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Comments on 2025 Pre-rulemaking Express Terms

Additional submitted attachment is included below.

Comments on the 2025 Title 24 Pre-Rulemaking Express Terms

Docket Number 22-BST-01

Commissioner McAllister and Building Standards Office staff,

Thank you for the opportunity to participate in the 2025 Energy Code (Title 24, Part 6) update. The Statewide Utility Codes and Standards Enhancement (CASE) Team and utility Compliance Improvement (CI) Team appreciate the California Energy Commission (CEC) providing an opportunity for stakeholders to engage in the pre-rulemaking process for updating the statewide building energy code. We welcome collaborative discussions between CEC staff and the individuals who recommended each revision so we can understand the concerns and resolve outstanding issues to achieve enforceable requirements that will lead to sustained energy savings and GHG reductions.

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 (herein referred to as the Statewide CASE Team) — 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.

This document includes more than 130 recommendations that address the standards and the reference appendices. Below is a summary of the highest priority issues. Details are provided in *Table 1: Substantive Recommendations — Express Terms Review*.

Highest Priority Recommendations: Single Family and Multifamily

1. **Apply supplemental heating controls requirement only where cost effective (Remark #26).** We appreciate that CEC has accepted the recommendation to require heat pumps controls that limit supplementary heating. However, as written in the Express Terms, the supplemental heating controls apply in building types where it is not cost effective. This includes small dwelling units under 500 square feet in all climate zones, and all building types in climate zones 7 and 15. The language should be updated to remedy this.
2. **Apply defrost requirements only where cost effective (Remark #27).** We appreciate that CEC has accepted the recommendation to require defrost controls. However, as written in the Express Terms, the defrost controls apply in building types where it is not cost effective. Our analysis found that this requirement is not cost effective in Climate Zones 6 or 7, or in small dwelling units under 500 square feet in Climate Zone 3, 5-10, or 16. The language should be updated to remedy this error.
3. **Add updated requirements for refrigerant charge verification in alterations (Remark #28).** The proposed modification to Section 150.2(b)1Fi provides clearer direction on the scope of requirements for altered air conditioners or heat pumps. The sentences have been restructured to clarify that the requirements apply to air-source heat pump alterations in all climate zones, but to air-cooled air conditioners in selected climate zones.
4. **Include proposed requirements that assure proper HVAC design (Remarks #19, 20, 21, 22, 24).** The design measure is the highest energy savings opportunity across all proposed residential HVAC measures. To realize the full potential of energy and GHG savings from residential HVAC systems that will persist over time, it is critically important that the systems be designed correctly. The CASE Team proposed a package of requirements that address sizing by selecting proper equipment for expected loads as well as requirements to document loads and duct and diffuser design. Many of the recommendations are not included in the Express Terms. This omission results in a missed opportunity for the code to mitigate a common energy penalty associated with improper equipment sizing and duct design. As written in the Express Terms, the residential HVAC system sizing requirements would only apply to single family buildings. To realize the full impact of this measure, the requirements should also apply to multifamily buildings.
5. **Include advanced controls for air conditioners and heat pumps (Remark #30).** The language added as Section 150.0(h)10 is included in the Express

Terms, but the CASE Team understands that the CEC intends to remove it. Studies have shown that crankcase heating (CCH) can represent over half the annual energy use for a heat pump in certain instances. Because the measure offers the designer the option of either an occupant-controlled smart thermostat or the CCH power limits, it does not pose a preemption concern, and should be easily enforceable.

6. **Update prescriptive window U-factors based on heat pump baseline (Remark #18).** To align with the CEC's preference to recommend lower prescriptive window U-factors only where it was found to be cost effective with a heat pump, the CASE Team recommends retaining the maximum U-factor values for climate zones 5 through 10 and climate zone 15 at the U-0.30 value as they are in the 2022 Energy Code.
7. **Multifamily Restructuring: require all multifamily buildings to meet the procedures of Appendix NA7.1 (Remark #3).** The Express Terms does not include an important edit to Appendix NA7.1 proposed by the CASE Team. The modification to NA7.1 Purpose and Scope continues the clean-up of the multifamily restructuring efforts by replacing "high-rise residential" with "multifamily", ensuring that the acceptance procedures covered by the nonresidential appendix are applied to all multifamily buildings, not just high-rise residential.
8. **Multifamily Indoor Air Quality: specify independent third-party evaluator (Remark #s 9, 10, 11, 12).** The CASE Team recommends adding language to specify that an Energy Code Compliance (ECC) Program rater should verify key energy-saving measures in buildings, including the Fault indicator display (FID), compartmentalization air leakage, and Heat/energy recovery ventilator (HRV/ERV). Without this qualifier, it may be assumed that the builder can conduct and report on this verification, which would be a conflict of interest.
9. **Multifamily Envelope: correct error in 2022 code (Remark #17).** In the 2022 Energy Code, the maximum U-factors for "all other fenestration" in climate zones 6 and 8 were mistakenly set at U-0.30 and U-0.34. The correct values should be U-0.34 for climate zone 6 and U-0.30 for climate zone 8, as proposed in the 2022 Multifamily Restructuring CASE Report.¹ The energy analysis for climate zone 6 does not support the 2022 value and will create an unnecessary compliance burden for multifamily buildings in that area.

¹ The 2022 Multifamily Restructuring CASE Report is available here: <https://title24stakeholders.com/wp-content/uploads/2020/03/T24-2022-CASE-Study-Results-Reports-Multifamily-Restructuring.pdf>

Highest Priority Recommendations: Nonresidential

1. **Add exception for vestibules requirement to clarify it should only apply to high traffic entrances (Remark #13).** The intent is for the vestibules requirement to apply to buildings with high traffic entrances. Adding the proposed exception will more effectively target the high traffic entrances.
2. **Provide manufacturers and controls suppliers with a method to comply with Guideline 36 Requirements (Remark #14).** We appreciate the addition of a prescriptive requirement that controls programming for DDC systems must use a control logic from a CEC-certified Guideline 36 programming library. The certification requirements for the CEC-certified library are intended to appear in a new joint appendix (JA). The Express Terms reference the new JA, but there is no associated mark-up in the Reference Appendices Express Terms. The new appendix is necessary to provide manufacturers or controls suppliers a method to certify that their products comply with the new control requirements in Section 140.4(r). The certification allows the controls contractor, commissioning agent, ATT, code officials, and other stakeholders to know that the manufacturer programming follows ASHRAE Guideline 36. The certification requirements should be added.
3. **Clarify airflow rates for occupant controls in laboratories are maximum flowrates and lower flowrates are allowed (Remark #15).** The Express Terms incorporate the CASE Team's recommendation to modify existing laboratory variable air volume requirements to clarify that labs must have the ability to reduce airflows when occupied and further reduce airflows when unoccupied. The language as written in the Express Terms inadvertently sets an airflow rate that may be higher than what is required in some labs, which does not match the intent of the requirement. Specifically, the Express Terms omitted the phrase "not exceed" before listing the airflow rates. This creates defined arbitrary fixed setpoints instead of allowing lower setpoint minimums based on safe operation of the lab space.
4. **Include new temperature setpoints and exceptions to laboratories reheat to reduce mold growth potential:** The Express Terms include the Statewide CASE Team's recommended code change which eliminates reheat in most labs without interfering with any special pressurization, cross contamination, humidity, or high exhaust requirements. However, ongoing discussions with a stakeholder yielded potential concerns that the temperature minimum setpoint for mechanically cooled air and the dewpoint temperatures will provide an environment that is conducive to mold growth. The Statewide CASE Team

suggests revisions to the exceptions and temperature points in Section 140.9(c)5 of the Express Terms to address this concern.

All Recommended Revisions

All recommended revisions are provided in *Table 1: Substantive Recommendations – Pre-Rulemaking Express Terms Review* and *Table 2: Non-substantive Recommendations – Pre-Rulemaking Express Terms Review* along with a justification for each change. Substantive changes are those where there is a difference in what the code is compelling, allowing or limiting. The following revisions are substantive: scope changes, stringency changes, new requirements added, existing requirements are removed. Revisions that impact field verification requirements are considered substantive. In many cases, substantive changes impact the energy and GHG savings potential of the code.

In some instances, it was difficult to provide marked-up code language within the body of the tables. See the Appendix for additional mark-up language.

Table 1: Substantive Recommendations – Pre-Rulemaking Express Terms Review

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 <u>underlining</u>)	Justification	Is the Change Needed for Both SF and MF?	Does the change affect energy saving, cost, or cost effectiveness?	Does the change affect HERS or ATT procedure?	Was this presented during a CEC-hosted pre-rulemaking workshop?
1	MF	Multifamily Restructuring	Skylight Properties (Additions and Alterations)	180.2(b)1C	Grant Marr	Mikey Shewmaker Payam Bozorgchami	See appendix of docketed comment letter for markup.	By not including the proposed changes, small skylight replacements will be required to meet the requirements in table 180.2-B, even though 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	No	No	Yes
2	MF	Multifamily Restructuring	Skylight Properties (Additions and Alterations)	Table 180.2-B	Grant Marr	Mikey Shewmaker Payam Bozorgchami	See appendix of docketed comment letter for markup.	By keeping a technically infeasible 0.30 U-factor requirement for skylight alterations in some buildings, this means there will still be no feasible prescriptive compliance option for these skylight replacements and miss the opportunity for modest energy savings.	No	Yes	No	Yes
3	MF	Multifamily Restructuring	Central Ventilation Shaft Sealing	NA7.1	Lucy Albin	Javier Perez Bach Tsan	This appendix defines acceptance procedures that must be completed on certain controls and equipment before the installation is deemed to be in compliance with the Standards. These requirements apply to all newly installed equipment for which there are acceptance requirements in new and existing buildings. The procedures	This change is necessary to require the central ventilation shaft sealing requirement for low-rise multifamily buildings, for the purpose of alignment of multifamily requirements and savings in low-rise buildings.	No	Yes	No	Yes
4	MF	Multifamily Restructuring	Verification (HERS/ATT) Clean-Up	Table RA 2-1	Lucy Albin	Javier Perez Bach Tsan	See appendix of docketed comment letter for markup.	The changes proposed to this table are necessary to clarify the scope for compliance options that are not available for multifamily buildings, and those that are extended to high-rise residential. These changes align compliance options across low-rise and high-rise multifamily buildings for simplification of options for multifamily building types and improved compliance for measures subject to field verification.	No	Yes	No	Yes
5	MF	Multifamily Restructuring	Verification (HERS/ATT) Clean-Up	RA3.1.1	Lucy Albin	Javier Perez Bach Tsan	RA3.1 applies to air distribution systems in both new and existing low-rise single family and multifamily residential buildings.	This change is necessary to extend the low leakage air-handling unit compliance credit to high-rise multifamily.	No	Yes	No	Yes
6	MF	Multifamily Restructuring	Verification (HERS/ATT) Clean-Up	RA3.3.4	Lucy Albin	Javier Perez Bach Tsan	When field verification and diagnostic testing of a central fan ventilation cooling system is required for compliance credit for the performance standards set forth in Standards Section 150.1(b), the CFVCS shall be verified according to the procedures in this section. <u>Central fan ventilation cooling is not applicable to multifamily buildings.</u>	This change is necessary to specify that the central fan ventilation cooling compliance option is not applicable to multifamily buildings. This change aligns compliance options across low-rise and high-rise multifamily buildings for simplification and improved compliance for measures subject to field verification.	No	No	No	Yes
7	MF	Multifamily Restructuring	Verification (HERS/ATT) Clean-Up	RA3.9	Lucy Albin	Javier Perez Bach Tsan	RA3.9 contains procedures for <u>measurement of WHF systems in single family buildings</u> :	This change is necessary to specify that the whole house fan compliance option is not available for multifamily buildings. This change aligns compliance options across low-rise and high-rise multifamily buildings for simplification and improved compliance for measures subject to field verification.	No	No	No	Yes
8	MF	Multifamily Restructuring	Verification (HERS/ATT) Clean-Up	RA3.3	Lucy Albin	Javier Perez Bach Tsan	RA3.3 contains procedures for: (a) Verification of improved system airflow rate (cfm) in ducted split system and packaged space conditioning systems serving low-rise single family and multifamily residential buildings.	This change is necessary to extend the Variable Capacity Heat Pump (VCHP) compliance credit to high-rise multifamily, which requires system airflow rate verification. This change aligns compliance options across low-rise and high-rise multifamily buildings for simplification and improved compliance for measures subject to field verification.	No	Yes	No	Yes
9	MF	Multifamily Indoor Air Quality	Fault Indicator Display (FID)	150.1(c)15	Tharanga Jayarathne	Anushka Raut	15. Ventilation system Fault Indicator Display (FID): All balanced and supply ventilation systems serving individual dwelling units shall have a Fault Indicator System Display (FID) that is <u>ECC-rater</u> field verified as specified in Joint Reference Appendix JA17	The Statewide CASE team proposes adding the term ECC-rater to ensure that FID field verification is done by a 3rd party and not the builder.	No	No	Yes	Yes
10	MF	Multifamily Indoor Air Quality	Fault Indicator Display (FID)	170.2(c)3B	Tharanga Jayarathne	Anushka Raut	v. Dwelling unit ventilation system requirements. All balanced and supply ventilation systems serving individual dwelling units shall have a Fault Indicator Display (FID) that is <u>ECC-rater</u> field verified as specified in Joint Appendix JA17.	The Statewide CASE team proposes adding the term ECC-rater to ensure that FID field verification is done by a 3rd party and not the builder.	No	No	Yes	Yes
11	MF	Multifamily Indoor Air Quality	Compartmentalization	160.2(b)2A	Tharanga Jayarathne	Anushka Raut	The dwelling unit envelope leakage is shall be less than or equal to 0.3 cubic feet per minute at 50 Pa (0.2 inch water) per ft2 of dwelling unit envelope surface area as confirmed by <u>ECC-rater</u> field verification and diagnostic testing in accordance with the procedures specified in Reference Appendix RA3.8 or NA2.3 as applicable.	The Statewide CASE team proposes adding the term ECC-rater to ensure that blower door testing is done by a 3rd party and not the builder.	No	No	Yes	Yes
12	MF	Multifamily Indoor Air Quality	Heat/Energy Recovery Ventilator (HRV/ERV)	170.2(c)3B	Tharanga Jayarathne	Anushka Raut	These measures shall be confirmed through <u>ECC-rater</u> field verification in accordance with the procedures in RA3.7.4.4 for buildings with three habitable stories or less, or the procedures in NA2.2.4.1.5 for buildings with four or more habitable stories.	The Statewide CASE team proposes adding the term ECC-rater to ensure that HRV/ERV efficiency verification is done by a 3rd party and not the builder.	No	No	Yes	Yes

13	NR	Nonresidential Envelope	Vestibules	120.7(e)	Maureen Guttman	Mikey Shewmaker Payam Bozorgchami	<p>120.7(e) Vestibules. (charging language unchanged)</p> <p>EXCEPTIONS to Section 120.7(e): Vestibules are not required for the following:</p> <p>1.Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.</p> <p>2.Doors opening directly from a sleeping unit or dwelling unit.</p> <p><u>3. Main entrances in buildings that are located in Climate Zones 2 through 13 where the building is less than four stories above grade and less than 10,000 ft2 in gross conditioned floor area.</u></p> <p>4.Doors that open directly from a space less than 3,000 square feet in area.</p> <p>(remainder of exceptions unchanged)</p>	<p>Adding Exception 3 will align code language with the intent that the requirement only apply to building entrances with high traffic volume. The exception is similar to language in both ASHRAE 90.1 and in the IECC. As neither code makes reference to "high-traffic entrances", nor is there an accepted definition for that term, the recommended exception is applied to smaller low-rise nonresidential buildings.</p> <p>(NOTE: While generally non-substantive, the Statewide CASE Team questions the change from "Public entrances "in the charging language to "Main entrances". The term "Public entrances" is a defined term in Title 24 Part 2, and therefore appropriate, while "main entrances" is not defined.)</p>	No	Yes	No	Yes
14	NR	Nonresidential HVAC Controls	Guideline 36	Appendix JA15	Rupam Singla	Bach Tsan	See appendix of docketed comment letter for markup.	The Standard references joint appendix (JA)15 (a new JA), but there is no associated JA in the Reference Appendices Express Terms. The appendix is necessary to provide manufacturers or controls suppliers a method to comply with the Section 140.4(r) certification requirement. The certification requirements allow the controls contractor, commissioning agent, ATT, and other stakeholders to know that the manufacturer programming follows ASHRAE Guideline 36.	No	Yes	Yes	Yes
15	NR	Laboratories	Occupancy Setback	140.9(c)1	DJ Joh	Haile Bucaneg	<p>140.9(c)1Ai: Not exceed 1.0 cfm/ft² (equivalent to 6...</p> <p>140.9(c)2Bi: Not exceed 0.67 cfm/ft² (equivalent to 4...</p>	By omitting "Not exceed" language in these two sentences, there could be a situation where the setpoints are set artificially high to meet the requirements of the code rather than the true necessary setpoint needed to comply with the intent of this language.	No	No	No	Yes
16	NR	Laboratories	Reheat Limitation	140.9(c)5	DJ Joh	Haile Bucaneg	<p>140.9(c)5: Reheat Limitation. Air handlers in buildings with greater than 20,000 cfm of laboratory exhaust that serve multiple space conditioning zones in laboratory spaces shall not mechanically cool air handler supply air below 80 74 °F and shall not heat air handler supply air above 50°F, and each zone shall include heating and cooling capacity, such as 4-pipe VAV, to prevent cooling at the air handler and reheating at the zones.</p> <p>Exception 1 to Section 140.9(c)5: Additions or alterations to existing air handling systems serving existing zones without heating and cooling capacity.</p> <p>Exception 2 to Section 140.9(c)5: Systems in climate zones 7 or 15 or locations where the outdoor dew point temperature is greater than or equal to 66°F at the ASHRAE 2% annual dehumidification design condition.</p> <p>Exception 3 to Section 140.9(c)5: Systems dedicated to vivarium spaces or to spaces classified as biosafety level 3 or higher.</p> <p>Exception 4 to Section 140.9(c)5: Systems that:</p> <ol style="list-style-type: none"> 1. Are located where the outdoor dew point temperature is greater than or equal to 64 °F at the ASHRAE 2% annual dehumidification design condition, and 2. Include heating and cooling capacity at each zone, such as 4-pipe VAV, and 3. Do not mechanically cool air below 74 °F when the outdoor dew point temperature is below 60 °F. 	This recommended change is in response to concerns raised by stakeholders who have expressed that our previous exceptions did not adequately account for potential mold growth.	No	No	No	Yes
17	MF	Multifamily Envelope	High Performance Windows	170.2(a)3	Avani Goyal	Mikey Shewmaker Payam Bozorgchami	See appendix of docketed comment letter for markup.	This change is a correction of a mistake in the 2022 code language, to be picked up in 2025 code cycle as clean up. This will reduce confusion relating to inconsistency in U-factor requirements in climate zones 6 and 8. Climate zone 6 analysis does not support higher U factors such as 0.3 and will create unnecessary compliance burden on buildings.	No	Yes	No	Yes
18	SF	Single Family High Performance Windows and Walls	Prescriptive U-factor requirements for windows	Table 150.1A	Simon Pallin	Payam Bozorgchami	See appendix of docketed comment letter for markup.	Window U-factor requirements presented in Table 150.1A do not reflect what was presented at the CEC's workshop using a heat pump baseline. Climate Zones 6 through 10, and 15, should remain at the current code requirement of 0.30.	No	Yes	No	No
19	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	10-103(b)3	Kristin Heinemeier	Bach Tsan	<p><u>10-103(b)3. Format of Information to be provided by Builder. All documentation provided in compliance with Section 10-103(b) shall be organized into a binder, clipboard, or folder and mechanically attached to the equipment.</u></p>	Information that is required to be left for the homeowner is typically just left as loose sheets, and often discarded or placed somewhere where they will be inaccessible. We recommend adding a requirement in either 10-103, or alternatively it could be located in 150.0(h), that requires that the information be provided in a folder or binder and attached to the equipment, so that it will be accessible and will stay with the home despite ownership changes. This information is important for maintenance activities to keep the system operating at peak performance.	Yes - Section 160.3(b) for MF	No	No	No

