 provides the technical specifications for fault indication display devices (FIDs) that provide visual and/or audible indications that HRV/ERV systems, and balanced or supply-only systems that require an FID according to 150.0(o)1Civ or 160.2(b)2Axia, maintain their rated airflow and fan efficacy for the life of the equipment.	The FID requirements in JA17 apply to HRV/ERVs, as well as balanced or supply-only systems that are required under the exceptions within 150.0(o)1Cir or 160.2(b)2Axia	Yes	No	No
78	MF/NR	Nonresidential HVAC Controls	Guideline 36	140.4(r)3 160.3(a)2Hviii	Rupam Singla	Bach Tsan	140.4(r)3 The programming library shall be certified ~~by~~ to the Energy Commission as meeting the requirements of JA18. 160.3(a)2Hviii. The FDD system shall be certified ~~by~~ to the Energy Commission as meeting the requirements of Sections 160.3(a)2Hi through 160.3(a)2Hvii in accordance with Section 110.0 and JA6.3.	Make correction so language is referencing defined terms.	Yes	No	No
79	NR, MF	Lighting Code Cleanup	Lighting	Table 140.6-C	Gina Rodda	Simon Lee	No markup recommendations. Update table to address ambiguity on how many allowances can be used for each Primary Function Area.	Table 140.6-C is confusing because there are multiple rows with the same Primary Function Area and it is not clear how many credits are available for each Primary Function Area. This can be resolved with 2 steps: add a footnote to Table 140.6-C that clarifies multiple Additional Allowances can be used in same Primary Function Area. Example: Aging Eye/Low-vision Dining area can use both Decorative/Display (0.3 W/sqft) and Tunable white/dim to warm (0.1 W/sqft). Next, be consistent in the contents of the Primary Function Area and Allowed LPD for General Lighting columns. Some rows repeat Primary Function Area, some have "NA", and some rows repeat general lighting LPD.	No	No	No

Appendix A: Substantive Additional Mark-up Language

The appendix provides code language mark-ups for longer edits that did not fit into the table format in Table 1.

Remark # 2 (Substantive) | Multifamily Restructuring, Skylight Properties (Additions and Alterations)

Table 180.2-B Altered Fenestration Maximum U-Factor and Maximum RSHGC (Continue)

Building Type	Feature	CZ 1	CZ 2	CZ 3	CZ 4	CZ 5	CZ 6	CZ 7	CZ 8	CZ 9	CZ 10	CZ 11	CZ 12	CZ 13	CZ 14	CZ 15	CZ 16
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
Skylights, ~~4 habitable stories and greater~~	RSHGC	~~0.35~~ NA	0.25	~~0.25~~ NA	0.25	~~0.25~~ NA	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	NA
Skylights, ~~4 habitable stories and greater~~ Serving Common Areas	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

Remark #4 (Substantive) | Multifamily Envelope, Cool Roof

TABLE 170.2-A ENVELOPE COMPONENT PACKAGE – Multifamily Standard Building Design

Building Component - Roofs and Ceilings	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 5**	**CZ 6**	**CZ 7**	**CZ 8**	**CZ 9**	**CZ 10**	**CZ 11**	**CZ 12**	**CZ 13**	**CZ 14**	**CZ 15**	**CZ 16**
Option B[9] Below Roof Deck Insulation [1,2] (with air space)	NR	NR	NR	R19	NR	NR	NR	R19	R19	R13	R19	R19	R19	R19	R19	R13
Option B[9] 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
Option B[9] Radiant Barrier	NR	REQ	REQ	NR	REQ	REQ	REQ	NR	NR	NR	NR	NR	NR	NR	NR	NR
Option B[9] Low-Slope-Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.63	NR	0.63	NR
Option B[9] Low-Sloped-Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	NR	0.75	NR
Option B[9] Low-Sloped-Solar Reflectance Index	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	75	NR	75	NR
Option B[9] Steep-Sloped-Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	~~0.20~~0.25	~~0.20~~0.25	0.20	~~0.20~~0.25	0.20	~~0.20~~0.25	NR
Option B[9] Steep-Sloped-Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	~~0.~~ ~~75~~0.80	~~0.~~ ~~75~~0.80	0.75	~~0.~~ ~~75~~0.80	0.75	~~0.~~ ~~75~~0.80	NR
Option B[9] Steep-Sloped-Solar Reflectance Index	NR	NR	NR	NR	NR	NR	NR	NR	NR	~~16~~23	~~16~~23	16	~~16~~23	16	~~16~~23	NR
Option C[10]-Ceiling Insulation	R 38	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 38	R 38	R 38	R 38	R 38	R 38
Option C[10]-Radiant Barrier	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR
Option C[10] Low-Sloped-Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.63	NR	0.63	NR
Option C[10] Low-Sloped-Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	NR	0.75	NR
Option C[10] Low-Sloped-Solar Reflectance Index	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	75	NR	75	NR
Option C[10] Steep-Sloped-Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.20	0.20	0.20	0.20	0.20	0.20	NR
Option C[10] Steep-Sloped-Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0. 75	0.75	0.75	0.75	0.75	0.75	NR
Option C[10] Steep-Sloped-Solar Reflectance Index	NR	NR	NR	NR	NR	NR	NR	NR	NR	16	16	16	16	16	16	NR
Option D[11]-Metal Building U-factor	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041
Option D[11]-Wood Framed and Other U-factor	0.028	0.028	0.034	0.028	0.034	0.034	0.039	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028
Option D[11] Low-Sloped-Aged Solar Reflectance	NR	~~NR~~0.63	NR	~~NR~~0.63	NR	~~NR~~0.63	~~NR~~0.63	~~NR~~0.63	0.63	0.63	0.63	~~NR~~0.63	0.63	0.63	0.63	NR
Option D[11] Low-Sloped-Thermal Emittance	NR	~~NR~~0.75	NR	~~NR~~0.75	NR	~~NR~~0.75	~~NR~~0.75	~~NR~~0.75	0.75	0.75	0.75	~~NR~~0.75	0.75	0.75	0.75	NR
Option D[11] Low-Sloped-Solar Reflectance Index	NR	~~NR~~75	NR	~~NR~~75	NR	~~NR~~75	~~NR~~75	~~NR~~75	75	75	75	~~NR~~75	75	75	75	NR
Option D[11] Steep-Sloped-Aged Solar Reflectance	NR	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	NR
Option D[11] Steep-Sloped-Thermal Emittance	NR	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	NR
Option D[11] Steep-Sloped-Solar Reflectance Index	NR	16	16	16	16	16	16	16	16	16	16	16	16	16	16	NR