20	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.0(h)1ii	Kristin Heinemeier	Bach Tsan	<u>ii. Load calculations must be submitted along with the Certificate of Compliance to 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 used for a duct design shall be done on a room-by-room basis, but load calculations solely for system sizing are not required to be done on a room-by-room basis.</u>	While this code language was included in the Express Terms, the CASE Team understands that the CEC intends to remove it. Proper design of a residential HVAC system is the foundation for energy savings and effective operation over the life of the system. While load calculations are required by code, they are not required to be submitted with permits and many jurisdictions do not look for them. Adding a requirement for submission is important to clarify the requirements for the enforcement agency and result in load calculations being conducted more frequently. Sizing is particularly critical for heat pumps.	Yes - Section 160.3(b)1ii for MF	Yes	No	Yes
21	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.0(h)1	Kristin Heinemeier	Bach Tsan	See appendix of docketed comment letter for markup.	In current practice, load calculations often either aren't conducted or they are done with limited data from the home using assumptions (i.e. very leaky envelope) that exaggerate the resultant loads. This proposed language provides more rigor in the requirement to use and document authorized load calculations, with a particular emphasis on building infiltration, which has a large impact on sizing. Load calculations are important even for like-for-like(L4L) replacements, in many cases they may prevent replacing an oversized system with another oversized system. Load calculations used to be required for L4L, but current code is ambiguous on this. This proposal clarifies that they are required in all circumstances. To reduce the time and cost for L4L, allowance is made for simplification of the current procedures.	Yes - Section 160.3(b)1 for MF	Yes	No	Yes
22	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.0(h)#	Kristin Heinemeier	Bach Tsan	<u>#.Duct design. When plans are required to be submitted to the enforcement agency, they must include the following: A.a schematic duct layout diagram showing supply register locations, return grill locations, duct sizes of all ducts and plenums and target airflows at each register. B.equipment specifications with design total system airflow and corresponding design total external static pressure for each air handler C.supply register information, including register size, type, design static pressure drop, throw distance(s) and noise criteria D.return grill information, including grilled size, type, design static pressure drop and noise criteria E.return filter information, including filter type, dimensions, thickness, static pressure drop at design airflow, and MERV rating.</u>	Proper design of a residential HVAC system is the foundation for energy savings and effective operation over the life of the system. Often duct designs are not completed or are not documented as required. Requiring duct design during permitting is the right time to ensure that proper design and sizing is considered for distribution systems. Adding a requirement for submission and clarifying the items that must be included provides clear guidance to implementers and enforcement agencies and will result in duct design calculations being conducted more frequently. The intent is not to require code officials to review the accuracy of designs, but to ensure that a design is actually done, and that it is completed early in the project, because errors are difficult to remedy later.	Yes - Section 160.3(b)# for MF	Yes	No	Yes
23	SF/MF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.0(h)5	Kristin Heinemeier	Bach Tsan	See appendix of docketed comment letter for markup.	Requiring that heat pumps have sufficient compressor capacity to meet the heating load is critical to ensure comfort and mitigate peak load issues related to strip heating. Modified wording clarifies that the minimum heating capacity paragraph applies to furnace systems and streamlines the language. The proposed exception is important language to ensure that altered systems are not over-sized in combination with undersized ducts, which can lead to high energy use. Note that it is not needed for new construction, where we can assume that ducts are not undersized. Also recommend including the same language for multifamily as right sized systems are equally as important in all dwelling units.	Yes - Section 160.3(b)# for MF	Yes	No	Yes
24	SF	Residential HVAC Performance	HVAC	150.0(h)5Cia	Nick Brown/Luke Morton	Payam Bozorgchami	<u>Heating Capacity: Heating systems are required to have a heating capacity meeting the minimum requirements of the CBC with supplementary heating supplying no more than 25%. not including any supplementary heating.</u>	Requiring heat pumps to fully cover heating loads will result in higher capital costs and lower efficiency (with higher energy bills) for some systems. Allow for supplemental heat to account for some maximum % of heating load, and we suggest moving this requirement to Prescriptive and allow Performance to take appropriate penalty/credit for systems with backup heat.	Yes	Yes	No	Yes

25	SF	Residential HVAC Performance	Supplementary Heating	110.2(b)	Kristin Heinemeier	Bach Tsan	<p>(b) Controls for heat pumps with supplementary electric resistance heaters for non-residential and multifamily buildings. Controls for heat pumps with supplementary heaters for single-family residential buildings are provided in Section 150.0(h)9. For non-residential and multi-family buildings: H. Heat pumps with supplementary electric resistance heaters shall have controls:</p> <ol style="list-style-type: none"> 1. That prevent supplementary heater operation when the heating load can be met by the heat pump alone; and 2. In which the cut-on temperature for compression heating is higher than the cut-on temperature for supplementary heating, and the cut-off temperature for compression heating is higher than the cut-off temperature for supplementary heating. <p>Exception 1 to Section 110.2(b)1: The controls may allow supplementary heater operation during:</p> <ol style="list-style-type: none"> A. Defrost; and B. Transient periods such as start-ups and following room thermostat setpoint advance, if the controls provide preferential rate control, intelligent recovery, staging, ramping or another control mechanism designed to preclude the unnecessary operation of supplementary heating. <p>Exception 2 to Section 110.2(b)1: Room air-conditioner heat pumps.</p> <p>Exception 3 to Section 110.2(b)1: <u>Heat pump controls in single family residential buildings compliant with Section 150.0(h)7 without the use of exceptions or compliant with Section 150.0(i)2 without the use of exceptions.</u></p>	A loophole in the language between Sections 110.2 and 150.0 left single family homes in certain climate zones and of a certain size without any requirements. This language change would add those occupancies back into Section 110.2.	No	No	No	Yes
26	SF	Residential HVAC Performance	Supplementary Heating	150.0(h)7 & 150.0(h)8	Kristin Heinemeier	Bach Tsan	<p>Exception 2 to Section 150.0(h)7: <u>Dwelling units Buildings in Climate Zones 7 and 15.</u> Exception 3 to Section 150.0(h)7: <u>Dwelling units Buildings with a conditioned floor area of space less than 500 square feet or less in climate zones 7.</u></p> <p>also change</p> <p><u>150.0(h)8. Sizing of electric resistance supplementary heat. Where heat pumps have electric resistance heat, the capacity of electric resistance heat shall not exceed the heat pump nominal cooling capacity (at 95°F ambient conditions) multiplied by 2.7 kW per ton, rounded up to the closest kW.</u></p>	<p>Updated analysis provided by the CASE Team after the report was finalized resulted in changes in which climate zones were cost effective. This updated language reflects the latest analysis.</p> <p>Also make change in 150.0(h)8, to remove option to size strip heating based on gap between capacity and load.</p>	No	Yes	No	Yes
27	SF	Residential HVAC Performance	Defrost	150.0(h)6	Kristin Heinemeier	Bach Tsan	<p>Exception 1 to Section 150.0(h)6. <u>Dwelling units in Climate Zones 6 or 7.</u> Exception 2 to Section 150.0(h)6. <u>Dwelling units with a conditioned floor area of 500 square feet or less in Climate Zones 3, 5 through 10 or in Climate Zone 15 shall not be required to comply with the 90-minute delay timer requirements.</u></p>	Updated analysis provided by the CASE Team after the report was finalized resulted in changes in which climate zones were cost-effective. This updated language reflects the latest analysis.	No	Yes	No	Yes
28	SF	Residential HVAC Performance	Refrigerant Charge Verification	150.2(b)1Fi	Kristin Heinemeier	Bach Tsan	<p>b. Air-cooled air conditioners in Climate Zones 2, 8, 9, 10, 11, 12, 13, 14 and 15, air-cooled air conditioners and air-source heat pumps in all climate zones, including but not limited to ducted split systems, ducted package systems, small duct high velocity air systems, and minisplit systems, shall comply with Subsections a and b, unless the system is of a type that cannot be verified using the specified procedures. Systems that cannot comply with the requirements of 150.2(b)1Fi shall comply with Section 150.2(b)1FC.</p> <p>...</p> <p>c. Air-cooled air conditioners in climate Zones 2, 8, 9, 10, 11, 12, 13, 14, and 15, air-cooled air conditioners or and air-source heat pumps in all climate zones, including but not limited to ducted split systems, ducted package systems, small duct high velocity, and minisplit systems, which are of a type that cannot comply with the requirements of 150.2(b)1Fi shall comply with subsections a and b, as applicable.</p>	Add marked up language for refrigerant charge verification requirements for heat pumps in all climate zones for alterations to reflect the proposed code change per the CASE Report and CEC workshop.	No	Yes	No	Yes

29	SF/MF	Residential HVAC Performance	Variable Capacity and Zonally Controlled Systems	150.0(m)13C	David Springer	Bach Tsan	<p>C. Zonally controlled central forced air systems. Zonally controlled central forced air cooling systems shall be capable of simultaneously delivering, in every zonal control mode, an airflow from the dwelling, through the air handler fan and delivered to the dwelling, of greater than or equal to 350 cfm per ton of nominal cooling capacity, and operating at an air-handling unit fan efficacy of less than or equal to the maximum W/CFM specified in Subsections i or ii below. The airflow rate and fan efficacy requirements in this section shall be confirmed by field verification and diagnostic testing in accordance with the applicable procedures specified in Reference Residential Appendix RA3.3, with only the smallest zone calling—or the dump zone (zone without a zoning damper) if present.</p> <p>...</p> <p>Exception 1 to Section 150.0(m)13C: Multispeed or variable speed compressor systems, or single speed compressor systems that utilize the performance-compliance approach, that incorporate controls that vary fan speed with respect to the number of zones calling as certified by the installer may demonstrate compliance with the airflow (cfm/ton) and fan efficacy (Watt/cfm) requirements of Section 150.0(m)13C by operating the system at maximum compressor capacity and system fan speed with all zones calling for conditioning.</p> <p>Exception 2 to Section 150.0(m)13C: Zonally controlled forced air heat pump systems utilizing a single compressor to serve multiple air handlers shall demonstrate compliance with the airflow (cfm/ton) and fan efficacy (Watt/cfm) requirements of Section 150.0(m)13C using the sum of airflows and Watt/cfm of all air handlers.</p> <p>Exception 23 to Section 150.0(m)13C:</p>	<p>Exception 1 to 150.0(m)13C currently allows airflow and efficacy to be evaluated with all zones calling, though the presence of a multi-speed or variable speed compressor does not ensure that systems will not attempt to deliver maximum airflow when only the smallest zone is calling unless the compressor and fan speed is coordinated with the number of zones calling. Without the proposed change, which captures the intent of the exception, airflows can be much lower than 350 cfm/ton and efficacies much higher than 0.45 W/cfm for furnaces or 0.58 W/cfm for heat pumps. Note that it is not feasible to include these requirements as a Compliance Option, as that would require applying a performance degradation to all variable capacity zoned systems except those taking the option.</p> <p>CEC would like to remove the last clause proposed to be added in C (which would have allowed testing with smallest zone calling). Removed from language in Column I.</p>	Yes - Section 160.3(b)5Liii for MF	No	No	Yes
30	SF	Residential HVAC Performance	Crankcase Heating	150.0(h)10	Kristin Heinemeier	Bach Tsan	<p>10. Air conditioner and heat pump advanced controls. All air conditioners and heat pumps shall be controlled in accordance with either 150.1(h)10A or 150.1(h)10B.</p> <p>A. Occupant Controlled Smart Thermostat. Air conditioners and heat pumps shall be controlled by an Occupant Controlled Smart Thermostat compliant with Section 110.12(a) and the building complying with solar ready requirements of Section 110.10(b)1A without making use of Exception 5.</p> <p>B. Crankcase heating power limits. Installer has manufacturer-provided documentation of one of the following:</p> <p>i. The system does not heat the crankcase by any means.</p> <p>ii. Crankcase heating power input is controlled with a thermostat that measures ambient temperature with a sensing element temperature that is not affected by the heater, where the Crankcase Heater turn on temperature is no higher than 71°F. Crankcase heating is turned off when the compressor is operating.</p> <p>iii. Crankcase heating power is controlled based on a differential temperature between crankcase and evaporator or condenser. Crankcase heating is turned off when the compressor is operating.</p> <p>iv. Crankcase heating uses self-regulating control or other controls for which the sensing element temperature is affected by the heater. Crankcase heating is turned off when the compressor is operating.</p> <p>Exception 1 to 150.0(h)10: Room air conditioners and room air conditioner heat pumps.</p> <p>Exception 2 to 150.0(h)10: Dwelling units in Climate Zones 3, 5 or 6.</p> <p>Exception 3 to 150.0(h)10: Dwelling units with a conditioned floor area of 500 square feet or less.</p>	<p>While this code language was included in the Express Terms, the CASE Team understands that the CEC intends to remove it. The crankcase heating (CCH) measure was one of the highest energy savings of all residential HVAC measures, and eliminates a source of very avoidable energy waste. Studies have shown that CCH can represent over half of the annual energy use for a heat pump in certain climate zones. The structure of the measure has been reworked several times, to ensure that it does not violate preemption and that it is enforceable. This should be one of the easiest measures to comply with: the installer can choose not to install an OCST, but rather to select a system that has the right CCH control features.</p>	No	Yes	No	Yes
31	SF	Single Family High Performance Windows and Walls	Prescriptive U-factor requirements for windows in alterations	150.2(b)1	Simon Pallin	Payam Bozorgchami	<p>A. Added fenestration. Alterations that add vertical fenestration and skylight area shall meet the total fenestration area and west facing fenestration area, U-factor, and Solar Heat Gain Coefficient requirements of Section 150.1(c)3A and TABLE 150.1-A and a maximum U-factor of 0.27.</p> <p>B.Replacement fenestration. New manufactured fenestration products installed to replace existing fenestration products of the same total area shall meet a maximum the U-factor of 0.27, and the Solar Heat Gain Coefficient requirements of Sections 150.1(c)3A, and 150.1(c)4.</p>	<p>Window U-factor requirements for alterations do not reflect what was presented at the CEC's workshop using a heat pump baseline. All Climate Zones should have a maximum requirement of 0.27.</p>	No	Yes	No	Yes
32	SF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Ducts/Diffusers)	150.0(h)2 and JA2.2.	Kristin Heinemeier	Bach Tsan	<p>2. Design conditions.</p> <p>For the purpose of sizing the space- conditioning (HVAC) system, the indoor design temperatures shall be 68°F for heating and 75°F for cooling. Outdoor design conditions shall be selected from Reference Joint Appendix JA2, which is based on data from the ASHRAE 2021 Climatic Data for Region X. The outdoor design temperatures for heating shall be no lower than the 99.0 percent Heating Dry Bulb/Heating Winter Median of Extremes values. The outdoor design temperatures for cooling shall be no greater than the 1.0 percent Cooling Dry Bulb and Mean Coincident Wet Bulb values.</p>	<p>Updating to 2021 weather data will ensure that load calculations are as accurate as possible, and changing from the median of extremes to the 99% heating dry bulb design temperature will avoid oversizing. These proposed changes were retained in the Express Terms for multifamily in 160.3(b)2B but not for single family. This also includes updating JA2.2 Table 2-3 with 2021 ASHRAE data from http://ashrae-meteo.info/v2.0/places.php?continent=North%20America.</p>	No	Yes	No	Yes