Remark # 6 (Substantive) | Multifamily Envelope, High Performance Windows

Table 180.2-B Altered Fenestration Maximum U-Factor and Maximum RSHGCI

Building Type	Feature	CZ 1	CZ 2	CZ 3	CZ 4	CZ 5	CZ 6	CZ 7	CZ 8	CZ 9	CZ 10	CZ 11	CZ 12	CZ 13	CZ 14	CZ 15	CZ 16
Curtainwall / Storefront / Window Wall ~~and Glazed Doors~~[1]	U-factor	0.38	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.38
Curtainwall / Storefront / Window Wall ~~and Glazed Doors~~[1]	RSHGC	~~0.35~~ NR	0.26	~~0.26~~ NR	0.26	~~0.26~~ NR	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	~~0.25~~ NR
Curtainwall / Storefront / Window Wall ~~and Glazed Doors~~[1]	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
NAFS 2017 Performance Class AW - Window – Fixed[1]	RSHGC	~~0.35~~ NR	0.25	~~0.25~~ NR	0.25	~~0.25~~ NR	0.31	0.31	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	~~0.25~~ NR
NAFS 2017 Performance Class AW - Window – Fixed[1]	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
NAFS 2017 Performance Class AW - Window – Operable[1]	RSHGC	~~0.35~~ NR	0.24	~~0.24~~ NR	0.24	~~0.24~~ NR	0.31	0.31	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	~~0.24~~ NR
NAFS 2017 Performance Class AW - Window – Operable[1]	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~~ 0.28	0.30	~~0.30~~ 0.28	~~0.30~~ 0.28	~~0.30~~ 0.28	0.30	0.34	0.30	0.30	0.30	~~0.30~~ 0.28	0.30	~~0.30~~ 0.28	~~0.30~~ 0.28	~~0.30~~ ~~0.28~~ 0.30	~~0.30~~ 0.28
All Other Windows and Glazed - Doors[1]	RSHGC	~~0.35~~ NR	0.23	~~0.23~~ NR	0.23	~~0.23~~ NR	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	~~0.23~~ NR
~~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~~
~~Skylights, 3 habitable stories and fewer~~	~~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~~

Remark # 17 (Substantive) | Multifamily Indoor Air Quality (Single Family), Ventilation Systems

C. **Whole-dwelling unit mechanical ventilation for single-family ~~detached and townhouses~~dwellings.**

i. Whole-dwelling unit mechanical ventilation for single family detached and townhouses

Single-family detached dwelling units, and attached dwelling units not sharing ceilings or floors with other dwelling units, occupiable spaces, public garages, or commercial spaces shall have mechanical ventilation airflow as specified in Subsections ~~i~~a, ~~ii~~b, and ~~iii~~c below.

~~i.~~ a. **Total Required Ventilation Rate [ASHRAE 62.2:4.1.1].**

The total required ventilation rate shall be calculated using Equation 150.0-B.

$Q_{tot} = 0.03A_{floor} + 7.5(N_{br} + 1)$ (Equation 150.0-B)

where

Q_{tot}	=	total required ventilation rate, cfm
A_{floor}	=	dwelling-unit floor area, ft^2
N_{br}	=	number of bedrooms (not to be less than 1)

~~ii.~~ **b. Effective Annual Average Infiltration Rate.** The effective annual average infiltration rate shall be determined in accordance with Subsections ~~a~~1 and ~~b~~2:

~~a~~1. An enclosure leakage rate in cubic feet per minute at 50 Pa (0.2 inch water) (Q_{50}) shall be determined by either Subsection ~~1~~A, or Subsection ~~2~~B below.

~~1~~A. Q_{50} shall be calculated based on the conditioned volume of the dwelling unit and a default value for dwelling unit envelope leakage of 2 air changes per hour at 50 PA (0.2 inch water) (2 ACH_{50}) as specified by equation 150.0-C below.

$Q_{50} = V_{du}$ x 2 ACH_{50}/60 min (Equation 150.0-C)

where

Q_{50}	=	leakage rate at 50 Pa.
V_{du}	=	dwelling unit conditioned volume, ft^3.

ACH_{50} =air changes per hour at 50 Pa (0.2 inch water).

~~2~~B. If dwelling unit envelope leakage less than 2 ACH_{50} is confirmed by field verification and diagnostic testing, Q_{50} shall be calculated according to Equation 150.0-D below, using the value for dwelling unit envelope leakage less than 2 ACH_{50} verified by the procedures specified in Reference Residential Appendix RA3.8.

$Q_{50} = V_{du}$ x *Verified* ACH_{50}/60 min

where

Q_{50} = leakage rate at 50 Pa
(Equation 150.0-D)

V_{du} = dwelling unit conditioned volume, ft^3.

ACH_{50} = air changes per hour at 50 Pa (0.2 inch water).

~~b~~2. The Effective Annual Average Infiltration Rate (Q_{inf}) shall be calculated using Equation 150.0-E [ASHRAE 62.2:4.1.2.1].

$Q_{inf} = 0.052 \times Q_{50} \times wsf \times [H/H_r]^z$ (Equation 150.0-E)

where

Q_{inf} = effective annual infiltration rate, cfm (L/s)

Q_{50} = leakage rate at 50 Pa from equation 150.0-C, or equation 150.0-D

wsf = weather and shielding factor from Table 150.0-D

H = vertical distance between the lowest and highest above-grade points within the pressure boundary, ft (m)

H_r = reference height, 8.2 ft (2.5 m)

z = 0.4 for the purpose of calculating the Effective Annual Average Infiltration Rate

~~iii.~~ c. Required Mechanical Ventilation Rate [ASHRAE 62.2:4.1.2]

The Required Mechanical Ventilation Rate (Q_{fan}) shall be calculated using Equation 150.0-F.

Qfan = Qtot – *F* (Qinf × Aext) (Equation 150.0-F)

where

Q_{fan} = required mechanical ventilation rate, cfm (L/s).

Q_{tot}= total required ventilation rate, cfm (L/s) from Equation 150.0-B.

Q_{inf} = effective annual average infiltration rate, cfm (L/s) from Equation 150.0-E.

A_{ext} = 1 for single-family detached homes, or the ratio of exterior envelope surface area that is not attached to garages or other dwelling units to total envelope surface area for attached dwelling units not sharing ceilings or floors with other dwelling units, occupiable spaces, public garages, or commercial spaces.

F = 1 for balanced ventilation systems and Q_{inf}/Q_{tot} otherwise.