33	SF	Single Family High Performance Windows and Walls	Mandatory Window U-factor	150.0(q)	Simon Pallin, Brian Selby, Luke Morton	Payam Bozorgchami	SECTION 150.0 – MANDATORY FEATURES AND DEVICES (q) Fenestration products. Fenestration including skylight products , separating conditioned space from unconditioned space or outdoors shall meet the requirements of either Item 1 or 2 below: <u>meet the requirements of either Item 1 or 2 below:</u> 1.1. Fenestration, including skylight products, must Fenestration, excluding skylight products, must have a maximum weighted average U-factor of 0.450.40. 2.2. The area-weighted average U-factor of all fenestration, including skylight products shall not exceed 0.45. Skylight products separating conditioned space from unconditioned space or outdoors shall have a maximum U-factor of 0.50	Very few skylight products can meet a U-factor requirement of 0.45, thus the proposed separation. A search for NFRC related skylights that have a U-factor ≤ 0.40 showed only 21% (327 out of 1529) of the rated skylight products would qualify to meet the proposed max U-factor of 0.40. We feel that there are not enough available skylight products meeting this requirement for it to apply to skylights. We recommend removing "including skylight products" from the 0.40 max U-factor.	No	No	No	Yes
34	NR	N/A	Lighting Code Language Cleanup	Exception 1 to Section 130.1(b)	Jon McHugh	Simon Lee	Exception 141 to Section 130.1(b) 1-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, regardless of luminaire type.	This exception stems from the 2013 updates to Title 24, when light sources were fluorescent and dimming fluorescent ballasts were costly. Classrooms had less operating hours and could not justify the cost of dimming controls. By 2025 fluorescent lamps will be phased out in California with the implementation of Assembly Bill No. 2208. Additionally all the LPDs are based on LED technology. Dimming LED drivers are the standard product This exception is no longer needed.	N/A	Yes	No	No
35	NR	N/A	Lighting Code Language Cleanup	130.1(c)5	Jon McHugh	Simon Lee	SECTION 130.1(c)5 5. Occupant sensing controls are required for specified offices, multipurpose rooms, break rooms, lounges , classrooms, conference rooms and restrooms. In offices 250 square feet or smaller, multipurpose rooms of less than 1,000 square feet, break rooms, lounges , classrooms of any-size , conference rooms of any-size , and restrooms of any-size , In areas not required by Section 130.1(b) to have multilevel lighting controls, and in restrooms the occupant sensing controls shall function either as: A. Automatic full-on occupant Occupant sensing controls; or	Add breakroom and lounges to spaces requiring occupancy sensing controls. Omitting these spaces from the list is assumed to be an oversight as they have essentially the same function as multipurpose and conference rooms. Omitting these space types creates a compliance issue as one can easily label a multipurpose or a conference room as a break room and a lounge and avoid the occupancy controls requirement. This impacts lighting savings and occupied standby savings as these areas are permitted to reduce ventilation rate to zero when sensed as unoccupied. Zones that include these spaces are also exempted as it currently stands. Clarified that restrooms do not need manual on (they are exempted in Section 160.5(b)4B but must install restrooms are > 100 sf and typically will be above 0.5 W/sf). Clarified that occupant sensing control was automatic full-on.	N/A	Yes	No	No
36	NR	N/A	Lighting Code Language Cleanup	130.1(c)6Ei	Yao-Jung Wen	Simon Lee	SECTION 130.1(c)6E 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	Missing a critical preposition. Adding "to" or a "by" makes a significant difference.	N/A	No	No	No
37	NR	N/A	Lighting Code Language Cleanup	130.2(c)3A	Jon McHugh	Simon Lee	SECTION 130.2(c)3 A. Motion sensing controls shall be installed for the following outdoor luminaires providing lighting for general hardscape, vehicle service station hardscape, parking lots, outdoor sales lots and outdoor canopies (service station, sales, and non-sales) and for which where the bottom of the luminaire is mounted 24 feet above grade or lower	Not using the same terms as in Section 140.7: general hardscape, vehicle service station hardscape, parking lots, outdoor sales lots, and canopies (service station, sales and non-sales) where the bottom of the luminaire is mounted 24 feet above grade or lower. Add retail sales lots to the list of spaces and explicitly name the spaces from Table 140.7-A and 140.7-B.	N/A	Yes	No	No
38	SF	N/A	PV equation	150.1(c)14	Nick Brown	Muhammad Faisal Saeed	EER2adj = EER2-adjustment factor = 4.7 if EER2 ≥ 11.7	Equation 150.1-C has added a HVAC EER factor to the PV calculation. This may strike readers as a strange juxtaposition of two seemingly unrelated features in the PV equation. We should explain why EER is in there or remove it from the calculation. Also, CZ 2,4,6-10, 12, and 14 have EER factor B < 0.05 which results in very minor differences in PV calculations less than a single panel. Suggest keeping Factor B to the more significant CZs only – 11,13,15 only for simplicity and practicality	SF	No	No	Yes
39	SF	Single Family High Performance Windows and Walls	Mandatory Window U-factor	150.0(q)	Simon Pallin	Payam Bozorgchami	SECTION 150.0(q)1. Fenestration, including skylight products, must Fenestration, excluding skylight products, must have a maximum weighted average U-factor of 0.450.40.	Weighted average defeats the purpose of a mandatory backstop. If kept as is, a weighted average will allow the installation of any low-performance window if the rest of the windows make up for it. Very few building envelope components are replaced during the lifetime of a building and this allows for an opportunity to increase thermal performance and reduced energy demand.	No	No	No	Yes
40	SF	Single Family High Performance Windows and Walls	Mandatory Window U-factor	150.0(q)	Nick Brown	Mikey Shewmaker Payam Bozorgchami	(q) Fenestration products. Fenestrations, including skylight products, separating conditioned space from unconditioned space or outdoors shall meet the requirements of either Item 1 or 2 below: 1- Fenestration, including skylight products, must have a maximum weighted average U-factor of 0.45 0.40.	This would revert back to 2022 code language, which already prevents use of default dual pane low-e glazing and most Aluminum glazing in single family projects. Many designers prefer to upgrade existing houses from leaky single pane windows to more efficient dual pane tight Aluminum products, but this change will encourage leaving the old windows in place, so that the project can comply.	Yes	No	No	Yes

41	MF	Multifamily Indoor Air Quality	Heat/Energy Recovery Ventilator (HRV/ERV)	Table 170.2-K	Marian Goebes	Anushka Raut	Since we are adding the prescriptive H/ERV requirement for CZ 4 and removing it for CZ 15, Table 170.2-K must be updated. See Word Document for mark-up, since this is a table. A description is also provided here: - The row "HRV or ERV Sensible Recovery Efficiency" should be 0.67 NR under CZ 4 and NR 0.67 under CZ 15 - The row "HRV or ERV Fan Efficacy (W/cfm)" should be 0.6 4-0 under CZ 4 and 1.0 0-6 under CZ 15 - The row "Non-HRV or NonERV Fan Efficacy W/cfm" should be NR 0-4 under CZ 4 and 0.4 NR under CZ 15 - The row "Sensible Recovery Efficiency or Effectiveness" should be 0.67 NR under CZ 4 and NR 0.67 under CZ 15 - The row "Bypass Function" should be REQ NR -under CZ 4 and NR REQ under CZ 15	This aligns with the prescriptive changes recommended by the CASE Team and in the Express Terms from the CEC. In the CASE report, the CASE Team neglected to mark up Table 170.2-K to align with those prescriptive changes, so we are doing so here. H/ERVs will be prescriptively required in CZ 4 in T24 P6 -2025 (and they weren't in the 2022 version), and H/ERVs will no longer be prescriptively required in CZ 15 in T24 P6-2025 (and they were in the 2022 version). H/ERVs are already required in CZs 1, 2, 11-14, and 16 in T24 P6-2022, and will continue to be in T24 P6-2025, so no changes are needed for these CZs.	No	Yes	Yes	Yes
42	NR	N/A	Lighting Code Language Cleanup	140.6(c)2G	Jon McHugh	Simon Lee	See appendix of docketed comment letter for markup.	The additional language provides guidance on how to utilize the appropriate lighting power allowances and prevent double dipping by simultaneously utilizing the allowances provided for decorative lighting, wall display lighting, and floor display lighting. See Remark #42 and 43 in the appendix document.	N/A	Yes	No	No
43	NR	N/A	Lighting Code Language Cleanup	TABLE 140.6-C	Jon McHugh	Simon Lee	See appendix of docketed comment letter for markup.	Crossing out "display" because allowances for display lighting are now provided separately, and this will prevent double dipping by simultaneously utilizing the allowances provided for decorative lighting, wall display lighting, and floor display lighting. See Remark #42 and 43 in the appendix document.				
44	MF	N/A	Lighting Code Language Cleanup	160.5(b)4Cv	Jon McHugh	Simon Lee	SECTION 160.5(b)4Cv v. Occupant sensing controls are required for specified offices, multipurpose rooms, break rooms, lounges , classrooms, conference rooms and restrooms. In offices 250 square feet or smaller, multipurpose rooms of less than 1,000 square feet, break rooms, lounges , classrooms of any-size , conference rooms of any-size , and restrooms of any-size , In areas not required by Section 160.5(b)4B to have multilevel lighting controls, and in restrooms the occupant sensing controls shall function either as: A. Automatic full-on occupant Oeeupant sensing controls; or...	Add breakroom and lounges to spaces requiring occupancy sensing controls. Omitting these spaces from the list is assumed to be an oversight as they have essentially the same function as multipurpose and conference rooms. Omitting these space types creates a compliance issue as one can easily label a multipurpose or a conference room as a break room and a lounge and avoid the occupancy controls requirement. This impacts lighting savings and occupied standby savings as these areas are permitted to reduce ventilation rate to zero when sensed as unoccupied. Zones that include these spaces are also exempted as it currently stands. Clarified that restrooms do not need manual on (they are exempted in Section 160.5(b)4B but must install restrooms are > 100 sf and typically will be above 0.5 W/sf). Clarified that occupant sensing control was automatic full-on.	N/A	Yes	No	No
45	MF	N/A	Lighting Code Language Cleanup	160.5(c)	Yao-Jung Wen	Simon Lee	SECTION 160.5(c) 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	Missing a critical preposition. Adding "to" or a "by" makes a significant difference.	No	No	No	No
46	SF	N/A	PV equation	150.1(c)14, 170.2(f)	Luke Morton	Muhammad Faisal Saeed	150.1(c)14. Photovoltaic requirements. All single-family residential buildings shall have a newly installed photovoltaic (PV) system or newly installed PV modules meeting the minimum qualification requirements specified in Joint Appendix JA11. The annual electrical output of the PV system shall be no less than the smaller of a PV system size determined using Equation 150.1-C, or the total building's SARA- (Solar Access Roof Area) (SARA) multiplied by 18 for steep-sloped roofs or SARA- multiplied by 14 for low-sloped roofs or the maximum PV system size that can be installed on the building's Solar Access Roof Area (SARA)-	Clarify if he SARA is plan area, or actual surface area (accounting for slope). No proposed mark-up for this, but a request to clarify.	No	No	No	No
47	SF	N/A	DHW Recirculation	150.0(n)2	Luke Morton	Danny Tam	2. Water heating recirculation loops serving multiple dwelling units shall meet the requirements of Section 110.3(c)4.	Single-family increasingly have recirculation loops serving multiple dwelling units-- many new SF projects are 2-3 units on the same lot. The requirements seem appropriate for inclusion. Consider leaving the code requirement in place.	No	No	No	No
48	NR	N/A	Lighting Code Language Cleanup	130.1(b)	Jon McHugh	Simon Lee	SECTION 130.1(b) (b) Multilevel lighting controls. The general lighting of any enclosed area space 100 square feet or larger with a connected lighting load that exceeds greater than 0.5 0.4 watts per square foot shall be provided with multilevel lighting controls	We agree with the CEA proposal that recommended this change. This lower wattage is also justified by the fact that LED technology is at least 20% more efficacious than the fluorescent technology this was based on in 2013, so this change results in spaces with approximately the same design illuminance being covered by dimming controls.				
49	NR	N/A	Lighting Code Language Cleanup	130.1(c)6E	Jon McHugh	Simon Lee	SECTION 130.1(c)6 E. 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)4:	The last phrase implies that autoshut-off (including timeclock) is an accepted method of control. A timeclock would save significantly less energy.	N/A	No	No	No
50	SF	N/A	Lighting Code Language Cleanup	150.0(k)1A	Jon McHugh	Simon Lee	SECTION 150.0(k)1 A. Luminaire efficacy. All installed luminaires and light sources shall meet the requirements in Table 160.0-A--comply with Joint Appendix JA8 and shall be certified and marked as required by JA8.	Table 150.0-A included language about JA8 markings which is the key element of simplicity of JA8 approach. It relies on the "JA8" mark being on either the lamp or the luminaire.	N/A	No	No	No
51	MF	N/A	Lighting Code Language Cleanup	160.5(a)1A	Jon McHugh	Simon Lee	SECTION 160.5(a)1A A. Luminaire efficacy. All installed luminaires and light sources shall meet the requirements in Table 160.5-A comply with Joint Appendix JA8 and shall be certified and marked as required by JA8.	Table 150.0-A included language about JA8 markings which is the key element of simplicity of JA8 approach. It relies on the "JA8" mark being on either the lamp or the luminaire.	N/A	No	No	No

52	MF	N/A	Lighting Code Language Cleanup	160.5(b)4B	Jon McHugh	Simon Lee	SECTION 160.5(b)4B B Multilevel lighting controls. The general lighting of any enclosed area space 100 square feet or larger with a connected lighting load that exceeds greater than 9-5 0.4 watts per square foot shall be provided with multilevel lighting controls	We agree with the CEA proposal that recommended this change. This lower wattage is also justified by the fact that LED technology is at least 20% more efficacious than the fluorescent technology this was based on in 2013, so this change results in spaces with approximately the same design illuminance being covered by dimming controls.				
54	All	Domestic Hot Water	Individual HPWH Ventilati	110.3(c)7B2ii	James Haile	Danny Tam	Permanent openings shall consist of <u>a single layer of fixed flat slats with</u> 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 door shall be, via fully louvered <u>door</u> or has two <u>permanent</u> openings, located within 12 inches from the enclosure top and bottom; or	Laboratory and field testing have shown that in the small closet configuration the design of the louver profile impacts the flow of air into and out of the closet via natural thermal buoyancy. Chevron louvers and two layers of flat slat louvers (i.e. one grille on the exterior surface of the door and one on the interior surface of the door) impede this flow, resulting in the same performance issues that made this measure necessary.	Yes, code section applies to all occupancies.	Change in column I makes express terms consistent with assumptions used to calculate savings in the CASE report.	No	No
55	All	Domestic Hot Water	Individual HPWH Ventilati	110.3(c)7B3iv	James Haile	Danny Tam	If only the HPWH inlet or outlet is ducted, installation space shall include permanent openings <u>in the lower half of the enclosure. Minimum NFA shall be met using louvers or grilles consisting of a single layer of fixed flat slats, a door, undercut, or a combination of the two.</u> 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	Laboratory and field testing have shown that in the small closet configuration the design of the louver profile impacts the flow of air into and out of the closet via natural thermal buoyancy. Chevron louvers and two layers of flat slat louvers (i.e. one grille on the exterior surface of the door and one on the interior surface of the door) impede this flow, resulting in the same performance issues that made this measure necessary in the first place. For similar reasons of aiding (or rather, not impeding) the exchange of air between the closet and its exterior via thermal buoyancy, it is necessary to ensure that the permanent openings are in the lower half of the enclosure for the "half ducted" configuration.	Yes, code section applies to all occupancies.	Change in column I makes express terms consistent with assumptions used to calculate savings in the CASE report.	No	No
56	SF/MF	N/A	Performance Approach	10-109(c)1B, 140.1, 150.1(b)1, 170.1	Nick Brown	Payam Bozorgchami Javier Perez	10-109(c)1B. The compliance manager shall calculate the modeled energy budgets of the standard design building and the energy consumption of the proposed building in terms of long-term system cost and source energy. In addition, single family projects will calculate peak cooling energy for use in demonstrating compliance.	Discussions of the performance method only mentions LSC, not source and not peak cooling metrics. The section from 10-109 is shown here, but the other referenced code sections are incomplete in their discussion of performance approach.	Yes	No	No	Yes
57	SF	N/A	N/A	150.0(c)7	Brian Selby	Mikey Shewmaker Payam Bozorgchami	Masonry Mass walls shall be insulated to meet the wall insulation requirements of Table 150.1-A.	Previous code updates added the mandatory requirement for "Masonry Walls", to require insulation, and referrers to Table 150.1-A for the insulation requirement. As written, this requirement only applies to "masonry walls" and not to all mass walls (such as a solid concrete wall) as I believe it was intended to do. Suggest changing this language to clarify that it applies to all above grade mass walls. This would also clean up an existing loophole in the code. We suspect that this was an editorial error and the intent of the code was not intended to change.	No	No	No	Yes