~~iv. Requirements for balanced and supply only ventilation systems~~

~~a. IAQ filter and HRV/ERV accessibility. System air filters and HRV/ERV heat/energy recovery cores shall be located such that they are accessible for service from within occupiable spaces, basements, garages, balconies, and mechanical closets. Filters and heat/energy cores behind access panels, access doors, or grilles located no more than 10 feet above a walking surface inside a space specified above comply with this requirement.~~

Exception to Section 150.0(o)1C ivai(d)1: Systems that require servicing from inside the attic shall have the following:

1. An Fault Indicator Display (FID) meeting the requirements of Reference Appendix JA17; and

2. An attic access door located in a wall or, where attic access is provided through a ceiling, an attic access hatch that includes an integrated ladder;, and

3. A walkway from the attic access door to the HRV/ERV.

b . IAQ System component accessibility: Fans, motors, heat exchangers, filters and recovery cores shall meet all applicable requirements of California Mechanical Code Section 304.0 accessibility for service.

c. Outdoor air intake design: Outdoor air intakes shall comply with California Mechanical Code Section 402.4.1.

d. Outdoor air intake location and accessibility: To provide access for cleaning, outdoor air intakes shall be accessible. Air intakes located not more than 10 feet above a walking surface comply with this requirement. If located on roofs, they shall meet the requirements of California Mechanical Code Section 304.3.1.

Exception to Section 150.0(o)1Civdi(d)4: Outdoor air intake serving equipment with an FID meeting requirements of Reference Appendix JA 17.

ii. **Whole-dwelling unit mechanical ventilation for vertically-attached single-family dwellings.** Vertically-attached single-family dwellings which share ceilings or floors with other dwelling units, occupiable spaces, public garages, or commercial spaces, shall have mechanical ventilation airflow provided at rates greater than or equal to the value determined in accordance with Equation 150.0-G.

Total Required Ventilation Rate [ASHRAE 62.2:4.1.1].

$$Q_{tot} = 0.03A_{floor} + 7.5(N_{br} + 1) \quad \text{(Equation 150.0-G)}$$

WHERE:

Q_{tot} = total required ventilation rate, cfm A_{floor} = dwelling-unit floor area, ft^2

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

iii. Requirements for balanced and supply only ventilation systems

Single-family dwelling units using balanced or supply-only ventilation systems to meet Section 150.0(o)1Ci or Section 150.0(o)1Cii, shall meet subsections a, b, c, and d below.

a. IAQ filter and HRV/ERV accessibility. System air filters and HRV/ERV heat/energy recovery cores shall be located such that they are accessible for service from within occupiable spaces, basements, garages, balconies, and mechanical closets. Filters and heat/energy cores behind access panels, access doors, or grilles located no more than 10 feet above a walking surface inside a space specified above comply with this requirement.

Exception to Section 150.0(o)1Ciia: Systems that require servicing from inside the attic shall have the following:

1. A Fault Indicator Display (FID) meeting the requirements of Reference Appendix JA17; and
2. An attic access door located in a wall or, where attic access is provided through a ceiling, an attic access hatch that includes an integrated ladder; and
3. A walkway from the attic access door to the HRV/ERV.

a. IAQ System component accessibility: Fans, motors, heat exchangers, filters and recovery cores shall meet all applicable requirements of California Mechanical Code Section 304.0 accessibility for service.

b. Outdoor air intake design: Outdoor air intakes shall comply with California Mechanical Code Section 402.4.1.

c. Outdoor air intake location and accessibility: To provide access for cleaning, outdoor air intakes shall be accessible. Air intakes located not more than 10 feet above a walking surface comply with this requirement. If located on roofs, they shall meet the requirements of California Mechanical Code Section 304.3.1.

Exception to Section 150.0(o)1Ciid: Outdoor air intake serving equipment with an FID meeting requirements of Reference Appendix JA 17.

Remark # 18 (Substantive) | Multifamily Domestic Hot Water | Individual HPWH Ventilation

Justification

Stakeholders identified to the CASE Team a potential concern about allowing HPWH ventilation to move air from inside the pressure boundary of a building to outside the pressure boundary. This primarily concerns a scenario where a HPWH installed in an interior space with the exhaust directly ducted to outside. This would depressurize the house with approximately 100 to 200 cfm while the HPWH is operating, depending on the unit and duct configuration. The concerns are that this could impact the safety of gas appliances through backdraft, the performance of space conditioning equipment through increased infiltration, and indoor air quality in multifamily buildings by disrupting the operation of balanced ventilation systems.

While backdraft of gas appliances within the pressure boundary is a possibility in this scenario, it is very unlikely. Gas storage water heaters are typically the significant backdraft concern in residential buildings. As the scenario involves installing a HPWH instead of a gas water heater, a gas water heater would not be present. Other potential gas appliances include a furnace, range, and clothes dryer, which would also not be a concern for backdraft in this scenario for the following reasons:

- Installing a furnace in such a way that it receives combustion air from indoors is difficult. Though technically allowed by code, it is vanishingly rare.
- The range is not a backdraft concern, as gas ranges always backdraft by design.

- The clothes dryer is not a backdraft concern, as its ventilation is driven by a blower.

The greater concern to the CASE Team is the impact on space conditioning system performance and indoor air quality ventilation systems in multifamily. In the scenario of concern, HPWH exhaust airflow would be intermittent. The length and frequency of exhaust events would depend on DHW loads, but likely more frequent and of longer duration than for other exhausts (e.g. bath fans and kitchen hoods), which could affect balanced ventilation systems.

However, this scenario of an indoor HPWH with an exhaust ducted to the outside is a frequently utilized installation method (especially in single family) and allowed by manufacturers. Altering the 45-Day Express Terms to disallow this type of installation could be opposed by the manufacturers and other stakeholders.

Therefore, the CASE Team proposes adding a non-regulatory note following 110.3(c)7B3v and providing additional guidance in the Compliance Manuals on this issue, to encourage designers and installers to consider the impacts of increased intermittent exhaust-only ventilation on space conditioning equipment performance and balanced ventilation systems for indoor air quality.

Language Markup

"NOTE: Ducting only the inlet or exhaust across the pressure boundary could interfere with balanced ventilation systems. This should be considered when specifying HPWH location and ventilation method."

Remark # 22 (Substantive) | Nonresidential, Section 130.1(b)

Title- changing the title from "Multilevel lighting controls" to "Dimmable Lighting" signifies that the base requirement is no longer a multi-level lighting control but rather dimmable lighting. Multi-level (step switching) lighting is only allowed as an exception to the requirement in very limited cases. This is different from the 2022 multi-level control requirements in Table 130.1-A which required continuous dimming for some light sources and various types of stepped switching of stepped dimming for other light sources. LED and incandescent light sources were required to be continuous dimming and fluorescent, HID and Induction lighting were allowed to have fewer control steps. By 2025, the fluorescent lamps used in general lighting will be banned in California due to their mercury content. The market share of HID and induction lamps have declined precipitously due to competitive pressures from LED light sources. As a result, the main requirement is for continuously dimmable lighting with an exception to allow HID and induction lighting to be multilevel.

Clarity concerning manual dimming controls. When this section was introduced in 2013, the primary requirement was written in terms of the controllability of the luminaire.

Each general lighting luminaire had to be capable of providing more than one light level and they had to be controlled by at least one control that would make use of the intermediate light levels. Each luminaire had to be controlled by one of following methods: Manual dimming, Lumen maintenance, High-end trim (tuning), daylighting controls or DR controls. In other words, manual dimming was not required if one of the other controls was utilizing the controllability of the light source.

In the 2016 version of the Energy Code, the control was required to be a dimmer but then specifically exempted applications in Sections 130.1(c)6 and 7 where partial or full occupancy controls were required (offices, multipurpose, conference rooms, warehouses, library stacks, corridors, stairwells, and parking garages). The 2016 changes recognized that manual dimming was not cost-effective if occupancy sensing was used in the space types that often would also have partial off dimming. However, both the daylighting controls and DR controls requirements required controls in accordance with the uniformity requirements of Table 130.1-A (multi-level control within the luminaire).

No longer included in the list of controls that displaced manual controls were lumen maintenance controls, high-end trim (tuning) controls or DR controls. Lumen maintenance controls, and high-end trim controls did not have any direct recognition by the standards as required or for compliance credit. Both controls reset the maximum power needed at any time, whereas the manual dimming provides reduced light output at specific times when less light is needed. Similarly, the DR controls reduce lighting power for around 40-100 hours per year, thus a significant number of hours remain where manual dimming might provide a benefit.

In comparison, partial off controls are controls that can be adjusted up and down by the installing contractor or by facility maintenance and reduce lighting power for the many hours that the designated spaces are unoccupied, but the building is occupied.

In the 2019 version of T-24, pt 6, clarity was lost in that “general lighting …shall provide multi-level controls that allow the lighting to be adjusted up and down.” Was this intending manual controls provide this adjustment or can automatic controls be adjusted up and down? The compliance manual provides limited interpretation: “Multilevel lighting controls allow the lighting level to be adjusted to accommodate how a room is being used.”

In 2022, the main requirement did not change but split out the number of control steps and the uniformity requirements. It is still unclear if a manual dimmer was required.

The proposed modification to the 45-Day Express Terms clarifies the requirements; the light source has to be dimmable and have at least one control that makes use of dimmability: 1) manual dimmers 2) continuous dimming automatic daylighting control or 3) dimming partial off occupant sensing controls. Minimal compliance with the manual

controls requirements of Section 130.1(a) would still on/off manual controls. The areas where dimmable partial off occupant sensing controls would be used include: corridors, stairs, library stacks, parking garages, and warehouses.

Remarks # 32 and 33 (Substantive) | Swimming Pool and Spa Heating | 110.4(c) Exception 2

The Statewide CASE Team ha already provided the following comments to CEC staff. We have also discussed the swimming pool proposal with CEC staff. We are not requesting revisions to the 45-Day Express Terms, but are documenting our feedback here.

The Title 24 CASE Team has studied the issues presented in the letter from the Pool and Hot Tub Alliance (PHTA) from January 19, 2024, and found that our analysis does not align with several of their assertions. The CASE Team believes the decision to exempt all nonresidential and multifamily alterations goes too far and that there are many buildings that could feasibly and cost-effectively employ solar thermal collectors or heat pump pool heaters to heat their pools.

By extending the alterations exception to all nonresidential and multifamily building types ignores other market actors and citizens that will be negatively impacted by this change, such as those from the solar industry, heat pump industry, environmental sector, and local communities with decarbonization goals.

Exempting all nonresidential and multifamily buildings represents a lost opportunity for savings available to the state and denies building owners and their residents the energy, cost and environmental benefits as documented in the Final Swimming Pool and Spa Heating CASE Report. The CASE Team estimates the lost savings to be 547 million kBtu first year source energy savings and therefore significantly impede progress towards the state's energy efficiency and decarbonization goals. This represents an estimated loss of 33.2 percent of the total CASE Team measure portfolio source energy savings for the 2025 code cycle.

Table 41 from the Final Swimming Pool and Spa Heating CASE report is shown below to illustrate the loss in savings. The strike through represents the lost savings from extending the exception to nonresidential alterations.

Table 41: Statewide Energy and Energy Cost Impacts – New Construction, Additions, and Alterations

Application Type	Construction Type	First-Year Electricity Savings (GWh)	First-Year Peak Electrical Demand Reduction (MW)	First -Year Natural Gas Savings (Million Therms)	First-Year Source Energy Savings (Million kBtu)	30-Year Present Valued Energy Cost Savings (PV$ Million)
Nonresidential	New Construction & Additions	N/A	N/A	0.7	61.3	36
	Alterations	N/A	N/A	0.0 ~~6.1~~	0.0 ~~547.7~~	0.0 ~~322~~
	Total	N/A	N/A	0.7 ~~6.8~~	61.3 ~~609~~	36 ~~358~~
Residential	New Construction & Additions	N/A	N/A	1.3	113.5	143
	Alterations	N/A	N/A	0.0 ~~2.8~~	0.0 ~~252.2~~	0.0 ~~318~~
	Total	N/A	N/A	1.3 ~~4.1~~	113.5 ~~365.7~~	143 ~~461~~
All	Total	N/A	N/A	2.0 ~~10.9~~	174.8 ~~974.7~~	179 ~~818.6~~

a. First-year savings from all alterations completed statewide in 2026.

In addition to lost energy savings, reducing the requirements for heat pump pool heater (HPPH) installations decreases the opportunity for electric pool heating, a load with significant flexibility and benefit to grid management strategies. With the CEC's recent rulemaking for Pool Controls, this reduces the impact to flex these loads and to support load management, which is a critical component of achieving larger decarbonization efforts.

The CASE Team responses to the specific concerns raised by the PHTA and an alternative recommendation are documented below. The CASE Team requests that these be considered as part of the 2028 code cycle.

Regarding the need to install multiple heat pumps

The PHTA letter asserts that a pool owner would install three heat pump pool heaters to match the capacity of the gas heater. While the heating capacity of the heat pump pool heater is lower than a gas heater, a heat pump pool heater can provide a pool owner with the same comfort and temperature. The pool owner would have to adapt to the longer heat up times due to the lower capacity. This is analogous to the experience when replacing a gas furnace with a heat pump that the comfort can be maintained with a change to heating behavior.

In our analysis, as documented in the CASE Report, the CASE Team assumed that a pool owner would opt for a gas heater as backup for when colder outdoor conditions make heating with a heat pump pool heater more challenging. This configuration of one

heat pump pool heater paired with one gas heater would be more suitable than the three heat pump pool heater system suggested in the comment letter because it could use the existing gas service and provide adequate heating even in the most challenging conditions. This configuration was shown to be cost-effective.

The PHTA letter estimates the impact of upgrading electrical service assuming a need for three heat pump pool heaters requiring 150 amps. The Title 24 CASE Team asserts that the more likely configuration of one HPPH with a gas backup heater would require 50 amps of service. A recent report by the Association for Energy Affordability provides perspective on panel upgrades in multifamily buildings showing that the more modest 50-amp load can be accommodated by many existing multifamily buildings.