Table 2: Non-substantive Recommendations – Pre-Rulemaking Express Terms Review

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 <u>underlining</u>)	Justification	Is the Change Needed for Both SF and MF?	Does the language change affect energy saving cost or cost effectiveness?	Does the change to language affect HERS or ATT procedure?	Was this presented during a CEC-hosted workshop?
1	NR	Nonresidential HVAC Controls	Guideline 36	100.1	Sally Blair	Ron Balneg	Programming Library PROGRAMMING LIBRARY is a collection of programming logic used for controlling HVAC equipment with direct digital control systems.	This definition is in the wrong place, it is under the LIGHTING definitions and should be under P in section 100.1. Also, there is a typo in this definition. Need a space between "HVAC" and "equipment".	NA	No	No	Yes
2	NR	Nonresidential HVAC Controls	Guideline 36	140.4(f)	Sally Blair	Ron Balneg	Exception 3 to Section 140.4(f): Exception 1 to Section 140.4(f): Non-programmable (configurable-only) controllers...	Instead of trying to explain which part of 140.4(f) doesn't apply, make the exception to 140.4(f)3. That makes it more clear that the rest of 140.4(f) DOES apply.	NA	No	No	Yes
3	N/A	N/A	N/A	141.0(b)2C	Sally Blair	Ron Balneg		This table is difficult to understand Table 141.0-E-1. The requirement is the column header? This table is confusing the way it is configured. The requirement should be where the CZ currently is.	NA	No	No	No
4	NR	Nonresidential HVAC Controls	Guideline 36	Exception 6 to 141.0(b)2C	Sally Blair	Ron Balneg	Exception 6 to Section 141.0(b)2C: Requirements for the use of ASHRAE Guideline 36 in Sections 140.4(f)(2), 140.4(f)(2)(b), 140.4(f)(2)(c), 140.4(f)(2)(d), 140.4(f)(2)(e), 140.4(f)(2)(f), 140.4(f)(2)(g), 140.4(f)(2)(h), 140.4(f)(2)(i), 140.4(f)(2)(j), 140.4(f)(2)(k), 140.4(f)(2)(l), 140.4(f)(2)(m), 140.4(f)(2)(n), 140.4(f)(2)(o), 140.4(f)(2)(p), 140.4(f)(2)(q), 140.4(f)(2)(r), 140.4(f)(2)(s), 140.4(f)(2)(t), 140.4(f)(2)(u), 140.4(f)(2)(v), 140.4(f)(2)(w), 140.4(f)(2)(x), 140.4(f)(2)(y), 140.4(f)(2)(z), 140.4(f)(2)(aa), 140.4(f)(2)(ab), 140.4(f)(2)(ac), 140.4(f)(2)(ad), 140.4(f)(2)(ae), 140.4(f)(2)(af), 140.4(f)(2)(ag), 140.4(f)(2)(ah), 140.4(f)(2)(ai), 140.4(f)(2)(aj), 140.4(f)(2)(ak), 140.4(f)(2)(al), 140.4(f)(2)(am), 140.4(f)(2)(an), 140.4(f)(2)(ao), 140.4(f)(2)(ap), 140.4(f)(2)(aq), 140.4(f)(2)(ar), 140.4(f)(2)(as), 140.4(f)(2)(at), 140.4(f)(2)(au), 140.4(f)(2)(av), 140.4(f)(2)(aw), 140.4(f)(2)(ax), 140.4(f)(2)(ay), 140.4(f)(2)(az), 140.4(f)(2)(ba), 140.4(f)(2)(bb), 140.4(f)(2)(bc), 140.4(f)(2)(bd), 140.4(f)(2)(be), 140.4(f)(2)(bf), 140.4(f)(2)(bg), 140.4(f)(2)(bh), 140.4(f)(2)(bi), 140.4(f)(2)(bj), 140.4(f)(2)(bk), 140.4(f)(2)(bl), 140.4(f)(2)(bm), 140.4(f)(2)(bn), 140.4(f)(2)(bo), 140.4(f)(2)(bp), 140.4(f)(2)(bq), 140.4(f)(2)(br), 140.4(f)(2)(bs), 140.4(f)(2)(bt), 140.4(f)(2)(bu), 140.4(f)(2)(bv), 140.4(f)(2)(bw), 140.4(f)(2)(bx), 140.4(f)(2)(by), 140.4(f)(2)(bz), 140.4(f)(2)(ca), 140.4(f)(2)(cb), 140.4(f)(2)(cc), 140.4(f)(2)(cd), 140.4(f)(2)(ce), 140.4(f)(2)(cf), 140.4(f)(2)(cg), 140.4(f)(2)(ch), 140.4(f)(2)(ci), 140.4(f)(2)(cj), 140.4(f)(2)(ck), 140.4(f)(2)(cl), 140.4(f)(2)(cm), 140.4(f)(2)(cn), 140.4(f)(2)(co), 140.4(f)(2)(cp), 140.4(f)(2)(cq), 140.4(f)(2)(cr), 140.4(f)(2)(cs), 140.4(f)(2)(ct), 140.4(f)(2)(cu), 140.4(f)(2)(cv), 140.4(f)(2)(cw), 140.4(f)(2)(cx), 140.4(f)(2)(cy), 140.4(f)(2)(cz), 140.4(f)(2)(da), 140.4(f)(2)(db), 140.4(f)(2)(dc), 140.4(f)(2)(dd), 140.4(f)(2)(de), 140.4(f)(2)(df), 140.4(f)(2)(dg), 140.4(f)(2)(dh), 140.4(f)(2)(di), 140.4(f)(2)(dj), 140.4(f)(2)(dk), 140.4(f)(2)(dl), 140.4(f)(2)(dm), 140.4(f)(2)(dn), 140.4(f)(2)(do), 140.4(f)(2)(dp), 140.4(f)(2)(dq), 140.4(f)(2)(dr), 140.4(f)(2)(ds), 140.4(f)(2)(dt), 140.4(f)(2)(du), 140.4(f)(2)(dv), 140.4(f)(2)(dw), 140.4(f)(2)(dx), 140.4(f)(2)(dy), 140.4(f)(2)(dz), 140.4(f)(2)(ea), 140.4(f)(2)(eb), 140.4(f)(2)(ec), 140.4(f)(2)(ed), 140.4(f)(2)(ee), 140.4(f)(2)(ef), 140.4(f)(2)(eg), 140.4(f)(2)(eh), 140.4(f)(2)(ei), 140.4(f)(2)(ej), 140.4(f)(2)(ek), 140.4(f)(2)(el), 140.4(f)(2)(em), 140.4(f)(2)(en), 140.4(f)(2)(eo), 140.4(f)(2)(ep), 140.4(f)(2)(eq), 140.4(f)(2)(er), 140.4(f)(2)(es), 140.4(f)(2)(et), 140.4(f)(2)(eu), 140.4(f)(2)(ev), 140.4(f)(2)(ew), 140.4(f)(2)(ex), 140.4(f)(2)(ey), 140.4(f)(2)(ez), 140.4(f)(2)(fa), 140.4(f)(2)(fb), 140.4(f)(2)(fc), 140.4(f)(2)(fd), 140.4(f)(2)(fe), 140.4(f)(2)(ff), 140.4(f)(2)(fg), 140.4(f)(2)(fh), 140.4(f)(2)(fi), 140.4(f)(2)(fj), 140.4(f)(2)(fk), 140.4(f)(2)(fl), 140.4(f)(2)(fm), 140.4(f)(2)(fn), 140.4(f)(2)(fo), 140.4(f)(2)(fp), 140.4(f)(2)(fq), 140.4(f)(2)(fr), 140.4(f)(2)(fs), 140.4(f)(2)(ft), 140.4(f)(2)(fu), 140.4(f)(2)(fv), 140.4(f)(2)(fw), 140.4(f)(2)(fx), 140.4(f)(2)(fy), 140.4(f)(2)(fz), 140.4(f)(2)(ga), 140.4(f)(2)(gb), 140.4(f)(2)(gc), 140.4(f)(2)(gd), 140.4(f)(2)(ge), 140.4(f)(2)(gf), 140.4(f)(2)(gg), 140.4(f)(2)(gh), 140.4(f)(2)(gi), 140.4(f)(2)(gj), 140.4(f)(2)(gk), 140.4(f)(2)(gl), 140.4(f)(2)(gm), 140.4(f)(2)(gn), 140.4(f)(2)(go), 140.4(f)(2)(gp), 140.4(f)(2)(gq), 140.4(f)(2)(gr), 140.4(f)(2)(gs), 140.4(f)(2)(gt), 140.4(f)(2)(gu), 140.4(f)(2)(gv), 140.4(f)(2)(gw), 140.4(f)(2)(gx), 140.4(f)(2)(gy), 140.4(f)(2)(gz), 140.4(f)(2)(ha), 140.4(f)(2)(hb), 140.4(f)(2)(hc), 140.4(f)(2)(hd), 140.4(f)(2)(he), 140.4(f)(2)(hf), 140.4(f)(2)(hg), 140.4(f)(2)(hh), 140.4(f)(2)(hi), 140.4(f)(2)(hj), 140.4(f)(2)(hk), 140.4(f)(2)(hl), 140.4(f)(2)(hm), 140.4(f)(2)(hn), 140.4(f)(2)(ho), 140.4(f)(2)(hp), 140.4(f)(2)(hq), 140.4(f)(2)(hr), 140.4(f)(2)(hs), 140.4(f)(2)(ht), 140.4(f)(2)(hu), 140.4(f)(2)(hv), 140.4(f)(2)(hw), 140.4(f)(2)(hx), 140.4(f)(2)(hy), 140.4(f)(2)(hz), 140.4(f)(2)(ia), 140.4(f)(2)(ib), 140.4(f)(2)(ic), 140.4(f)(2)(id), 140.4(f)(2)(ie), 140.4(f)(2)(if), 140.4(f)(2)(ig), 140.4(f)(2)(ih), 140.4(f)(2)(ij), 140.4(f)(2)(ik), 140.4(f)(2)(il), 140.4(f)(2)(im), 140.4(f)(2)(in), 140.4(f)(2)(io), 140.4(f)(2)(ip), 140.4(f)(2)(iq), 140.4(f)(2)(ir), 140.4(f)(2)(is), 140.4(f)(2)(it), 140.4(f)(2)(iu), 140.4(f)(2)(iv), 140.4(f)(2)(iw), 140.4(f)(2)(ix), 140.4(f)(2)(iy), 140.4(f)(2)(iz), 140.4(f)(2)(ja), 140.4(f)(2)(jb), 140.4(f)(2)(jc), 140.4(f)(2)(jd), 140.4(f)(2)(je), 140.4(f)(2)(jf), 140.4(f)(2)(jg), 140.4(f)(2)(jh), 140.4(f)(2)(ji), 140.4(f)(2)(jk), 140.4(f)(2)(jl), 140.4(f)(2)(jm), 140.4(f)(2)(jn), 140.4(f)(2)(jo), 140.4(f)(2)(jp), 140.4(f)(2)(jq), 140.4(f)(2)(jr), 140.4(f)(2)(js), 140.4(f)(2)(jt), 140.4(f)(2)(ju), 140.4(f)(2)(jv), 140.4(f)(2)(jw), 140.4(f)(2)(jx), 140.4(f)(2)(jy), 140.4(f)(2)(jz), 140.4(f)(2)(ka), 140.4(f)(2)(kb), 140.4(f)(2)(kc), 140.4(f)(2)(kd), 140.4(f)(2)(ke), 140.4(f)(2)(kf), 140.4(f)(2)(kg), 140.4(f)(2)(kh), 140.4(f)(2)(ki), 140.4(f)(2)(kj), 140.4(f)(2)(kl), 140.4(f)(2)(km), 140.4(f)(2)(kn), 140.4(f)(2)(ko), 140.4(f)(2)(kp), 140.4(f)(2)(kq), 140.4(f)(2)(kr), 140.4(f)(2)(ks), 140.4(f)(2)(kt), 140.4(f)(2)(ku), 140.4(f)(2)(kv), 140.4(f)(2)(kw), 140.4(f)(2)(kx), 140.4(f)(2)(ky), 140.4(f)(2)(kz), 140.4(f)(2)(la), 140.4(f)(2)(lb), 140.4(f)(2)(lc), 140.4(f)(2)(ld), 140.4(f)(2)(le), 140.4(f)(2)(lf), 140.4(f)(2)(lg), 140.4(f)(2)(lh), 140.4(f)(2)(li), 140.4(f)(2)(lj), 140.4(f)(2)(lk), 140.4(f)(2)(lm), 140.4(f)(2)(ln), 140.4(f)(2)(lo), 140.4(f)(2)(lp), 140.4(f)(2)(lq), 140.4(f)(2)(lr), 140.4(f)(2)(ls), 140.4(f)(2)(lt), 140.4(f)(2)(lu), 140.4(f)(2)(lv), 140.4(f)(2)(lw), 140.4(f)(2)(lx), 140.4(f)(2)(ly), 140.4(f)(2)(lz), 140.4(f)(2)(ma), 140.4(f)(2)(mb), 140.4(f)(2)(mc), 140.4(f)(2)(md), 140.4(f)(2)(me), 140.4(f)(2)(mf), 140.4(f)(2)(mg), 140.4(f)(2)(mh), 140.4(f)(2)(mi), 140.4(f)(2)(mj), 140.4(f)(2)(mk), 140.4(f)(2)(ml), 140.4(f)(2)(mm), 140.4(f)(2)(mn), 140.4(f)(2)(mo), 140.4(f)(2)(mp), 140.4(f)(2)(mq), 140.4(f)(2)(mr), 140.4(f)(2)(ms), 140.4(f)(2)(mt), 140.4(f)(2)(mu), 140.4(f)(2)(mv), 140.4(f)(2)(mw), 140.4(f)(2)(mx), 140.4(f)(2)(my), 140.4(f)(2)(mz), 140.4(f)(2)(na), 140.4(f)(2)(nb), 140.4(f)(2)(nc), 140.4(f)(2)(nd), 140.4(f)(2)(ne), 140.4(f)(2)(nf), 140.4(f)(2)(ng), 140.4(f)(2)(nh), 140.4(f)(2)(ni), 140.4(f)(2)(nj), 140.4(f)(2)(nk), 140.4(f)(2)(nl), 140.4(f)(2)(nm), 140.4(f)(2)(nn), 140.4(f)(2)(no), 140.4(f)(2)(np), 140.4(f)(2)(nq), 140.4(f)(2)(nr), 140.4(f)(2)(ns), 140.4(f)(2)(nt), 140.4(f)(2)(nu), 140.4(f)(2)(nv), 140.4(f)(2)(nw), 140.4(f)(2)(nx), 140.4(f)(2)(ny), 140.4(f)(2)(nz), 140.4(f)(2)(oa), 140.4(f)(2)(ob), 140.4(f)(2)(oc), 140.4(f)(2)(od), 140.4(f)(2)(oe), 140.4(f)(2)(of), 140.4(f)(2)(og), 140.4(f)(2)(oh), 140.4(f)(2)(oi), 140.4(f)(2)(oj), 140.4(f)(2)(ok), 140.4(f)(2)(ol), 140.4(f)(2)(om), 140.4(f)(2)(on), 140.4(f)(2)(oo), 140.4(f)(2)(op), 140.4(f)(2)(oq), 140.4(f)(2)(or), 140.4(f)(2)(os), 140.4(f)(2)(ot), 140.4(f)(2)(ou), 140.4(f)(2)(ov), 140.4(f)(2)(ow), 140.4(f)(2)(ox), 140.4(f)(2)(oy), 140.4(f)(2)(oz), 140.4(f)(2)(pa), 140.4(f)(2)(pb), 140.4(f)(2)(pc), 140.4(f)(2)(pd), 140.4(f)(2)(pe), 140.4(f)(2)(pf), 140.4(f)(2)(pg), 140.4(f)(2)(ph), 140.4(f)(2)(pi), 140.4(f)(2)(pj), 140.4(f)(2)(pk), 140.4(f)(2)(pl), 140.4(f)(2)(pm), 140.4(f)(2)(pn), 140.4(f)(2)(po), 140.4(f)(2)(pp), 140.4(f)(2)(pq), 140.4(f)(2)(pr), 140.4(f)(2)(ps), 140.4(f)(2)(pt), 140.4(f)(2)(pu), 140.4(f)(2)(pv), 140.4(f)(2)(pw), 140.4(f)(2)(px), 140.4(f)(2)(py), 140.4(f)(2)(pz), 140.4(f)(2)(qa), 140.4(f)(2)(qb), 140.4(f)(2)(qc), 140.4(f)(2)(qd), 140.4(f)(2)(qe), 140.4(f)(2)(qf), 140.4(f)(2)(qg), 140.4(f)(2)(qh), 140.4(f)(2)(qi), 140.4(f)(2)(qj), 140.4(f)(2)(qk), 140.4(f)(2)(ql), 140.4(f)(2)(qm), 140.4(f)(2)(qn), 140.4(f)(2)(qo), 140.4(f)(2)(qp), 140.4(f)(2)(qq), 140.4(f)(2)(qr), 140.4(f)(2)(qs), 140.4(f)(2)(qt), 140.4(f)(2)(qu), 140.4(f)(2)(qv), 140.4(f)(2)(qw), 140.4(f)(2)(qx), 140.4(f)(2)(qy), 140.4(f)(2)(qz), 140.4(f)(2)(ra), 140.4(f)(2)(rb), 140.4(f)(2)(rc), 140.4(f)(2)(rd), 140.4(f)(2)(re), 140.4(f)(2)(rf), 140.4(f)(2)(rg), 140.4(f)(2)(rh), 140.4(f)(2)(ri), 140.4(f)(2)(rj), 140.4(f)(2)(rk), 140.4(f)(2)(rl), 140.4(f)(2)(rm), 140.4(f)(2)(rn), 140.4(f)(2)(ro), 140.4(f)(2)(rp), 140.4(f)(2)(rq), 140.4(f)(2)(rr), 140.4(f)(2)(rs), 140.4(f)(2)(rt), 140.4(f)(2)(ru), 140.4(f)(2)(rv), 140.4(f)(2)(rw), 140.4(f)(2)(rx), 140.4(f)(2)(ry), 140.4(f)(2)(rz), 140.4(f)(2)(sa), 140.4(f)(2)(sb), 140.4(f)(2)(sc), 140.4(f)(2)(sd), 140.4(f)(2)(se), 140.4(f)(2)(sf), 140.4(f)(2)(sg), 140.4(f)(2)(sh), 140.4(f)(2)(si), 140.4(f)(2)(sj), 140.4(f)(2)(sk), 140.4(f)(2)(sl), 140.4(f)(2)(sm), 140.4(f)(2)(sn), 140.4(f)(2)(so), 140.4(f)(2)(sp), 140.4(f)(2)(sq), 140.4(f)(2)(sr), 140.4(f)(2)(ss), 140.4(f)(2)(st), 140.4(f)(2)(su), 140.4(f)(2)(sv), 140.4(f)(2)(sw), 140.4(f)(2)(sx), 140.4(f)(2)(sy), 140.4(f)(2)(sz), 140.4(f)(2)(ta), 140.4(f)(2)(tb), 140.4(f)(2)(tc), 140.4(f)(2)(td), 140.4(f)(2)(te), 140.4(f)(2)(tf), 140.4(f)(2)(tg), 140.4(f)(2)(th), 140.4(f)(2)(ti), 140.4(f)(2)(tj), 140.4(f)(2)(tk), 140.4(f)(2)(tl), 140.4(f)(2)(tm), 140.4(f)(2)(tn), 140.4(f)(2)(to), 140.4(f)(2)(tp), 140.4(f)(2)(tq), 140.4(f)(2)(tr), 140.4(f)(2)(ts), 140.4(f)(2)(tt), 140.4(f)(2)(tu), 140.4(f)(2)(tv), 140.4(f)(2)(tw), 140.4(f)(2)(tx), 140.4(f)(2)(ty), 140.4(f)(2)(tz), 140.4(f)(2)(ua), 140.4(f)(2)(ub), 140.4(f)(2)(uc), 140.4(f)(2)(ud), 140.4(f)(2)(ue), 140.4(f)(2)(uf), 140.4(f)(2)(ug), 140.4(f)(2)(uh), 140.4(f)(2)(ui), 140.4(f)(2)(uj), 140.4(f)(2)(uk), 140.4(f)(2)(ul), 140.4(f)(2)(um), 140.4(f)(2)(un), 140.4(f)(2)(uo), 140.4(f)(2)(up), 140.4(f)(2)(uq), 140.4(f)(2)(ur), 140.4(f)(2)(us), 140.4(f)(2)(ut), 140.4(f)(2)(uu), 140.4(f)(2)(uv), 140.4(f)(2)(uw), 140.4(f)(2)(ux), 140.4(f)(2)(uy), 140.4(f)(2)(uz), 140.4(f)(2)(va), 140.4(f)(2)(vb), 140.4(f)(2)(vc), 140.4(f)(2)(vd), 140.4(f)(2)(ve), 140.4(f)(2)(vf), 140.4(f)(2)(vg), 140.4(f)(2)(vh), 140.4(f)(2)(vi), 140.4(f)(2)(vj), 140.4(f)(2)(vk), 140.4(f)(2)(vl), 140.4(f)(2)(vm), 140.4(f)(2)(vn), 140.4(f)(2)(vo), 140.4(f)(2)(vp), 140.4(f)(2)(vq), 140.4(f)(2)(vr), 140.4(f)(2)(vs), 140.4(f)(2)(vt), 140.4(f)(2)(vu), 140.4(f)(2)(vv), 140.4(f)(2)(vw), 140.4(f)(2)(vx), 140.4(f)(2)(vy), 140.4(f)(2)(vz), 140.4(f)(2)(wa), 140.4(f)(2)(wb), 140.4(f)(2)(wc), 140.4(f)(2)(wd), 140.4(f)(2)(we), 140.4(f)(2)(wf), 140.4(f)(2)(wg), 140.4(f)(2)(wh), 140.4(f)(2)(wi), 140.4(f)(2)(wj), 140.4(f)(2)(wk), 140.4(f)(2)(wl), 140.4(f)(2)(wm), 140.4(f)(2)(wn), 140.4(f)(2)(wo), 140.4(f)(2)(wp), 140.4(f)(2)(wq), 140.4(f)(2)(wr), 140.4(f)(2)(ws), 140.4(f)(2)(wt), 140.4(f)(2)(wu), 140.4(f)(2)(wv), 140.4(f)(2)(ww), 140.4(f)(2)(wx), 140.4(f)(2)(wy), 140.4(f)(2)(wz), 140.4(f)(2)(xa), 140.4(f)(2)(xb), 140.4(f)(2)(xc), 140.4(f)(2)(xd), 140.4(f)(2)(xe), 140.4(f)(2)(xf), 140.4(f)(2)(xg), 140.4(f)(2)(xh), 140.4(f)(2)(xi), 140.4(f)(2)(xj), 140.4(f)(2)(xk), 140.4(f)(2)(xl), 140.4(f)(2)(xm), 140.4(f)(2)(xn), 140.4(f)(2)(xo), 140.4(f)(2)(xp), 140.4(f)(2)(xq), 140.4(f)(2)(xr), 140.4(f)(2)(xs), 140.4(f)(2)(xt), 140.4(f)(2)(xu), 140.4(f)(2)(xv), 140.4(f)(2)(xw), 140.4(f)(2)(xx), 140.4(f)(2)(xy), 140.4(f)(2)(xz), 140.4(f)(2)(ya), 140.4(f)(2)(yb), 140.4(f)(2)(yc), 140.4(f)(2)(yd), 140.4(f)(2)(ye), 140.4(f)(2)(yf), 140.4(f)(2)(yg), 140.4(f)(2)(yh), 140.4(f)(2)(yi), 140.4(f)(2)(yj), 140.4(f)(2)(yk), 140.4(f)(2)(yl), 140.4(f)(2)(ym), 140.4(f)(2)(yn), 140.4(f)(2)(yo), 140.4(f)(2)(yp), 140.4(f)(2)(yq), 140.4(f)(2)(yr), 140.4(f)(2)(ys), 140.4(f)(2)(yt), 140.4(f)(2)(yu), 140.4(f)(2)(yv), 140.4(f)(2)(yw), 140.4(f)(2)(yx), 140.4(f)(2)(yy), 140.4(f)(2)(yz), 140.4(f)(2)(za), 140.4(f)(2)(zb), 140.4(f)(2)(zc), 140.4(f)(2)(zd), 140.4(f)(2)(ze), 140.4(f)(2)(zf), 140.4(f)(2)(zg), 140.4(f)(2)(zh), 140.4(f)(2)(zi), 140.4(f)(2)(zj), 140.4(f)(2)(zk), 140.4(f)(2)(zl), 140.4(f)(2)(zm), 140.4(f)(2)(zn), 140.4(f)(2)(zo), 140.4(f)(2)(zp), 140.4(f)(2)(zq), 140.4(f)(2)(zr), 140.4(f)(2)(zs), 140.4(f)(2)(zt), 140.4(f)(2)(zu), 140.4(f)(2)(zv), 140.4(f)(2)(zw), 140.4(f)(2)(zx), 140.4(f)(2)(zy), 140.4(f)(2)(zz)	The section reference is incorrect and should reference 140.4(c)2Bii	NA	No	No	Yes
5	MF	Domestic Hot Water Controls	Central DHW Electric-Ready	160.9(f)	Jose Garcia	Danny Tam	(f) Central Heat Pump Water Heater Ready . Central air/water 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.	NA	No	No	Yes
6	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.	No	No	No	Yes
7	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	Yes
8	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 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	Yes
9	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(f)	The code section was updated to 160.9(f). This reference was not updated and no longer works	No	No	No	Yes
10	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	Yes
11	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	Yes
12	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 <u>propane</u> water heating system	This change improves language clarity since the code language intends to apply to gas or propane water heating systems.	No	No	No	Yes
13	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	Yes
14	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 64 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	Yes
15	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.2.2	Jose Garcia	Danny Tam	JA154.2.2 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	Yes
16	MF	Domestic Hot Water	Central DHW Electric-Ready	JA15.2.3(a)	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	Yes
17	MF	Domestic Hot Water	Central DHW Electric-Ready	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	Yes
18	SF	N/A	N/A	150.2(b)1C	Brian Selby	Mikey Shewmaker / Payam Bozorghchani	Entirely new or complete replacement space conditioning systems shall meet the requirements of Sections 150.0(h), 150.0(i), 150.0(j)1, 150.0(j)2, 150.0(m)1 through 150.0(m)10; 150.0(m)12; 150.0(m)13, 150.1(c)7, 150.2(b)1C, 150.2(b)1Fii and TAB F 150.2-A	I believe the intent for new/replacement systems is to require a heat pump prescriptively, but this language is missing from this section. Referencing Section 150.2(b)1Fii would be the best approach to provide clarification.	No	No	No	Yes
19	SF	N/A	N/A	150.2(b)1Fi	Brian Selby	Mikey Shewmaker / Payam Bozorghchani	When an air conditioner or space-conditioning system is altered or newly by the installation or replacement of an air conditioner installed in an existing dwelling unit , the system shall comply with the following requirements of either A or B below.	The proposed language in Section 150.2(b)1Fi needs to clearly indicate that the alteration of an AC unit is altering only that component of a space-conditioning system, and indicate that "either A or B" options apply based on the scope of work.	No	No	No	No
20	SF	N/A	N/A	150.2(b)1FiB	Brian Selby	Mikey Shewmaker / Payam Bozorghchani	B. An air conditioner shall meet the following requirements: a. R-8 duct insulation when ducts located in unconditioned space; and b. Measured leakage of the duct system					