Finally, many pools at existing buildings are located in coastal climate zones with moderate climates further reducing the likelihood that a pool owner would install multiple heat pump pool heaters.

Regarding the concern of space capacity limitations and noise

Heat pump pool heaters are comparable in size to gas pool heaters. A typical heat pump pool heater footprint is about three-foot by three-foot square. Pools are typically designed surrounded by pool decks that could provide space for a heat pump pool heater.

We acknowledge that space constraints represent a legitimate challenge for heat pump pool heater installations, but these constraints don't exist at all sites. While some nonresidential buildings may require an exemption, many buildings would not.

As an example, see the images of apartment buildings, motels, condos, and mobile home parks with community pools. In each ariel view there is ample roof space near the pool or room adjacent to the pool for a heat pump pool heater. While this survey only represents a fraction of the pools in CA (pools between Vallejo to Napa), it demonstrates that there are pools that would clearly benefit from the proposed measure.

A HPPH manufacturer claims that the noise level of their HPPH is about 55 to 65 decibels, which is equivalent to the sound level of moderate rainfall or a casual conversation. Additionally, the pool equipment area already contains other mechanical equipment such as pool pumps so equipment may already be placed in a suitable location at existing pools to accommodate noise levels.

Our Recommendation

The CASE Team believes a more reasonable and beneficial alternative to address the concerns in the letter is available. The CASE Team recommends adopting the exception shown below to address the primary concerns raised by industry. The exception would only apply to those nonresidential and multifamily buildings without adequate solar access, or those without adequate space in proximity to the pool for a heat pump pool heater. The existing exception for single family buildings with existing pool heating systems would remain unchanged.

The CASE Team respectfully ask that you consider the following alternative proposal for the 2028 code cycle.

> Exception 6 to Section 110.4(c): Nonresidential and multifamily buildings with existing pool heating systems that do not have adequate solar access and do not have adequate space availability in proximity to the existing pool heating system to accommodate a heat pump pool heater.

The CASE Team has other draft language ideas that add specificity in terms of calculating solar access and addressing square footage limitations, to improve the enforceability of the language.

Remark #49 (Substantive) | Multifamily Restructuring, Slab Edge Insulation

TABLE 170.2-A ENVELOPE COMPONENT PACKAGE – Multifamily Standard Building Design (continued)

Building Component - Walls, Floors, Doors, and QII	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 5**	**CZ 6**	**CZ 7**	**CZ 8**	**CZ 9**	**CZ 10**	**CZ 11**	**CZ 12**	**CZ 13**	**CZ 14**	**CZ 15**	**CZ 16**
Walls - Metal Building - Any Fire Rating	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.057	0.057	0.057	0.057	0.057	0.057
Walls - Framed (wood, metal) and other - >1hr fire rating	0.059	0.059	0.059	0.059	0.059	0.065	0.065	0.059	0.059	0.059	0.051	0.059	0.059	0.051	0.051	0.051
Walls - Framed (wood, metal) and other - ≤1hr fire rating[3]	0.051	0.051	0.051	0.051	0.051	0.065	0.065	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
Walls - Mass Light[4,5]	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.059 R 17
Walls - Mass Heavy	0.253	0.650	0.650	0.650	0.650	0.690	0.690	0.690	0.690	0.650	0.184	0.253	0.211	0.184	0.184	0.160
Floors/Soffits - Slab Perimeter[8], ~~Three Habitable Stories or less~~	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	~~U~~ F 0.58 R 7.0
Floors/Soffits – Wood Framed	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19
Floors/Soffits - Raised Mass	U 0.092 R 8.0	U 0.092 R 8.0	U 0.269 R 0	U 0.269 R 0	U-0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.092 R 8.0	U 0.138 R 4.0	U 0.092 R 8.0	U 0.092 R 8.0	U 0.138 R 4.0	U 0.092 R 8.0
Floors/Soffits - Other	0.048	0.039	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.039	0.071	0.071	0.039	0.039	0.039
Exterior Doors[6] - Max U-Factor Dwelling Unit Entry	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Exterior Doors[6] - Max U-Factor Common Use Area Entry Non-Swinging	0.50	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	0.50
Exterior Doors[6] - Max U-Factor Common Use Area Entry Swinging	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Quality Insulation Installation up to 3 habitable stories	Yes	Yes	Yes	Yes	Yes	Yes	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Remark # 50 (Substantive) | Buried Duct | Option C for Cathedral Ceilings

TABLE 150.1-A COMPONENT PACKAGE – Single-Family Standard Building Design

Building Component Roofs and Ceilings	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 5**	**CZ 6**	**CZ 7**	**CZ 8**	**CZ 9**	**CZ 10**	**CZ 11**	**CZ 12**	**CZ 13**	**CZ 14**	**CZ 15**	**CZ 16**
~~Roof Deck Insulation for Cathedral Ceilings[1,4]~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~	~~R 38~~
Option B[13] Below Roof Deck Insulation[1,2] (With Air Space)	NR	NR	NR	R 19	NR	NR	NR	R 19	R 19	R 19	R 19	R 19	R 19	R 19	R 19	R 19
Option B[13] 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
Option B[13] Radiant Barrier	NR	REQ	REQ	NR	REQ	REQ	REQ	NR	NR	NR	NR	NR	NR	NR	NR	NR
Option C[14] Ceiling Insulation for vented attics	R 38	R 30	R 30	R 30	R 30	R 30	R 30	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38
Option C[14] Below Roof Deck Insulation for Cathedral Ceilings	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38
Option C[14,15] - Radiant Barrier	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR
Low-Sloped Roofing Product Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.63	NR	0.63	NR
Low-Sloped Roofing Product Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	NR	0.75	NR
Steep-Sloped Roofing Product Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.20	0.20	0.20	0.20	0.20	0.20	NR
Steep-Sloped Roofing Product Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	0.75	0.75	0.75	0.75	0.75	NR

…

14. Option C meets §150.1(c)9B

15. Radiant barriers are not required for roofs with no air gap between roof deck and cavity insulation.

Appendix B: Non-Substantive Additional Mark-up Language

The appendix provides code language mark-ups for longer edits that did not fit into the table format in Table 2.

Remark #4 (Non-substantive) | Cooling Towers, Blowdown Controls | 110.2(e)

(e) Open and closed-circuit cooling towers. All open and closed cooling tower installations shall comply with the following:

1. Be equipped with conductivity ~~or flow-based~~ controls that maximize cycles of concentration based on local water quality conditions. Controls shall automate system bleed and chemical feed based on conductivity, ~~or in proportion to metered makeup volume, metered bleed volume, recirculating pump run time, or bleed time~~. Conductivity controllers shall be installed in accordance with manufacturer's specifications in order to maximize accuracy.

2. Documentation of maximum achievable cycles of concentration. Building owners shall document the ~~maximum~~ cycles of concentration needed based on local water supply as reported annually by the local water supplier~~, and~~ using the ~~calculations~~ calculator approved by the Energy Commission ~~or approved by the Energy Commission~~ ~~below~~. The ~~calculations or are is intended~~ calculator is intended to determine a maximum achievable cycles of concentration based on ~~a Langelier Saturation Index (LSI) of 2.5 or less~~ the parameters identified in Table 110.2-A-1 using the local water supply quality as reported by the local water supplier. Building owner shall document maximum achievable cycles of concentration on the mechanical compliance form which shall be reviewed and signed by the Professional Engineer (P.E.) of Record.

The maximum achievable cycles of concentration shall be the minimum of each value in Table 110.2-A-1 divided by the water supply concentration of each value reported by the local water supplier.

~~The maximum cycles of concentrations are based on the local water supply quality as reported by the local water supplier, and shall be the minimum of:~~

~~A. 2970 divided by the conductivity of the entering make-up water~~

~~B. 1845 divided by the total dissolved solids of the entering make-up water~~

~~C. 540 divided by the M-alkalinity excluding galvanized steel of the entering make-up water~~

~~D. 450 divided by the M-alkalinity including galvanized steel of the entering make-up water~~

~~E. 540 divided by the calcium hardness of the entering make-up water~~

~~F. 270 divided by the chlorides of the entering make-up water~~

~~G. 225 divided by the sulfates of the entering make-up water~~

~~H. 135 divided by the silica of the entering make-up water~~

~~I. 10^((-1/2.038895)*(Log(M-alkalinity excluding galvanized steel of the entering make-up water *0.9*1.219)-0.061105*Log(calcium hardness of the entering make-up water *M-alkalinity excluding galvanized steel of the entering make-up water)+0.0050325*max skin temp-5.95)~~

3. Blowdown controls programming. Cooling tower controls shall be programmed to ~~s shall~~ not allow blowdown until one or more of the parameters in Table 110.2-A-1 reaches the maximum value specified:

Table 110.2-A-1 RECIRCULATING WATER PROPERTIES

Recirculating Water Parameters	**Maximum Values**
Conductivity (micro-siemens/cm)	2970 micro-siemens/cm
Total dissolved solids (ppm)	1845 ppm
Total alkalinity as ~~CaCO23~~ CaCO3 (ppm) excluding galvanized steel	540 ppm
Total alkalinity as CaCO3 (ppm) galvanized steel (passivated)	450 ppm
Calcium hardness as CACO3 (ppm)	540 ppm
Chlorides as Cl (ppm)	270 ppm
Sulfates (ppm)	225 ppm
Silica (ppm)	135 ppm
Langelier saturation index (LSI)	2.5 (LSI)

Remark # 55 (Non-substantive) | Language mark-up for Multifamily Indoor Air Quality, Ventilation

150.0(o): Exception to Section 150.0(o): The following sections of ASHRAE 62.2 shall not be required for compliance: Section 4.1.1, Section 4.1.2, Section 4.1.4, Section 4.3, Section 4.6, Section 5, Section 6.1.1, Section 6.1.3 ~~6.5.2~~, Section 6.7, and Normative Appendix A.

150.0(o)1D: Air filtration. Air filtration shall conform to the specifications in Section 150.0(m)12. ~~Compliance with ASHRAE 62.2 Sections 6.7 (Minimum Filtration) and 6.7.1 (Filter Pressure Drop) shall not be required.~~

160.2(b)2: Exception to Section 160.2(b)2 The following sections of ASHRAE 62.2 shall not be required for compliance: Section 4.1.1, Section 4.1.2, Section 4.1.4, Section 4.2, Section 4.3, Section 4.6, Section 5, Section 6.1.1, Section 6.1.3 ~~6.5.2~~, Section 6.7, and Normative Appendix A.

160.2(b)2Aiii: Air filtration. Air filtration shall conform to the specifications in Section 160.2(b)1. ~~Compliance with~~

~~ASHRAE 62.2 Sections 6.7 (Minimum Filtration) and 6.7.1 (Filter Pressure Drop) shall not be required.~~

150.2(b)1Mib: Replacement ventilation fans. Whole-dwelling unit replacement ventilation fans shall be rated for airflow and sound in accordance with the requirements of ASHRAE 62.2 Sections 7.1 and 7.3 ~~7.2~~.

160.2(b)2Avif: Sound ratings for local mechanical exhaust. Local mechanical exhaust systems shall be rated for

sound in accordance with Section 7.3 ~~7.2~~ of ASHRAE 62.2 at no less than the minimum airflow rate

required by Section 160.2(b)2Avi.

180.2(b)5Bib: Replacement ventilation fans. Whole-dwelling unit replacement ventilation fans shall be rated for airflow and sound in accordance with the requirements of ASHRAE 62.2 Sections 7.1 and 7.3 ~~7.2~~.

150.0(o)1Gvi:Sound ratings for local mechanical exhaust. Local mechanical exhaust systems shall be rated for sound in accordance with Section 7.3 ~~7.2~~ of ASHRAE 62.2 at no less than the minimum airflow rate required by Section 150.0(o)1G.

150.0(o)1I:Sound ratings for whole-dwelling unit ventilation systems. Whole-dwelling unit ventilation systems shall be rated for sound in accordance with Section 7.3 ~~7.2~~ of ASHRAE 62.2 at no less than the minimum airflow rate required by Section 150.0(o)1C.

160.2(b)2Aviii: Sound ratings for whole-dwelling unit ventilation systems. Whole-dwelling unit ventilation systems shall be rated for sound in accordance with Section 7.3 ~~7.2~~ of ASHRAE 62.2 at no less than the minimum airflow rate required by Section 160.2(b)2Aiv or 160.2(b)2Av as applicable.