23	MF	Multifamily Indoor Air Quality	IAQ component and Outdoor air intake accessibility	160.2(b)2A	Tharanga Jayarathne	Anushka Raut	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, mechanical closets or accessible rooftops. Filters and heat/energy recovery cores behind access panels, access doors, or grilles located no more than 10 feet above a walking surface inside a space specified above those spaces comply with this requirement.	The CASE team proposes this more specific language in place of the potentially vague term "spaces specified above".	No. Similar requirement for SF but without accessible rooftops	No	No	Yes
24	MF	Multifamily Indoor Air Quality	Fault Indicator Display (FID)	170.2(c)3B	Tharanga Jayarathne	Anushka Raut	ii. Central fan integrated ventilation systems	CEC has struck through the numbering for Central fan integrated ventilation systems. The CASE Team recommends adding back numbering (ii) for Central fan integrated ventilation system since this is a separate requirement under space-conditioning and ventilation systems.	No	No	No	Yes
25	NR	Nonresidential HVAC Space Heating	Heat Recovery	140.4(i)	Ben Lalor	Ron Bahneg	CHL = coincident peak cooling load of all spaces with a design equipment power density > 5 watts/ft2 and a minimum outdoor airflow requirement < 0.5 cfm/ft2, i.e., high load spaces.	Obtaining information, calculating, and documenting spaces with equipment power density > 5 watts/ft2 throughout the whole building is not going to be easy. When adding filtering spaces by ventilation requirements as well, it becomes extremely tedious for compliance purposes. I suggest using space types from 140.6-C and CZs if needed that meet the currently prescribed thresholds to reduce the burden of calculating and verification.	No	No	No	Yes
26	NR	Cooling Towers	Cooling Tower Efficiency	110.2(e)	Ben Lalor	Ron Bahneg	These calculations are embedded in the NRCC-MCH-E compliance document.	Referencing the contents of the certificate of compliance within the standards is not a current practice. I suggest removing the reference to the contents of the compliance documents and leaving that guidance to the compliance manual and supporting resources. Codifying the contents of a compliance form before it is created/modified to support such measure is not advised.	No	No	No	Yes
27	SF	Buried Ducts and Roofs with Cathedral Ceilings	Cathedral Ceilings	150.1(c)1Aii	Nick Brown/Luke Morton/Simon Pallin	Bach Tsan/RJ W	1. Insulation. A. Roof and ceiling insulation shall be installed in a ventilated attic with an R-value equal to or greater than that shown in Table 150.1-A meeting options ii or iii below. i. Option A: RESEVED. ii. Option B: A minimum R-value of insulation in a ventilated attic installed between the roof rafters in contact with the roof deck and an additional layer of ceiling insulation located between the attic and the conditioned space when meeting Section 150.1(c)9A; or iii. Option C: A minimum R-value of ceiling insulation located between the ventilated attic and the conditioned space or within a cathedral ceiling assembly, when meeting when meeting what comply with Section 150.1(c)9B.	With the new cathedral ceiling option ventilated attic only refers to Option B and the first part of Option C. Suggest re-wording to clarify this. Also provide clarification on the cathedral ceiling path in Option C.	No	No	No	No
28	SF	Single Family High Performance Windows and Walls	Skylight exceptions	150.1(c)3A	Nick Brown	Mikey Shewmaker / Payam Bozorchami	Exception 23 to Section 150.1(c)3A: In Climate Zones 2, 4, and 6 through 15, For each dwelling unit up to 16 square feet of new skylight area with a maximum U-factor of 0.560-40 0.50 and a maximum SHGC of 0.30. In Climate Zones 1, 3, 5, and 16 there is no SHGC requirement.	Typical national skylight manufacturers have products around U=0.48. This will align with proposed changes to the maximum mandatory U-factor for skylights.	SF	No	No	Yes
29	SF/MF	Multifamily Indoor Air Quality	Ventilation FID	SF: 150.1(c)15 & MF: 170.2(c)3B.v	Nick Brown	Anushka Raut	15. Ventilation system Fault Indicator Display (FID): All balanced and supply-ventilation systems serving individual dwelling units shall have a Fault Indicator System (FID) that is field verified as specified in Joint Reference Appendix JA175.	Requiring FID on supply and balanced ventilation systems will tend to encourage the inferior method of exhaust only ventilation. Suggest removing requirement on supply at least and ensuring that performance method penalty for not meeting this requirement is small.	Yes	Yes	Yes	Yes
30	SF	Multifamily Indoor Air Quality	Ventilation FID	SF: 150.1(c)15	Marian Goebes	Anushka Raut	15. Ventilation system Fault Indicator Display (FID): All balanced and supply-ventilation systems serving individual dwelling units shall have a Fault Indicator System (FID) that is field verified as specified in Joint Reference Appendix JA175.	The CASE Team and CI Team agree that for single family we should remove the requirement for supply-only ventilation (or possibly "supply-only and balanced ventilation without heat recovery") for single family homes. The CASE Team suggests NOT removing the requirement for supply-only ventilation in multifamily, since exhaust-only isn't an option for multifamily. Alternatively, the CASE Team and CI Team both agree that the CEC going back to the CASE Team's original idea of using a "carrot not a stick" and allowing FIDs as a compliance option rather than a prescriptive requirement, at least for the 2025 cycle, and shifting to prescriptive in T24-2028. The CASE Team found FIDs for HERVs, but no FIDs for supply-only or balanced systems without heat recovery. Also, a stakeholder (Mike Moore) recently commented that FIDs aren't being enforced in the performance path under Title 24-2022.	No	Yes	Yes	Yes
31	SF	Buried Ducts and Roofs with Cathedral Ceilings	Cathedral Ceilings	Table 150.1-A	Nick Brown	Bach Tsan/RJ W	Footnote 1: leave air gap of at least 1" between insulation and roof deck except for sprayfoam, which is applied directly to the underside of the roof deck.	This footnote needs to consider cathedral ceilings with sprayfoam installed directly in contact with the underside of the roof deck, in which case there will be no gap.	SF	No	No	Yes
32	MF	Multifamily Indoor Air Quality	Ventilation systems	160.2(b)2Axi.a	Nick Brown	Anushka Raut	NA	Exception should have points 1-3 indented so they are under a and b (just formatting)	No	No	No	No
33	MF	Domestic Hot Water	Central DHW Electric Ready	160.9(f)2B	Nick Brown	Danny Tam	Tanks. The minimum space reserved shall include space for service clearances and shall meet one of the following: space capable of structurally supporting the tanks that are part of a central heat pump water heater system of that size	Reserved space should be structurally designed to support tanks capable of replacing gas DHW systems [in case of roof locations] as central HPWHs have very large tanks	SF	No	No	No
34	MF	Domestic Hot Water	Central DHW Electric Ready	160.9(f)2B	Jose Garcia	Danny Tam	Tanks. The minimum space reserved shall include space for service clearances and shall meet one of the following:	The data that we have currently available does not support the necessity of adding language for structural requirements. We documented the decision making process and overview of data gathered in Section 10.2.2.5 of the CASE report (and Appendix M which documents the prototype designs including tank specifications for each design), but will happily consider new data that might change the current recommendation.	No	No	No	No
35	MF	Domestic Hot Water	Central HPWH Clean-up	170.2(d)	Dove Feng	Danny Tam	170.2(d) Domestic Hot Water Systems. Water-heating systems shall meet the applicable requirements of 1, or 2, or 3, or 4 below. 170.2(d)2. Central Systems. For systems serving multiple dwelling units, the water-heating system shall meet the applicable requirement of A through F, E, or shall meet the performance compliance requirements of Section 170.1	170.2(d) water-heating system shall "meet the applicable requirement of 1, 2 or 3 or 4". Instead, it should be "meet the applicable requirement of 1, 2 or 3". There is no need of option 4 due to restructuring of the requirement language. 170.2(d)2. water-heating system shall "meet the applicable requirement of A through F". Instead, it should be "meet the applicable requirement of A through E".	No	No	No	Yes
36	NR	Daylighting	Revise auto daylighting control exceptions	Section 130.1(d) & Section 160.5(b)4D	Yao-Jung Wen	Simon Lee	2. General lighting luminaires longer than 8 feet shall be evaluated in segments of 8 feet or less for allocating lighting power to the different daylight zones. 2.3 The automatic daylighting/light responsive controls shall provide separate control for general lighting in each type of daylight zone. ...	Specifying how lighting power for long luminaires should be allocated to each type of daylight zone is important. This would be the first step to determining how much lighting power is in each daylight zone and whether the daylight zones will require daylight responsive controls. The original language in Express Terms 130.1(d)2C only specifies how a long luminaire should be segmented for control purposes, but does not provide clear guidance on which daylight zone the lighting power of each segment of a long luminaire should be allocated to. This could potentially create a loophole where one can claim that all the lighting power of a long luminaire is allocated to the primary daylight zone; therefore, the lighting power in the secondary daylight zone is less than 10W and does not require daylight responsive controls. And even though the luminaire segments located in the secondary daylight zone need to be controlled separately from those located in the primary daylight zone, they are not controlled because daylight responsive controls are not required in the secondary daylight zone. The proposed addition will prevent this loophole.	No	No	No	Yes

37	NR	Daylighting	Revise auto daylighting control exceptions	NAT.6.1.4	Yao-Jung Wen	Simon Lee	(f) Interaction with Manual Controls. Conduct this test under partial daylight conditions where the electric lighting is, neither at full output nor at minimum light output. Where manual controls are required in the enclosed space with electric lighting controlled by daylight responsive controls, verify and document the following. 1. Manual on/off control lighting reduction test a. Try to turn off controlled electric lighting with manual controls. The manual controls shall turn off the lights. b. After turning off the lighting with the manual control, turn the lights back on. The lights shall return to their partially dimmed level in response to the daylight responsive controls. 2. Manual dimmer control lighting reduction test a. If manual control is also a dimmer, the manual control must also be a multi-level control, try to dim lights. The manual control shall dim the lights below the light level set by daylighting controls. b. After automatic shut-off controls turn off lights and turn on lights again, evaluate dimming level. The lights shall return to their partially dimmed level in response to the daylight responsive controls. 3. Manual dimmer control lighting increase test. Manual dimmers are not required to increase light levels above the level set by the daylight responsive controls, but if the manual dimmers are configured to increase light levels above the levels set by the daylight responsive controls, the manual override of the daylighting controls shall be automatically reset the next time the lights are turned back on as confirmed by the following test. a. Use manual dimmer to increase electric light level above that set by automatic daylighting controls. b. After automatic shut-off controls turn off lights and turn on lights again, evaluate dimming level.	Ensuring daylight responsive controls correctly interact with manual controls in actual installation is important for occupant satisfaction and to result in sustained savings. The Statewide CASE Team and National Lighting Contractors Association of America (NLCAA) collaborated on designing the language and procedure.	No	No	Yes	Yes
38	NR	Daylighting	Revise auto daylighting control exceptions	NAT.6.1.5	Yao-Jung Wen	Simon Lee	(f) Interaction with Manual Controls. Conduct this test under partial daylight conditions where the electric lighting is, neither at full output nor at minimum light output. Where area controls are required in the enclosed space with electric lighting controlled by daylighting controls, verify and document the following. 1. Manual on/off control lighting reduction test a. Try to turn off controlled electric lighting with manual controls. The manual controls shall turn off the lights. b. After turning off the lighting with the manual control, turn the lights back on. The lights shall return to their partially dimmed level in response to the daylight responsive controls.	Ensuring daylight responsive controls correctly interact with manual controls in actual installation is important for occupant satisfaction and to result in sustained savings. The Statewide CASE Team and National Lighting Contractors Association of America (NLCAA) collaborated on designing the language and procedure.	No	No	Yes	Yes
39	MF	Multifamily Restructuring	Additions and Alterations Clean-Up	180.0, 180.1, and 180.2	Lucy Albin	Javier Perez	[Note: See the Multifamily Restructuring CASE Report, Section 10 for mark-up of the MULTIFAMILY BUILDINGS – ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING MULTIFAMILY BUILDINGS Chapter.] https://file24stakeholders.com/wp-content/uploads/2023/10/Revised-2025_T24_Final_CASE-Report_MultifamilyRestructuring-Oct-2023.pdf	The restructuring of the additions, alterations, and repairs chapters as proposed in the CASE report streamline code language and structure, address gaps and misalignments from multifamily restructuring in the 2022 code cycle, and ensure that dwelling units and common use areas are appropriately addressed.	No	No	No	Yes
40	MF	Multifamily Restructuring	Snapshot Quality Insulation Installation (QI)	RA3.5	Lucy Albin	Mikey Shewmaker / Payam Bozorghchami	RA3.5 is a procedure for verifying the quality of insulation installation and air leakage control used in low-rise residential buildings. This procedure is to be followed by the insulation installer and a qualified Home Energy Rating System (HERS) rater must verify its conformance for meeting the requirements of Sections 150.1(c) or 170.2(a)(6), and 110.7 of the Standards.	This change adds the reference to Section 170.2(a)(6) in RA3.5 which includes the QI requirements for low-rise multifamily buildings from the MF chapter.	No	No	No	Yes
41	SF and NR	Domestic Hot Water	Central DHW Electric-Ready	110.3(b)7	Luke Morton	Danny Tam	The door shall be fully louvered or has have two openings, located within 12 inches from the enclosure top and bottom; or		Yes	No	No	No
42	NR	Laboratories	Heat Recovery	140.9(c)6	DJ Joh	Haile Bucaneg	Exception 3 to Section 140.9(c)6: Buildings in climate zones 6 or in jurisdictions where gas heating is allowed—Locations that meet both of the following: 1. in Climate Zone 6 or 7, and 2. in a jurisdiction where gas heating is allowed.	The CASE Report proposed language was ambiguous, and the Express Terms language was an oversight; CEC did not intend to provide a near state-wide exception for this measure language. The proposed revision cleans up the language and maintains the original intent of the CASE proposal.	No	No	No	Yes
43	SF	Residential HVAC Performance	Design (Sizing, Equipment Selection, and Duct/Diffusers) Reheat Limitation	Exception 3 to Section 150.2(a)	Luke Morton	Bach Tsan	The heating system capacity must be adequate to meet the minimum requirements of 600-Section-4204-4 . <u>CRC 303.10</u>	Code should reference applicable requirement for single-family residential buildings.	No	No	No	Yes
44	NR	Laboratories		100.1	DJ Joh	Haile Bucaneg	4-PIPE VAV A VAV system with terminal units that have both hot water and chilled water coils or a single switchover coil that can be fed with hot water or chilled water. A 2-pipe VAV system only has hot water coils at the zones and can result in significant reheat because the air handler mechanically cools the supply air to safety zones with high cooling loads and zones with low cooling loads must reheat the supply air to prevent overcooling. In a 4-pipe VAV system reheat can be eliminated because cooling for zones with high cooling loads can be provided by the zone cooling coils.	This addition adds clarity to the definition of what a 4-pipe VAV system is, as referenced in section 140.9 for reheat limitations.	No	No	No	Yes
45	NR	Laboratories	All	100.1	DJ Joh	Haile Bucaneg	Laboratory is a space or room where hazardous materials are used for activities such as testing, analysis, instruction, research, or development.	This edit is a grammatical fix for the definition of Laboratories.	No	No	No	Yes
46	SF and NR	N/A	Metrics	Inconsistently between code language and compliance software	Luke Morton	Payam Bozorghchami / Javier Perez		Is it "Long-term System Cost" or is it "Long-term Systemwide Cost"? There's inconsistency here between Standards and software.	Yes	No	No	Yes
47	SF	Single Family High Performance Windows and Walls	Mandatory wall insulation U-factor/R-value	150.0(c)	Simon Pallin	Mikey Shewmaker / Payam Bozorghchami	SECTION 150.0 – MANDATORY FEATURES AND DEVICES (a)Roof deck, ceiling and rafter roof insulation. The opaque portions of roof decks separating attic spaces from ambient air, and ceilings or rafter roofs separating conditioned spaces from unconditioned spaces or ambient air, shall meet the requirements of Items 1 through 5 below: <u>5.Bay or bow window roofs and floors shall be insulated to meet the wall insulation requirements of Table 150.1-A.</u> (c)Wall insulation. Opaque portions of above grade walls separating conditioned spaces from unconditioned spaces or ambient air shall meet the following requirements: 1.2 x 4 inch framing shall have an overall assembly U-factor not exceeding U-0.4420.095. <u>In wood framed assemblies, compliance with U-factors may be demonstrated by installing wall insulation with an R-value of 15 with 16 inches on center spacing.</u> <u>Exception 4-to Section 150.0(c)1: Existing walls already insulated to a U-factor not exceeding U-0.110 or already insulated between framing members with insulation having an installed thermal resistance of R-11 or greater.</u> 2.2 x 6 inch or greater framing shall have an overall assembly U-factor not exceeding U-0.4740.069. <u>In wood framed assemblies, compliance with U-factors may be demonstrated by installing wall insulation with an R-value of 21 with 16 inches on center spacing.</u> <u>Exception to Section 150.0(c)2: Existing walls already insulated to a U-factor not exceeding U-0.074 or already insulated between framing members with insulation having an installed thermal resistance of R-19 or greater.</u>	1.For the purpose of accuracy, we suggest moving 150.0(c)4. to a Section 150.0(a)5. 2. Along with the exception to 2x4 framing in 150.0(c)1., an exception for 2x6's in 150.0(c)2. is appropriate, as proposed by the CASE Report. 3.We suggest moving language from 150.0(c)9 to respective examples in 150.0(c)1 and 150.0(c)2. As of issuance of the Express Terms, 150.0(c)9 helps to interpret 150.0(c)1. and 150.0(c)2, but is not an unique code requirement. We suggest, as proposed in the CASE Report, any informative language to aid in the interpretation of 150.0(c)1 and 2 be presented in conjunction with the specific requirements. 4. We also suggest keeping the current language in 150.0(c)9., but not adding "R" since it becomes redundant to the previously stated "R-value".	No	No	No	Yes