TABLE 150.1-A COMPONENT PACKAGE – Single- Family Standard Building Design (continued)

Building Envelope HVAC and Water Heating Systems	**CZ 1**	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 5**	**CZ 6**	**CZ 7**	**CZ 8**	**CZ 9**	**CZ 10**	**CZ 11**	**CZ 12**	**CZ 13**	**CZ 14**	**CZ 15**	**CZ 16**
Space Heating - Electric-Resistance Allowed	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Space Heating - If gas, AFUE~~2~~[16]	NA ~~MIN~~	~~MIN~~ NA	NA	NA	~~MIN~~ NA	~~MIN~~ NA	~~MIN~~ NA	~~MIN~~ NA	~~MIN~~ NA	~~MIN~~ NA	~~MIN~~ NA	~~MIN~~ NA	NA	NA	~~MIN~~ NA	~~MIN~~ NA
Space Heating - If Heat Pump, ~~HSPF~~[7] –/HSPF~~2~~[8]	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
Space Cooling - ~~SEER/~~SEER2	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
Space Cooling - Whole-house fan~~8~~[9]	NR	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR	NR
Refrigerant Charge Verification Air Conditioners	NR	REQ	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR
Refrigerant Charge Verification Heat Pumps	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
Central Fan Integrated Ventilation System - Fan Efficacy	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
Option B[13] Roof/Ceiling - Duct Insulation	R 8	R 8	R 6	R 8	R 6	R 6	R 6	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8
Option B[13] - §150.1(c)9A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Option C[14] Roof/Ceiling - Duct Insulation	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6
Option C[14] - §150.1(c)9B	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
FIDs in HRV/ERV systems[15] (Section 150.1(c)15)	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
Water Heating (Section 150.1(c)8)	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ

Footnote requirements to TABLE 150.1-A:

1. Install the specified R-value with an air space present between the roofing and the roof deck, such as standard installation of concrete or clay tile.
2. R-values shown for below roof deck insulation are for wood-frame construction with insulation installed between the framing members. Alternatives including insulation above rafters or above roof deck shall comply with the performance standards.

3. Assembly U-factors for exterior framed walls can be met with cavity insulation alone or with continuous insulation alone, or with both cavity and continuous insulation that results in an assembly U-factor equal to or less than the U-factor shown. Use Reference Joint Appendices JA4 Table 4.3.1, 4.3.1(a), or Table 4.3.4 to determine alternative insulation products to be less than or equal to the required maximum U-factor.

4.Assembly U-factors for roofs can be met with cavity insulation alone or with continuous insulation alone, or with both cavity and continuous insulation that results in an assembly U-factor equal to or less than the U-factor shown. Use Reference Joint Appendices JA4 Table 4.2.2 to determine alternative insulation products to be less than or equal to the required maximum U-factor. R-values shown represent the required insulation to meet the maximum U-factor with cavity insulation alone.

45. Mass wall has a heat capacity greater than or equal to 7.0 Btu/h-ft^2.

65. "Interior" denotes insulation installed on the inside surface of the wall. "Exterior" denotes insulation installed on the exterior surface of the wall.

76. Below grade "interior" denotes insulation installed on the inside surface of the wall, and below grade "exterior" denotes insulation installed on the outside surface of the wall.

87. HSPF2 means heating seasonal performance factor.

98. When whole-house fans are required (REQ), only those whole-house fans that are listed in the Home Ventilating Institute Certified Products Directory may be installed. Compliance requires installation of one or more WHFs whose total airflow cfm is capable of meeting or exceeding a minimum 1.5 cfm/square foot of conditioned floor area as specified by Section 150.1(c)12.

109.A supplemental heating unit may be installed in a space served directly or indirectly by a primary heating system, provided that the unit thermal capacity does not exceed 2 kilowatts or 7,000 Btu/hr and is controlled by a time-limiting device not exceeding 30 minutes.

110.For duct and air handler location: REQ denotes location in conditioned space. When the table indicates ducts and air handlers are in conditioned space, a ~~HERS~~ verification is required as specified by Reference Residential Appendix RA3.1.4.3.8.

121.New dwelling units with a conditioned floor area of 500 square feet or less in Climate Zone 5-10 and 15 may comply with a maximum U-factor of 0.30.

13. Option B meets §150.1(c)9A

14. Option C meets §150.1(c)9B

15. FID is prescriptively required when HRV/ERV systems are included in the design.

16. A supplemental heating unit may be installed in a space served directly or indirectly by a primary heating system, provided that the unit thermal capacity does not exceed 2 kilowatts or 7,000 Btu/hr and is controlled by a time-limiting device not exceeding 30 minutes.

Remark # 57 (Non-substantive) | Multifamily Indoor Air Quality, Ventilation Systems

TABLE 170.2-K MECHANICAL COMPONENT PACKAGE – Multifamily Standard Building Design

Component	CZ 1	CZ 2	CZ 3	CZ 4	CZ 5	CZ 6	CZ 7	CZ 8	CZ 9	CZ 10	CZ 11	CZ 12	CZ 13	CZ 14	CZ 15	CZ 16
Unitary[~~1~~2] – ~~Balanced Ventilation System[1]~~ HRV/ERV Sensible Recovery Efficiency	0.67	0.67	NR	~~NR~~ 0.67	NR	NR	NR	NR	NR	NR	0.67	0.67	0.67	0.67	~~0.67~~NR	0.67
Unitary[~~1~~2] – ~~Balanced Ventilation System[1]~~ HRV/ERV Fan Efficacy (W/cfm)	0.6	0.6	1.0	~~1.0~~ 0.6	1.0	1.0	1.0	1.0	1.0	1.0	0.6	0.6	0.6	0.6	~~0.6~~ 1.0	0.6
Unitary[~~1~~2] – ~~Balanced Ventilation System[1]~~ Non-HRV/ERV Fan Efficacy (W/cfm)	NR	NR	NR	~~0.4~~ NR	0.4	0.4	0.4	0.4	0.4	0.4	NR	NR	NR	NR	~~NR~~ 0.4	NR
Unitary[~~1~~2] – Heat Pump, ~~HSPF[2]~~/HSPF2[~~2~~1]	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
Unitary[~~1~~2] – Dual-Fuel Heat Pump, AFUE	MIN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	MIN
Unitary[~~1~~2] – Refrigerant Charge Verification or Fault Indicator Display	NR	REQ	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR
Unitary[~~1~~2] – ~~SEER/~~SEER2	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
Unitary[2] – FIDs in HRV/ERV Systems	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
Central[~~2~~3] - ~~Balanced Ventilation Systems[1]~~ Sensible Recovery Efficiency or Effectiveness	0.67	0.67	NR	~~NR~~ 0.67	NR	NR	NR	NR	NR	NR	0.67	0.67	0.67	0.67	~~0.67~~ NR	0.67
Central[~~2~~3] HRV/ERV Systems ~~Balanced Ventilation Systems[1]~~ Bypass Function	REQ	REQ	NR	~~NR~~ REQ	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	~~REQ~~NR	REQ
Central[~~2~~3] – Central Fan Integrated Ventilation System Fan Efficacy[4]	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
Duct Insulation in Unconditioned Space	R 8	R 8	R 6	R 8	R 6	R 6	R 6	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8
Water Heating - All Buildings System Shall meet Section 170.2(d)	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ

Footnotes to TABLE 170.2-K:

~~1. Requirements only apply when using Balanced Ventilation to meet 160.2(b)2Aivb.~~

~~2~~1. HSPF2 means "heating seasonal performance factor."