48	SF	Single Family High Performance Windows and Walls	All	Table 150.1A	Simon Pallin, Nick Brown	Payam Bozorgchami	See appendix of docketed comment letter for markup.	Some footnote numbers in the table don't match footnote descriptions. Also R-values corresponding to Wall and Floor U factors should all be rounded to the nearest integer.	No	No	No	Yes
49	SF	Single Family High Performance Windows and Walls	Buried Ducts	Exception to 150.0(a)1	Simon Pallin	Mikey Shewmaker / Payam Bozorgchami	Proposed revision: Exception 2 to Section 150.0(a)1: Space-conditioning ducts systems buried within insulation in the <u>attic</u> shall comply <u>es</u> using Section 150.1(b) and verified according to RA 3.1.4.1.	Clarify language to reduce the risk of misunderstanding.	No	No	No	Yes
50	NR	Nonresidential HVAC Space Heating	Mechanical Heat Recovery	140.4(s)	Bryan Boyce and S	Ron Balneg	EXCEPTION 4 to Section 140.4(r)1: Buildings that include thermal-energy-storage meeting Section 140.4(r)2. EXCEPTION 1 to Section 140.4(r)1: Laboratory buildings with exhaust air heat recovery systems meeting Section 140.9(c)6. EXCEPTION 2 to Section 140.4(r)1: Buildings in Climate Zone 15 with SWHCAP < 600 kBtu/h. 2. Heat Recovery for Service Water Heating. If the building is required to have simultaneous mechanical heat recovery by Section 140.4(r)1 or thermal-energy-storage by Section 140.4(r)2 , and SWHCAP ≥ 500 kBtu/h, then the heat recovery system shall also heat or preheat the service hot water.	CEC did not move forward with the CASE team's proposed language at 140.4(r)2, so exception 1 to 140.4(r)1 should be deleted and the exceptions renumbered. Also, both the CI Team and CASE authors noted that since CEC added the proposed language at 140.4(s), any reference to "r" should be changed to "s".	No	No	No	Yes
51	NR	Cooling Towers	Blowdown Controls	110.2(e)	Bryan Boyce	Ron Balneg	Table 110.2-A-1 RECIRCULATING WATER PROPERTIES Conductivity (micro-ohm <u>micro</u> -mhos/cm) 2970 micro-ohm <u>micro</u> -mhos/cm	"mho" is the SI unit for electrical conductance and is the inverse of electrical resistance (measured in "ohms"). The units were incorrectly stated as ohms in the CASE report due to an inaccuracy with the underlying source (which was ASHRAE 189) for what is being proposed for table 110.2-A-1. "micro" could be expressed using the Greek letter mu. Also note that the unit should be normalized by centimeter.	No	No	No	Yes
52	NR	HVAC Editorial Memo	Occupied Standby Controls	120.1(d)5 and 160.2(c)5E	Bryan Boyce	Ron Balneg	A. ... iii. The zone and ventilation system that serves it is controlled by DDC is not served by pneumatic controls. <u>Spaces meeting these criteria include:</u> • <u>Post-secondary classrooms and lecture halls</u> • <u>Conference, meeting, and training rooms</u> • <u>Multipurpose rooms < 1,000 ft²</u> • <u>Breakrooms</u> • <u>Enclosed offices and open plan office areas</u> • <u>Corridors and stairwells</u> B. <u>Occupied standby zone controls</u> ... viii. <u>Decoupled ventilation systems (e.g., DOAS) serving spaces required to have occupant sensing, ventilation controls shall include modulating pressure independent air valves or other means of modulating outside air, at all space conditioning zones. This shall be done to, variable ventilation to, unoccupied zones while maintaining measured outside air ventilation rates to, occupied zones.</u>	• Change "DDC" to "not pneumatic" so that single zone systems are not inadvertently excluded. • Add the list of space types that are impacted by the combined criteria described in sections 120 and 130 so that users don't have to compare different sections of the code to see if their space type is required to have occupied standby controls • Un-delete the last sentence of the new viii requirement for DOAS systems.	No	No	No	No
53	MF	Multifamily Envelope	High Performance Windows	170.2(a)3 160.2(b)1C	Avani Goyal	Mikey Shewmaker / Payam Bozorgchami	See appendix of docketed comment letter for markup.	This is a minor change to ensure proper order/numbering of footnotes in table	No	No	No	Yes
54	SF/MF	Multifamily Indoor Air Quality	ASHRAE 62.2 reference	100.1	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 Residential Buildings," 2022 2019 (ANSI/ASHRAE Standard 62.2- 2022 2019 including ANSI/ASHRAE Addenda v and d — published in the 2020).	While the MF IAQ CASE report did not explicitly propose changing the reference from the 2019 to the 2022 version of 62.2, the CASE Team recommends the CEC make this change, because it includes useful clarifications to language, new definitions that better align with model codes, and updated references (e.g., references to documents that have been withdrawn have been removed). All of the substantive (technical) changes in the 2022 version are addressed with the CASE team's recommendations and Express Terms. This includes the following: 62.2-2019 requires 0.3 cfm50/sf and 62.2-2022 requires 0.2 cfm50/sf for compartmentalization; this is addressed through an exception to the 62.2 standard in the Express Terms for Title 24 Part 6-2025 which requires 0.3 cfm50/sf. 62.2-2022 requires balanced or supply-only ventilation for MF units on enclosed corridors; this is addressed through an exception to the 62.2 standard in the Express Terms for Title 24 Part 6-2025 which requires balanced or supply-only ventilation for all MF units.	Yes	No	No	No
55	NR	Nonresidential Envelopes	Opaque Assemblies	Table 140.3B	Maureen Outman	Michael Shewmaker / Payam Bozorgchami	U-factor for metal building walls in Climate Zone 15: 0.063-0.050	U-0.050 is from the measure set, but savings differential is insignificant	N/A	Yes	No	Yes

56	NR	Nonresidential Envelopes	Vestibules	120.7(e)	Maureen Guttman	Michael Shewmaker / Payam Bozorchami	Main Public entrances in buildings	Public entrances is a defined term; main entrances is not	N/A	No	No	Yes
57	MF	Domestic Hot Water	Pipe Insulation Enhancement	160.4(f)	Amin Delagah	Danny Tam	See appendix of docketed comment letter for markup.	This is a minor change to add the word "plumbing" in front of "appliance" as a plumbing appliance is defined in the plumbing code Part 5. Also, one misspelling corrected with re-installable, and a period added after the number 4 Insulation Quality Verification subsection. RA Appendix section changed to RA3.6.3 from RA3.6.8. to match the RA document.	No	No	No	Yes
58	SF	Residential HVAC Performance	Optimal and Verified Sizing (Mandatory, Applicable to all HVAC)	150.0(i)(2C and 150.0(h)7	Luke Morton	Bach Tsan	C. As described in 150.0(h)(4), the thermostat and heat pump shall lock-out supplementary heat when the outdoor air temperature is above 34°F.	First, the reference to 150.0(h)(8) is incorrect, it should be 150.0(h)7. This cross-referencing seems stylistically inconsistent with the rest of code language. This language is redundant with 150.0(h)7 and should be removed.	No	No	No	Yes
59	MF	Domestic Hot Water	Pipe Insulation Enhancement	RA3.6.3	Amin Delagah	Danny Tam	Table RA3-1 - Summary of Measures Requiring Field Verification and Diagnostic Testing Inspection to verify that the central system hot water piping, fittings and plumbing appliances are continuously insulated per mandatory requirements. RA3.6.3 Verified Pipe Insulation for Central Systems (a) All piping for multifamily domestic hot water systems shall be insulated to the thickness specified in Table 160.4-A, including the first 8 feet of inlet cold water piping to the heating plant. Insulation on the piping and plumbing appliances shall be continuous. (b) All plumbing appliances at the heating plant, from a heating source to storage tank(s), or in between storage tanks and storage water heaters, and recirculation supply and return loop shall meet the following: 1. Insulation shall be flush with pipe insulation or have minimum of one inch if appliance is bulkier. 2. Insulation shall be removable and re-installable for maintenance or replacement. (c)(3) All pipe Pipe supports, hangers, and clamps shall be attached on the outside of rigid pipe insulation. (d)(4) All pipe All pipe insulation seams shall be sealed along the length of the pipe and between adjacent sections of insulation material. (e)(4) Insulation for pipe elbows shall be mitered, and insulation for tees shall be notched. Alternatively, tees and elbows may be pre-formed, or site fabricated with PVC covers. (f)(5) Isolation valves shall be fully functional. Extended stem isolation valves shall be installed on hot water piping or where pipe insulation is required.	RA3.6.3(b)(2) would read more clear if it starts with "Insulation to be" removable and re-installable as with (b)1. In RA3.6.3(b)3, pipe supports, hangers and clamps don't relate to the appliances but to the heating plant and recirculation loop. Changed the outline section to RA3.6.3(c) and started the sentence by adding All.	No	No	No	Yes
60	SF	N/A	Envelope	150.2(b)1.iv	Luke Morton	Mike Shewmaker / Payam Bozorchami	150.2(b)1.iv Attic ventilation shall comply with the California Building Code requirements <u>CRC 806</u>	Energy Code should add specific pointers for code references.	No	No	No	No
61	NR	Commercial Kitchens	Electrification Readiness	SECTION 100.1 DEFINITIONS AND RULES OF CONSTRUCTION	Kiri Coakley, Ted Tiffany	Haile Bucaneg	KITCHEN, FULL-SERVICE COMMERCIAL is a kitchen dedicated to an establishment that offers table service by waitstaff. with patrons paying after eating. KITCHEN, QUICK-SERVICE COMMERCIAL is a kitchen that provides fast food, fast casual, or limited service and payment is required upfront, dedicated to an establishment primarily engaged in providing food services where patrons generally order or select items and pay before eating. Food and drink may be consumed on premises, taken out, or delivered to the customer's location.	The Compliance Team indicated that it is extremely uncommon for designers to have their point of sale equipment on the plans or have a specification for "pay first, or pay later" in their plans, therefore the energy code should not include this point of sale information in the definitions.	N/A	No	No	Yes
62	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) through (i)(a).	This change is needed to make sure the correct code sections are referenced	No	No	No	No
63	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 140.4-W4:	Due to other structural changes to Section 160.9, this reference is no longer required and now references the wrong language	No	No	No	No
64	MF	Domestic Hot Water	Individual DHW Electric-Ready Cleanup	160.9(e)4.B.i	Jose Garcia	Danny Tam	i. Fully lowered doors with fixed louvers consisting of a single layer of fixed flat slats.	In coordination with the HPWH ventilation measure per James Haile's meeting with CEC	No	No	No	Yes
65	NR	N/A	Lighting Code Language Cleanup	110.12(c)3	Yao-Jung Wen	Simon Lee	SECTION 110.12(c)3 General lighting shall be reduced in a manner consistent with the uniform level of illumination requirements in Table 430.4-A <u>illumination uniformity</u> requirements of Section 130.1(b) or 160.5(b)4B.	Use of the term "illumination uniformity" is incorrect in Section 110.2(c)3. Illuminance uniformity in illuminating engineering refers to the differences between the locations within a space that receives minimum illuminance and maximum illuminance. This is not the same as reducing the light level in the space in a uniform manner. Since continuous dimming is essentially required for all multilevel controls, we recommend not over-specifying how light level reductions need to be controlled in order to leave flexibility to the practitioners and assure controls are implemented in accordance with Section 130.1(b).	N/A	No	No	No
66	NR	N/A	Lighting Code Language Cleanup	130.1(b)	Yao-Jung Wen	Simon Lee	SECTION 130.1(b) (b) Multilevel lighting controls. ... The multilevel lighting controls shall provide, and enable continuous dimming from 40 to 100 percent 100 percent to 10 percent or lower of lighting power to achieve illuminance uniformity.	This change suggests clarifying the language in Section 130.1. The language 10 to 100 percent provides a false sense of a rigid boundary, no more and no less. But in fact, less than 10% is permitted and is a good thing, and the language should explicitly allow it. In addition, the use of the term "illuminance uniformity" is incorrect. Illuminance uniformity in illuminating engineering refers to the differences between the locations within a space that receives minimum illuminance and maximum illuminance. This is not the same as reducing the light level in the space in a uniform manner. Since continuous dimming is essentially required for all multilevel controls, we recommend not over-specifying how light level reductions need to be controlled in order to leave flexibility to the practitioners and assure controls are implemented in accordance with Section 130.1(b).	N/A	No	No	No
67	NR	N/A	Lighting Code Language Cleanup	130.1(c)6D	Yao-Jung Wen	Simon Lee	SECTION 130.1(c)6D i. The occupant sensing controls shall be configured so that lighting shall be controlled separately in control zones not greater than 600 square feet. For luminaires with an embedded occupant sensor that are capable of reducing power independently from other luminaires, each luminaire can be considered its own control zone. Luminaires with an embedded occupant sensor, when reducing power independently from other luminaires, each luminaire can be considered its own control zone. All control zones in offices greater than 250 square feet shall be shown on the plans and	The intent of the stricken-out language was to serve as an important qualifier for how control zones are defined in the case of occupant sensing lighting controls (LLC). Each LLC luminaire is considered its own control zone only if the controls are not coordinated among multiple luminaires. The added language is good, but does not provide the same guidance originally intended.	N/A	No	No	No
68	NR	N/A	Lighting Code Language Cleanup	140.6(a)2Ki	Yao-Jung Wen	Simon Lee	SECTION 140.6(a)2K ii. General lighting shall be reduced in a manner consistent with uniform level of illumination requirements in Table 430.4-A <u>At the illumination uniformity requirements of Section 130.1(b).</u>	Use of the term "illuminance uniformity" is incorrect. Illuminance uniformity in illuminating engineering refers to the differences between the locations within a space that receives minimum illuminance and maximum illuminance. This is not the same as reducing light level in the space in a uniform manner. Since continuous dimming is essentially required for all multilevel controls, we recommend not over-specifying how light level reduction needs to be controlled to leave flexibility to the practitioners and just make sure controls are implemented in accordance with 130.1(b).	N/A	No	No	No
69	SF	N/A	Lighting Code Language Cleanup	JA8.3.3	Yao-Jung Wen	Simon Lee	[Note: SECTION JA8.3.3 Copy the ENERGY STAR test method into JA8 or a separate JA]	The start time test method specified in this section refers to ENERGY STAR Program Requirements for Lamps and Fixtures. The ENERGY STAR lamp and fixture programs will be sunset by the time the 2025 Standards take effect so the test method should be added here for reference.	N/A	No	No	No
70	SF	N/A	Lighting Code Language Cleanup	JA8.3.7	Yao-Jung Wen	Simon Lee	[Note: SECTION JA8.3.7 Copy the ENERGY STAR test method into JA8 or a separate JA]	The audible noise test method specified in this section refers to ENERGY STAR Program Requirements for Lamps and Fixtures. The ENERGY STAR lamp and fixture programs will be sunset by the time the 2025 Standards take effect so the test method should be added here for reference.	N/A	No	No	No
71	SF	N/A	Lighting Code Language Cleanup	JA8.5	Yao-Jung Wen	Simon Lee	[Note: SECTION JA8.5 Copy the ENERGY STAR test method into JA8 or a separate JA]	The elevated temperature life test method specified in this section refers to ENERGY STAR Program Requirements for Lamps and Fixtures. The ENERGY STAR lamp and fixture programs will be sunset by the time the 2025 Standards take effect so the test method should be added here for reference.	N/A	No	No	No

72	SF	N/A	Lighting Code Language Cleanup	150.2(b)1K	Jon McHugh	Simon Lee	SECTION 150.2(b)1K K. Lighting. The altered lighting system shall meet the lighting requirements of Section 150.0(k). The altered luminaires shall meet the luminaire efficacy requirements of Section 150.0(k) and TABLE 160.0-A . Where existing screw base sockets are present in ceiling-recessed luminaires, removal of these sockets is not required provided that new JAB compliant trim kits or lamps designed for use with recessed downlights or luminaires are installed.	Reflects that Table 150.0-A is deleted	N/A	No	No	No
73	MF	N/A	Lighting Code Language Cleanup	180.2(b)4A	Jon McHugh	Simon Lee	SECTION 180.2(b)4A A. Dwelling unit lighting. The altered lighting system shall meet the lighting requirements of Section 160.5(a). The altered luminaires shall meet the luminaire efficacy requirements of Section 160.5(a) and Table 160.0-A . Where existing screw base sockets are present in ceiling-recessed luminaires, removal of these sockets is not required, provided that new JAB compliant trim kits or lamps designed for use with recessed downlights or luminaires are installed.	Reflects that Table 160.0-A is deleted	N/A	No	No	No
74	MF	N/A	Lighting Code Language Cleanup	160.5(b)4B	Yao-Jung Wen	Simon Lee	SECTION 160.5(b)4B B. Multilevel lighting controls. ... <u>The multilevel lighting controls shall provide, and enable continuous dimming from 40 to 100 percent, 100 percent to 10 percent, or lower-of-lighting-power-to-achieve-illuminance-uniformity.</u>	This change suggests clarifying the language in Section 130.1. The language 10 to 100 percent provides a false sense of a rigid boundary, no more and no less. But in fact, less than 10% is permitted and is a good thing, and the language should explicitly allow it. In addition, the use of the term "illuminance uniformity" is incorrect. Illuminance uniformity in illuminating engineering refers to the differences between the locations within a space that receives minimum illuminance and maximum illuminance. This is not the same as reducing the light level in the space in a uniform manner. Since continuous dimming is essentially required for all multilevel controls, we recommend not over-specifying how light level reductions need to be controlled in order to leave flexibility to the practitioners and assure controls are implemented in accordance with Section 130.1(b).	N/A	No	No	No

Appendix: Additional Mark-up Language

The appendix provides code language markups for longer edits that did not fit into the previous tables.

Remark # 1 and 2 (Substantive Table) | Multifamily Restructuring, Skylight Properties (Additions and Alterations)

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

Climate Zone		<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>16</u>
<u>Curtainwall / Storefront / Window Wall and Glazed Doors¹</u>	<u>U-factor</u>	<u>0.38</u>	<u>0.41</u>	<u>0.41</u>	<u>0.41</u>	<u>0.41</u>	<u>0.41</u>	<u>0.41</u>	<u>0.41</u>	<u>0.41</u>	<u>0.41</u>	<u>0.41</u>	<u>0.41</u>	<u>0.41</u>	<u>0.41</u>	<u>0.41</u>	<u>0.38</u>
<u>Curtainwall / Storefront / Window Wall and Glazed Doors¹</u>	<u>RSHGC</u>	<u>0.35</u>	<u>0.26</u>	<u>0.26</u>	<u>0.26</u>	<u>0.26</u>	<u>0.26</u>	<u>0.26</u>	<u>0.26</u>	<u>0.26</u>	<u>0.26</u>	<u>0.26</u>	<u>0.26</u>	<u>0.26</u>	<u>0.26</u>	<u>0.26</u>	<u>0.25</u>
<u>Curtainwall / Storefront / Window Wall and Glazed Doors¹</u>	<u>VT²</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>
<u>NAFS 2017 Performance Class AW Window — Fixed¹</u>	<u>U-factor</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.47</u>	<u>0.47</u>	<u>0.41</u>	<u>0.41</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>	<u>0.38</u>
<u>NAFS 2017 Performance Class AW Window — Fixed¹</u>	<u>RSHGC</u>	<u>0.35</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.31</u>	<u>0.31</u>	<u>0.26</u>	<u>0.26</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>
<u>NAFS 2017 Performance Class AW Window — Fixed¹</u>	<u>VT²</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>
<u>NAFS 2017 Performance Class AW Window — Operable¹</u>	<u>U-factor</u>	<u>0.43</u>	<u>0.43</u>	<u>0.43</u>	<u>0.43</u>	<u>0.43</u>	<u>0.47</u>	<u>0.47</u>	<u>0.43</u>	<u>0.43</u>	<u>0.43</u>	<u>0.43</u>	<u>0.43</u>	<u>0.43</u>	<u>0.43</u>	<u>0.43</u>	<u>0.43</u>
<u>NAFS 2017 Performance Class AW Window — Operable¹</u>	<u>RSHGC</u>	<u>0.35</u>	<u>0.24</u>	<u>0.24</u>	<u>0.24</u>	<u>0.24</u>	<u>0.31</u>	<u>0.31</u>	<u>0.24</u>	<u>0.24</u>	<u>0.24</u>	<u>0.24</u>	<u>0.24</u>	<u>0.24</u>	<u>0.24</u>	<u>0.24</u>	<u>0.24</u>
<u>NAFS 2017 Performance Class AW Window — Operable¹</u>	<u>VT²</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>	<u>0.37</u>
<u>All Other Windows and Glazed Doors¹</u>	<u>U-factor</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.34</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>
<u>All Other Windows and Glazed Doors¹</u>	<u>RSHGC</u>	<u>0.35</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>	<u>0.23</u>
<u>Skylights, 3 habitable stories and fewer</u>	<u>U-factor</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>
<u>Skylights, 3 habitable stories and fewer</u>	<u>RSHGC</u>	<u>NA</u>	<u>0.23</u>	<u>NA</u>	<u>0.23</u>	<u>NA</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>NA</u>

Skylights, 4 habitable stories and greater	U- fac tor	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>	<u>0.46</u>
Skylights, 4 habitable stories and greater	R SHGC	0.35 N A	<u>0.25</u>	0.25 NA	<u>0.25</u>	0.25 NA	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	<u>0.25</u>	0.25 NA
Skylights serving common use areas, 4 habitable stories and greater	VT ^d	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>	<u>0.49</u>

Footnotes to TABLE 180.2-B

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

Remark #4 (Substantive Table) | Multifamily Restructuring, Verification Clean Up

Table RA2-1 — Summary of Measures Requiring Field Verification and Diagnostic Testing

Measure Title	Description	Procedure(s)
	Duct Measures	
Duct Sealing	Component Packages require that space conditioning ducts be sealed. If sealed and tested ducts are claimed for compliance, field verification and diagnostic testing is required to verify that approved duct system materials are utilized, and that duct leakage meets the specified criteria.	RA3.1.4.3
Duct Location, Surface Area and R-value	Compliance credit can be taken for improved duct location, surface area and R-value. Field verification is required to verify that the duct system was installed according to the design, including location, size and length of ducts, duct insulation R-value and installation of buried ducts. ¹ For buried ducts measures, Duct Sealing and High Quality Insulation Installation (QII) is required.	RA3.1.4.1
Verification of low leakage ducts located entirely in conditioned space	Duct system location shall be verified by visual inspection and diagnostic testing. Compliance credit can be taken for verified duct systems with low air leakage to the outside when measured in accordance with Reference Residential Appendix Section RA3.1.4.3.8. Field Verification for ducts in conditioned space is required. Duct sealing is required.	RA3.1.4.3.8
Low Leakage Air-handling Units	Compliance credit can be taken for installation of a factory sealed air handling unit tested by the manufacturer and certified to the Commission to have met the requirements for a Low Leakage Air-Handling Unit. Field verification of the air handler's model number is required. Duct Sealing is required.	RA3.1.4.3.9
Verification of Return Duct Design	Verification to confirm that the return duct design conform to the applicable criteria given in TABLE 150.0-B, TABLE 150.0-C, TABLE 160.3-A, or TABLE 160.3-B.	RA3.1.4.4
Verification of Air Filter Device Design	Verification to confirm that the air filter devices conform to the requirements given in applicable Standards Sections 150.0(m)12 or 160.2(b)1.	RA3.1.4.5
Verification of Prescriptive Bypass Duct Requirements	Verification to confirm zonally controlled systems comply with the bypass duct requirements in Section 150.1(c)13 or 170.2(c)3C.	RA3.1.4.6
	Air Conditioning Measures	
Improved Refrigerant Charge	Component Packages require in some climate zones that air-cooled air conditioners and air-source heat pumps be diagnostically tested in the field to verify that the system has the correct refrigerant charge. For the performance method, the Proposed Design is modeled with less efficiency if diagnostic testing and field verification is not performed. The system must also meet the prerequisite minimum System Airflow requirement.	RA3.3 RA3.2 RA1.2
Installation of Fault Indicator Display	Component Packages specify that a Fault Indicator Display can be installed as an alternative to refrigerant charge testing. The existence of a Fault Indicator Display has the same calculated benefit as refrigerant charge testing. Field verification is required.	RA3.4.2
Verified System Airflow	When compliance requires verified system airflow greater than or equal to a specified criterion, field verification and diagnostic testing is required.	RA3.3
Air-handling Unit Fan Efficacy	When compliance requires verified fan efficacy (Watt/cfm) less than or equal to a specified criterion, field verification and diagnostic testing is required.	RA3.3
Verified Energy Efficiency Ratio (EER/EER2)	Compliance credit can be taken for increased EER/EER2 by installation of specific air conditioner or heat pump models. Field verification is required. ²	RA3.4.3 RA3.4.4.1
Verified Seasonal Energy Efficiency Ratio (SEER/SEER2)	HERS Rater field verification of the SEER/SEER2 rating is required for some systems.	RA3.4.3 RA3.4.4.1
Rated Heat Pump Capacity	When performance compliance uses a heat pump, the rated capacity of the installed system shall be verified to be greater than or equal to the specified	RA3.4.4.2

Verification	value.	
Evaporatively Cooled Condensers	Compliance credit can be taken for installation of evaporatively cooled condensers. Field verification of duct leakage is required. Field verification of refrigerant charge is required. Field verification of EER/EER2 is required. This measure is applicable to single family residential only.	RA3.1.4.3, RA3.2 RA3.4.3. RA3.4.4.1
Variable Capacity Heat Pump (VCHP) Compliance Option	When performance compliance uses the VCHP compliance option, the system shall be field verified to confirm it meets the eligibility requirements.	RA3.4.4.3
	Ventilation Cooling Measures	
Whole House Fan	When performance compliance uses a whole house fan, the installed whole house fan airflow rate (cfm) and fan efficacy (W/cfm) shall be verified to be equal to or better than the specified values. This measure is applicable to single family residential only.	RA3.9
Central Fan Ventilation Cooling System	When performance compliance uses a central fan ventilation cooling system (CFVCS), the installed CFVCS ventilation airflow rate (cfm) and fan efficacy (W/cfm) shall be verified to be equal to or better than the specified values. This measure is applicable to single family residential only.	RA3.3.4
	Mechanical Ventilation Measures for Improved Indoor Air Quality	
Continuous Whole-Building Mechanical Ventilation Airflow	Measurement of whole-building mechanical ventilation is mandatory for newly constructed buildings.	RA3.7.4.1
Intermittent Whole-Building Mechanical Ventilation Airflow	Measurement of whole-building mechanical ventilation is mandatory for newly constructed buildings.	RA3.7.4.2
Kitchen Local Mechanical Exhaust Verification	Verification of kitchen local mechanical exhaust is mandatory for newly constructed buildings.	RA3.7.4.3
Heat Recovery Ventilation (HRV) or Energy Recovery Ventilation (ERV) Rated Performance Verification	When performance compliance requires verification of the HRV/ERV fan efficacy (W/cfm) or heat recovery efficiency, then the installed ventilation system shall be verified.	RA3.7.4.4
	Building Envelope Measures	
Building Envelope Air Leakage	Compliance credit can be taken for reduced building envelope air leakage. Field verification and diagnostic testing is required. Multifamily dwelling units are required to have enclosure leakage verified when supply or exhaust ventilation systems are installed.	RA3.8
Quality Insulation Installation (QII)	Compliance Software recognizes standard and improved envelope construction. Quality Insulation Installation is a prescriptive measure in all climate zones for newly constructed buildings and additions greater than 700 square feet, except low-rise multifamily buildings in Climate Zone 7. Field verification is required.	RA3.5
Quality Insulation Installation for Spray Polyurethane Foam (SPF) Insulation	A HERS Rater shall verify the installation of SPF insulation whenever R-values other than the default R-value per inch are used for compliance.	RA3.5.6
	Single Family Domestic Hot Water Measures	
Verified Pipe Insulation Credit (PIC-H)	Inspection to verify that all hot water piping in non-recirculating systems is insulated and that corners and tees are fully insulated. No piping should be visible due to insulation voids with the exception of the last segment of piping that penetrate walls and delivers hot water to the sink, appliance, etc.	RA3.6.3.

Verified Parallel Piping (PP-H)	Inspection that requires that the measured length of piping between the water heater and single central manifold does not exceed five feet	RA3.6.4
Verified Compact Hot Water Distribution System Expanded Credit (CHWDS-H-EX)	Field verification to insure that the eligibility criteria specified in RA 3.6.5 are met.	RA3.6.5
Demand Recirculation: Manual Control (RDRmc-H)	Inspection to verify that all recirculating hot water piping is insulated and that corners and tees are fully insulated. No piping should be visible due to insulation voids	RA3.6.6
Demand Recirculation: Sensor Control(RDRsc-H)	Inspection to verify that all recirculating hot water piping is insulated and that corners and tees are fully insulated. No piping should be visible due to insulation voids.	RA3.6.7
Verified Drain Water Heat Recovery System (DWHR-H)	Inspection to verify that the DWHR unit(s) and installation configuration match the compliance document and the DWHR(s) is certified to the Commission to have met the requirements.	RA3.6.9
Multi Family Domestic Hot Water Heating Measures		
Multiple Recirculation Loop Design for DHW Systems Serving Multiple Dwelling Units	Inspection that a central DHW system serving a building with more than eight dwelling units has at least two recirculation loops, each serving roughly the same number of dwelling units. These recirculation loops may the same water heating equipment or be connected to independent water heating equipment.	RA3.6.8
Verified Drain Water Heat Recovery System (DWHR-H)	Inspection to verify that the DWHR unit(s) and installation configuration match the compliance document and the DWHR(s) is certified to the Commission to have met the requirements.	RA3.6.9

1. Note: Compliance credit for increased duct insulation R-value (not buried ducts) may be taken without field verification if the R-value is the same throughout the building, and for ducts located in crawlspaces and garages where all registers are either in the floor or within 2 feet of the floor. These two credits may be taken subject only to enforcement agency inspection.

2. Note: The requirement for verification of a high EER/EER2 does not apply to equipment rated only with an EER/EER2.

Remark #13 (Substantive Table) | Residential HVAC Design

Section 150.0(h)5

150.0(h)5. System Selection.

A. Equipment sizing and selection shall meet the cooling and heating loads of Section 150.0(h)1 and 2.

B. Systems shall be sized based on ACCA Manual S-2023, in accordance with the following requirements:

i. Cooling: There is no limit on the minimum or maximum cooling capacity.

ii. Furnace: Heating capacity be sized based on ACCA Manual S-2023, Table N2.5.

iii. Heat Pump Heating:

a. Minimum Capacity: shall meet the minimum requirements of the CBC, not including any supplementary heating.

b. Maximum Capacity: There is no limit on the maximum heating capacity.

Exception to 150.0(h)5B: For additions and alterations where airflow will NOT be field verified to be at least 350 cfm/ton, the cooling and heating capacity shall be no larger than that shown in Table 150.0-TBD2.

Table 150.0-**TBD2**: Maximum Heating and Cooling Capacity (HL = Design Heating Load; CL = Design Total Cooling Load)

<u>System Type</u>	<u>Maximum Heating Capacity for Heating Only Systems</u>	<u>Maximum Heating Capacity for Heat Pumps when CL minus HL is:</u>		
		<u>< 0</u>	<u>0 – 12 kveh</u>	<u>> 12 kBtuh</u>
<u>Single Speed System—Capacity</u>	<u>HL + 6 kBtuh</u>	<u>No maximum</u>	<u>HL + 12 kBtuh</u>	<u>No maximum</u>
<u>Variable or Multi Speed System—Maximum Capacity</u>	<u>HL + 6 kBtuh</u>	<u>No maximum</u>	<u>HL + 12 kBtuh</u>	<u>No maximum</u>
<u>Variable or Multi Speed System—Capacity at Lowest Speed</u>	<u>80% of HL</u>	<u>80% of HL</u>	<u>No maximum</u>	<u>No maximum</u>
<u>System Type</u>	<u>Maximum Cooling Capacity for Cooling Only Systems</u>	<u>Maximum Cooling Capacity for Heat Pumps when CL minus HL is:</u>		
		<u>< 0</u>	<u>0 – 12 kBtuh</u>	<u>> 12 kBtuh</u>
<u>Single Speed System—Capacity</u>	<u>CL + 6 kBtuh</u>	<u>No maximum</u>	<u>CL + 6 kBtuh</u>	<u>CL + 6 kBtuh</u>
<u>Variable or Multi Speed System—Maximum Capacity</u>	<u>CL + 6 kBtuh</u>	<u>No maximum</u>	<u>CL + 6 kBtuh</u>	<u>CL + 6 kBtuh</u>
<u>Variable or Multi Speed System—Capacity at Lowest Speed</u>	<u>80% of CL</u>	<u>No maximum</u>	<u>80% of CL</u>	<u>80% of CL</u>

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.

...

JA15 Guideline 36 Programming Library Certification

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 Guideline 36. This section describes the requirements of the Guideline 36 programming library.

JA15.1 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. The declaration at the end of this section shall be used to submit to the California Energy Commission.

JA15.2 Information that shall be included with the Declaration

The certifying company shall provide evidence of compliance with these requirements, including the following at a minimum:

- Evidence: List of hardwired points and control points used in the library.
- Evidence: Documentation of test plan and results, including inputs and outputs for each test.
- Evidence: Documentation of programming, such as screenshots of programming function blocks or programming script.

JA15.3 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, and shall meet the minimum validation requirements listed.