~~3 A supplemental heating unit may be installed in a space served directly or indirectly by a primary heating system, provided that the unit thermal capacity does not exceed 2 kilowatts or 7,000 Btu/hr and is controlled by a time-limiting device not exceeding 30 minutes.~~

~~4~~2. Unitary system serving one dwelling unit

~~5~~3. Central system serving multiple dwelling units

4. Requirements only apply when using Central fan integrated ventilation systems

Remark # 58 (Non-substantive) | Nonresidential Daylighting, Auto Daylighting Control Exceptions

The CASE Team recommends that in addition to requiring luminaires longer than 8 feet to be controlled independently in segments according to the daylit zone each segment is in, that this same approach is used to allocate the lighting power in each daylit zone for those luminaires longer than 8 feet.

In addition to reinforcing the rules associated with segmenting luminaires, the CASE Team expects this specificity to be embraced by designers, as fewer spaces would be required to install controls if large luminaires were allowed to be segmented in a manner that reflects the distribution of daylight in a space. One example would be a small office with a long pendant luminaire perpendicular to the perimeter wall; without considering the capability to segment the luminaire, a higher total wattage would be included in calculating the wattage in the daylit zone and perhaps bringing this space above the threshold at which the control applies. However, when the control is applied, only the segment of the luminaire that is in the daylit zone would be controlled.

The proposed change adds one sentence to the standard which reinforces a logical consistency between the calculation of watts in the daylit zone for calculating the threshold wattage and the wattage of the segment of the luminaire that would be controlled in accordance with Section 130.1(d)2Biii.

The CASE Team recommends inserting a new item Section 130.1(d)1D and renumbering the items that follow.

(d) Daylight Responsive Controls

1. Daylight responsive controls shall be installed in the following locations as applicable:

A. In any enclosed space where the total installed wattage of general lighting luminaires completely or partially within skylit daylit zones is 75 watts or greater, the general lighting in the skylit daylit zones shall be controlled by daylight responsive controls.

B. In any enclosed space where the total installed wattage of general lighting luminaires completely or partially within primary sidelit daylit zones is 75 watts or greater, the general lighting in the primary sidelit daylit zones shall be controlled by daylight responsive controls.

C. In any enclosed space where the total wattage of general lighting luminaires in the secondary zones is 75 watts or greater, the general lighting in the secondary sidelit daylit zones shall be controlled by daylight responsive controls. General lighting in the secondary sidelit daylit zones shall be controlled independently of general lighting in the primary sidelit daylit zones

D. General lighting luminaires longer than 8 feet shall be evaluated in segments of 8 feet or less for allocating luminaire power to the different daylit zones.

~~D.~~ E. For skylight located in an atrium, the….

Remark # 69 (Non-Substantive) | Lighting language cleanup 150.0(k)1A

Designers, contractors, building official need not be concerned with the details of reference Joint Appendix JA8. They mainly need to specify JA8 compliant products. The manufacturers of JA8 products need to know the details of JA8 so they can register their product in the MAEDBS database and be allowed to mark their product JA8-2025 or JA-2025-E. Products that complied to earlier versions of JA8 are also compliant, the JA8 standard has not increased in stringency. By placing what the designer, contractor and building official needs to know in the text of the standard, this simplifies compliance.

Alternative approach to the markup language: However, if it was felt that this was too much information in the text of the standard, this detail could be written into JA8. The JA8 standard does not currently provide the needed information to users of the standard that products compliant with the prior versions of JA8 would also be deemed compliant with the 2025 standard. One method would be to allow all products complying with prior version of the JA8 to label their products JA8-2025. If this approach were desired, the changes to JA8 would be as follows:

JA8.5 Marking

Light sources meeting the requirements of this Appendix shall be marked with “JA8-2025” to indicate their compliance with the criteria of this Appendix. Light sources that have passed the Elevated Temperature Life Test specified in the ENERGY STAR Product Specification for Lamps Version 2.1, or that have passed the rated life test specified in the ENERGY STAR Product Specification for Luminaires Version 2.1, shall instead be marked with “JA8-2025-E” to indicate that they comply with this Appendix and may additionally be installed in elevated temperature applications such as enclosed fixtures. Light sources that do not comply with this Appendix shall not be marked with “JA8-2025” or “JA8-2025-E”.

Products complying with 2016, 2019, or 2022, versions of JA8 and currently recorded in the JA8 appliance database, shall be deemed as compliant with the 2025 version of JA8 and shall be allowed to be marked “JA8-2025” to indicate their compliance. If products complied with the elevated temperature requirements in addition to the rest of the requirements in the 2016, 2019, or 2022, versions of JA8 and are currently recorded in the JA8 appliance database, they shall be deemed as compliant with the elevated temperature requirements of 2025 version of JA8 and shall be marked “JA8-2025-E” to indicate that they comply, and may be installed in elevated temperature applications.

Remark # 74 (Non-substantive) | Residential HVAC Performance | Design (Sizing, Equipment Selection, and Ducts/Diffusers) Ventilation

A comment was raised at the Lead Commissioner Workshop regarding the new sizing requirements and whether they conflict with ENERGY STAR requirements, particularly

the prohibition on undersizing heat pump heating which can lead to oversized cooling in some climates.

The CASE Team investigated this and while there are indeed differences between the requirements of ENERGY STAR and the 45-Day Express Terms, no changes are recommended, following are details:

- ENERGY STAR takes its sizing requirements from the prior version of ACCA Manual S.
- The heat pump system selection requirements in the older version of Manual S as well as its recent changes are complicated, but they both provide limits for a complex range of different scenarios.
- Manual S provides an allowance for selecting equipment based on the higher of the heating or cooling load, depending on the system type: for a single speed system, it should be based on the cooling load, for a variable or multi speed system, it should be based on the heating load.
- Manual S and the 45-Day Express Terms have different requirements. Manual S allows undersized compressor heating to be made up for with supplementary heating, which is not allowed in the 45-Day Express Terms. Generally, in heating-dominated applications, there will have to be a tradeoff between using strip heating and oversizing cooling system. The CASE Team concluded that oversizing cooling is not as big a problem as the use of inefficient strip heating. In part this is based on NIST research that suggests that oversizing does not result in a large performance penalty except for systems with under-sized ducts in cooling dominated climates. This is true so long as ducts are properly sized, and Title 24 has requirements in place to ensure ducts are properly sized for new construction and new duct systems. Also, Manual S must accommodate climates with high humidity where cooling shouldn't be oversized. In California climates this is not an issue.
- Since ENERGY STAR takes its sizing requirements from Manual S, the requirements can conflict with the 45-Day Express Terms. However, in cases where Title 24 would result in the need for a larger system than ENERGY STAR would allow, compliance can still be achieved by installing a variable capacity system that meets both. Since ENERGY STAR is an above-code program it's ok that it would essentially require a variable capacity system in certain instances. Alternatively, house features can be revised to reduce heating loads so that the cooling won't be as severely oversized, and then comply with both Title 24 and ENERGY STAR.