Table JA15.3-1 Required Guideline 36 Logic for Certified Programming Library

<u>Guideline 36 Logic Section</u>	<u>Minimum Validation Requirements</u>
<u>Section 5.1</u> <u>General</u> <u>Sections 5.1.14 and 5.1.17.3 only</u>	<u>Trim and Respond Setpoint Reset Logic, including Importance Multipliers, Request-Hours Accumulator, and Trim and Respond Variables per 5.1.14</u> <u>Air Economizer High Limits based on device type and climate zone, per 5.1.17.3</u>
<u>Section 5.2</u> <u>Generic Ventilation Zones</u> <u>(Section 5.2.1.3 is not required)</u>	<u>Zone minimum outdoor air setpoints and occupied minimum airflow calculations per 5.2.1.4</u> <u>Time-averaged ventilation logic per 5.2.2</u>
<u>Section 5.3</u> <u>Generic Thermal Zones</u>	<u>Independently adjustable zone heating and cooling setpoints, demand limit setpoint adjustments, and setbacks per 5.3.2</u> <u>Heating Loop and Cooling Loop are separate control loops per 5.3.4</u>
<u>Section 5.4</u> <u>Zone Groups</u>	<u>Separate schedules for each Zone Group per 5.4.2</u> <u>All zones in a Zone Group are in the same Operating Mode per 5.4.3</u> <u>Zone Group Operating Modes per 5.4.6</u>
<u>Section 5.5</u> <u>VAV Terminal Unit—Cooling Only</u>	<u>Airflow endpoints determined by Zone Group Mode per 5.5.4</u> <u>Airflow setpoint is reset by Heating Loop or Cooling Loop signals per 5.5.5</u> <u>System Requests per 5.5.8</u>
<u>Section 5.6</u> <u>VAV Terminal Unit with Reheat</u>	<u>Airflow endpoints determined by Zone Group Mode per 5.6.4</u> <u>Airflow setpoint is reset by Heating Loop or Cooling Loop signals per 5.6.5</u> <u>System Requests per 5.6.8</u>
<u>Section 5.15</u> <u>Air-Handling Unit System Modes</u>	<u>All Operating Modes defined for Zone Groups (see Section Error! Reference source not found.) are also defined for air-handling units per 5.15.1</u>
<u>Section 5.16</u> <u>Multiple-Zone VAV Air-Handling Unit</u> <u>(Sections 5.16.3.1, 5.16.4.1, 5.16.5.1, 5.16.6.1, and 5.16.11.2.a are not required)</u>	<u>Fan speed control and duct static pressure setpoint reset using trim and respond logic per 5.16.1</u> <u>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</u> <u>System outdoor airflow requirements dynamically calculated for Zone Groups in Occupied Mode in accordance with Title 24 ventilation requirements, per 5.16.3.2</u> <u>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</u> <u>Building relief per 5.16.8 and 5.16.9</u> <u>Return fan control, per 5.16.10 and 5.16.11</u> <u>Fan, filter, and pressure alarms per 5.16.13</u> <u>Automatic FDD based on equipment operating state, including diagnostics based on fault conditions per 5.16.14</u> <u>Plant Requests per 5.16.16</u>

JA15.4 Declaration

Consistent with the requirements of Title 24, Part 6, Section 100.0(h), 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 specified by the instructions in JA15.5.

Company, Product Line, and Version Number of all libraries being certified

<u>Company</u>	<u>Product Line</u>	<u>Guideline 36 Version</u>	<u>Library Version</u>

When providing the information below, be sure to enter complete mailing addresses, including postal zip codes.

Certifying Company

<u>Contact Person Name *</u>	<u>Phone 1</u>
<u>Certifying Company Name **</u>	<u>Phone 2</u>
<u>Address</u>	<u>Fax</u>
<u>(Address)</u>	<u>E-mail</u>
<u>(Address)</u>	<u>Company Website (URL)</u>

* If the contact person named above is NOT the person whose signature is on the Declaration, then the full contact information for the person whose signature is on the Declaration must also be provided on a separate page.

** If the company named above is: A) a parent entity filing on behalf of a subsidiary entity; B) a subsidiary entity filing on behalf of a parent entity; or C) an affiliate entity filing on behalf of an affiliate entity, the above contact information must be provided for any additional entities on a separate page.

Company Responsible for Library Development if Different from Certifying Company

<u>Contact Person Name</u>	<u>Phone 1</u>
<u>Company Name</u>	<u>Phone 2</u>

<u>Address</u>	<u>Fax</u>
<u>(Address)</u>	<u>E-mail</u>
<u>(Address)</u>	<u>Company Website (URL)</u>

Declaration

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 Joint Appendix JA15 of Title 24, Part 6 of the California Code of Regulations.
- (2) [If the party submitting this statement is a corporation, partnership, or other business entity] I am authorized to make this declaration, and to file this statement, on behalf of the company named below.

<u>Certifying Company Name</u>	<u>Date</u>
<u>Name/Title (please print)</u>	<u>Signature</u>

JA15.5 Certification

Send declarations and evidence of functionality or test reports to the addresses below. Electronic submittals are preferred.

- (1) Electronic submittal:
CertifiedtoCEC@energy.ca.gov
Attn: Guideline 36 Library Certification
- (2) Mail:
Attn: Guideline 36 Library Certification
Building Standards Development Office
California Energy Commission
1516 Ninth St., MS 37
Sacramento, CA 95814

Remark #17 (Substantive Table) and Remark #53 (Non-Substantive Table) | Multifamily Envelope

Table 170.2-A:

1. Curtainwall: Min VT applied/extended to common use areas. The footnote says "7", should be "6" since it comes before the Class AW footnote.
2. Class AW: Min VT applied/extended to common use areas. The footnote should succeed the curtainwall footnote, #7.
3. This would imply Floor/soffits slab perimeter to have footnote #5 instead of #8 and Exterior doors to be #8.

Table 180.2-B:

1. Curtainwall footnote #1 should be underlined in table since it is a new addition in 2025 code.
2. Other window categories apart from curtainwall should have a strikethrough for footnote #1

Table 170.2-A

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
	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
	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
	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
	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 ^{4,5} , Three Habitable Stories or less	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	U 0.58 R 7.0
	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
	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
	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

Quality Insulation Installation (QII) for buildings up to three habitable stories			Yes	Yes	Yes	Yes	Yes	Yes	NR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fenestration	Curtain Wall/ Storefront ⁷⁶	Maximum 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	0.38
		Maximum RSHGC, three or fewer habitable stories	NR	0.26	NR	0.26	NR	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.25	NR
		Maximum RSHGC, four or more habitable stories	0.35	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.25	0.26
		Minimum VT, four or more habitable stories common use area	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 ⁵⁷	Maximum U-factor	0.38	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.38
		Maximum RSHGC, three or less habitable stories	NR	0.24	NR	0.24	NR	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	NR
		Maximum RSHGC, four or more habitable stories	0.35	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
		Minimum VT, four or more habitable stories common use areas	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 Fenestration	Maximum U-factor	0.30 <u>0.28</u>	0.30	0.30 <u>0.28</u>	0.30 <u>0.28</u>	0.30 <u>0.28</u>	0.30 <u>0.34</u> <u>0.30</u>	0.34	0.34 <u>0.30</u>	0.30	0.30	0.30 <u>0.28</u>	0.30	0.30 <u>0.28</u>	0.30 <u>0.28</u>	0.30 <u>0.28</u>
		Maximum RSHGC, three or less habitable stories	NR	0.23	NR	0.23	NR	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	NR
		Maximum RSHGC, four or more habitable stories	0.35	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
	Maximum Window to Floor Ratio		20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Maximum Window to Wall Ratio		40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
	Maximum Skylight Roof Ratio		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Exterior Doors ⁶⁸	Maximum 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
		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	0.50
		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

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. 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.
6. Requirements apply to doors included in the Curtainwall/Storefront construction assembly.
7. Product must be certified to meet the North American Fenestration Standard/Specification for an Architectural Window (AW).
8. Glazed doors must meet the fenestration requirements.

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

Climate Zone		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Curtainwall / Storefront / Window Wall and Glazed Doors ¹	U-factor	0.38	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 N R	0.26	0.26 N R	0.26	0.26 N R	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.25 N R
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 ³	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 ³	RSHGC	0.35 N R	0.25	0.25 N R	0.25	0.25 N R	0.31	0.31	0.26	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.25 N R
NAFS 2017 Performance Class AW Window – Fixed ³	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 ³	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 0.24 N R	0.24	0.24 0.24 N R	0.24	0.24 0.24 N R	0.31	0.31	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24 0.24 N R
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 N R	0.30	0.30 0.28 N R	0.30 0.28 N R	0.30 0.28 N R	0.30	0.34	0.30	0.30	0.30	0.30 0.28 N R	0.30	0.30 0.28 N R	0.30 0.28 N R	0.30 0.28 N R	0.30 0.28 N R
All Other Windows and Glazed Doors ¹	RSHGC	0.35 0.23 N R	0.23	0.23 0.23 N R	0.23	0.23 0.23 N R	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23 0.23 N R
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

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

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	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Skylights, 4 habitable stories and greater	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

Footnotes to TABLE 180.2-B

1. For fenestration installed in buildings with three or fewer habitable stories, there is no SHGC requirement in Climate Zones 1, 3, 5, and 16. Requirements apply to glazed doors included in the Curtainwall/Storefront construction assembly.
2. Minimum VT requirements do not apply to multifamily buildings 3 habitable stories or less.

Remark #18 (Substantive Table) and Remark #48 (Non-substantive Table) | Single Family Prescriptive Envelope

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

Single- Family				Climate Zone															
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
				Building Envelope Insulation															
Building Envelope	Roofs/Ceilings	Option B (meets § 150.1(c)9A)	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
			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
			Radiant Barrier	NR	REQ	REQ	NR	REQ	REQ	REQ	NR	NR	NR	NR	NR	NR	NR	NR	NR
		Option C (meets § 150.1(c)9B)	Ceiling Insulation for vented attics	R 38	R 30	R 30	R 30	R 30	R 30	R 30	R 380	R 380	R 380	R 38	R 38	R 38	R 38	R 38	R 38
			Radiant Barrier	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR
	Walls	Above Grade	Roof Deck Insulation for Cathedral Ceilings ^{1,4}	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>	<u>R-38</u>
			Framed ³	U 0.048	U 0.048	U 0.048	U 0.048	U 0.048	U 0.065	U 0.065	U 0.048	U 0.048	U 0.048	U 0.048	U 0.048	U 0.048	U 0.048	U 0.048	U 0.048
			Mass Wall Interior ^{4,5,6}	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
		Below Grade	Mass Wall Exterior ^{4,5,6}	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.125 R 8-0	U 0.077 R 13
			Below Grade Interior ^{6,7}	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 0.067 R 15

			Below Grade Exterior ⁶²	U 0.200 R 5-0	U 0.200 R 5-0	U 0.200 R 5-0	U 0.200 R 5-0	U 0.200 R 5-0	U 0.200 R 5-0	U 0.200 R 5-0	U 0.200 R 5-0	U 0.200 R 5-0	U 0.200 R 5-0	U 0.200 R 5-0	U 0.200 R 5-0	U 0.200 R 5-0	U 0.100 R 10	U 0.100 R 10	U 0.053 R 19
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TABLE 150.1-A COMPONENT PACKAGE – Single-Family Standard Building Design (continued)

			Climate Zone															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Building Envelope	Floors	Slab Perimeter	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	FU-0.58 R-7-0
		Raised	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
		Concrete Raised	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
		Quality Insulation Installation (QII)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Roofing Product	Low-Sloped	Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.63	NR	0.63
			Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	NR	0.75
		Steep-Sloped	Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	0.20	0.20	0.20	0.20	0.20	0.20	NR
			Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	0.75	0.75	0.75	0.75	0.75	0.75	NR
	Fenestration	Maximum U-factor ¹⁴⁸	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27	0.30 0.27
		Maximum SHGC	NR	0.23	NR	0.23	NR	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	NR
		Maximum Total Area	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
		Maximum West Facing Area	NR	5%	NR	5%	NR	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	NR
	Door	Maximum U-factor	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

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

				Climate Zone															
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
HVAC System	Space Heating ⁹	Electric-Resistance Allowed		No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	
		If gas, AFUE ¹⁰		<u>NA</u> MIN	<u>NA</u> MIN	NA	NA	MIN <u>NA</u>	MIN <u>NA</u>	MIN <u>NA</u>	MIN <u>NA</u>	MIN <u>NA</u>	MIN <u>NA</u>	MIN <u>NA</u>	NA	NA	MIN <u>NA</u>	MIN <u>NA</u>	
		If Heat Pump, HSPF ²¹¹ HSPF2 ⁸¹¹		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
		Whole-house fan ⁸¹²		NR	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR	NR
	<u>Refrigerant Charge Verification</u>	<u>Air Conditioners</u>		<u>NR</u>	<u>REQ</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>NR</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>NR</u>
		<u>Heat Pumps</u>		<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>	<u>REQ</u>
	Central System Air Handlers	Central Fan Integrated Ventilation System Fan Efficacy		REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
	Ducts ¹⁰³	Roof/Ceiling Options B	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
			\$150.1(c)9A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Roof/Ceiling Option C	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
			\$150.1(c)9B	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
	<u>Ventilation Systems</u>				<u>Ventilation systems shall meet Section 150.1(c)15</u>														

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-ft².
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.
8. New dwelling units with a conditioned floor area of 500 square feet or less in Climate Zones 5 through 10 and 15 may comply with a maximum U-factor of 0.30.
9. 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.
10. {add language for gas systems}
1187. HSPF₂ means heating seasonal performance factor.
1298. 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.~~
1310. 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 Zones 5 through 10 and 15 may comply with a maximum U-factor of 0.30.~~ 13. {add language for gas systems}

Remark #21 (Substantive Table) | Residential HVAC Design

(h) Space-conditioning equipment.

1. Building cooling and heating loads.

- A. Building heating and cooling loads shall be determined —for all new construction, additions, and alterations— using a method based on any one of the following:
 - i. ~~A.~~ The ASHRAE Handbook, Equipment Volume, Applications Volume and Fundamentals Volume; or
 - ii. ~~B.~~ The SMACNA Residential Comfort System Installation Standards Manual; or
 - iii. ~~C.~~ The ACCA Manual J.
- B. 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 used for a duct design shall be done on a room-by-room basis, but load calculations solely for system sizing are not required to be done on a room-by-room basis.
- C. For additions and alterations, the envelope leakage specified in the load calculation shall be no greater than the values shown in Table 150.0-TBD1.

Exception 1 to Section 150.0(h)1: Simplifying assumptions described in RA-TBD1 are allowed for system replacements where the new equipment is the same type and is expected to be the same or lower capacity as the replaced equipment, and for new systems serving an addition with a conditioned floor area of 144 square feet or less.

Exception 2 to Section 150.0(h)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 and alterations.

Exception to Section 150.0(h)1C: If leakage is established through field verification and diagnostic testing following procedures specified in Reference Residential Appendix RA3.8, the tested envelope leakage value may be used in the load calculations.

Table 150.0-TBD1: Maximum Infiltration Air Changes Per Hour for Load Calculations

		Floor Area of Heated or Cooled Space (sq ft):					Cfm for One Fireplace
		≤900	901-1500	1501-2000	2001-3000	≥3001	
Single Story	Heating	0.61	0.45	0.38	0.32	0.28	20
	Cooling	0.32	0.23	0.20	0.16	0.15	0
Two Story	Heating	0.79	0.80	0.50	0.41	0.37	20
	Cooling	0.41	0.30	0.26	0.21	0.19	0
Townhouses or Condominiums	Heating	0.69	0.50	0.43	0.36	0.32	20
	Cooling	0.36	0.27	0.23	0.19	0.17	0

The default ACH values for “Average” infiltration, from Tables 5A& 5B of ACCA Manual J, 8th Edition

Remark #41 (Substantive Table) | Multifamily Indoor Air Quality, Heat/Energy Recovery Ventilator (HRV/ERV)

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

Multifamily			Climate Zone															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Unitary (serving one dwelling unit)	If Balanced Ventilation System ¹	HRV or ERV Sensible Recovery Efficiency	0.67	0.67	NR	0.67 NR	NR	NR	NR	NR	NR	NR	0.67	0.67	0.67	0.67	0.67 NR	0.67
		HRV or ERV Fan Efficacy (W/cfm)	0.6	0.6	1.0	0.6 1.0	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
		Non-HRV or Non-ERV Fan Efficacy (W/cfm)	NR	NR	NR	NR 0.4	0.4	0.4	0.4	0.4	0.4	0.4	NR	NR	NR	NR	NR 0.4	NR
	If Heat Pump, HSPF ² /HSPF ²		MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
	If Dual-Fuel Heat Pump, AFUE		MIN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	MIN
	Refrigerant Charge Verification or Fault Indicator Display		NR	REQ	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR
	SEER/SEER2		MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
Central (serving multiple dwelling units)	If Balanced Ventilation Systems ¹	Sensible Recovery Efficiency or Effectiveness	0.67	0.67	NR	0.67 NR	NR	NR	NR	NR	NR	NR	0.67	0.67	0.67	0.67	NR 0.67	0.67
		Bypass Function	REQ	REQ	NR	REQ NR	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	NR REQ	REQ
Central System Air Handlers	Central Fan Integrated Ventilation System Fan Efficacy		REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
Duct Insulation	Ducts 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)															

Section 180.2(b)1C

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~~fenestration 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)1Cii:** 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.~~

Remark #42 and 43 (Substantive Table) | Lighting Code Language Cleanup

Over the last two decades lighting efficacy and controllability have advanced significantly. After several code cycles of significant reductions and energy efficiency benefits in lighting power allowances, the Statewide CASE Team did not propose further lighting power improvements for the 2025 Energy Code to focus on other end-uses and to improve the enforceability of the existing lighting standards. The Statewide CASE Team is supportive of the objectives of the effort to simplify the lighting power allowances. This has led to the merging of the less stringent tailored lighting method allowances into the area category method of lighting power allowances. This change simplifies the use of streamlined tailored lighting allowances in projects that in the past would have complied using area category. The net impact is difficult to predict. With the unknowns associated with how the lighting market will respond to the changes in the area category approach, it would be prudent to investigate lighting efficiency opportunities for the 2028 Energy Code update:

- Simplify and increase the stringency of newly introduced tailored lighting power allowances to assure they are at least as stringent as the 2024 IECC. If a comparative assessment is needed for finalizing 2025 Energy Code, the Statewide CASE Team may be able to assist.
- Correct the oversight of not including daylight compensation controls in the daylight adaptation zone of parking garages. The daylight adaptation zone has an allowed wattage that is 10 times that of the rest of the garage. Turning off this additional power at night reduces the visual adaptation associated with entering the relatively bright garage while saving energy. This was identified during the lighting code clean-up process, but without time to develop a proposal.
- Update how safety and security lighting is controlled. As shown in the changes to the TDVs and LSCs over time, energy costs at night are rising faster than during the day and buildings that reduce their loads at night are better aligned with the solar resource installed on top of buildings and throughout the grid.

Proposed changes to code language are below.

SECTION 140.6 – PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

140.6(c)2G

G. In addition to the allowed indoor lighting power calculated according to Sections 140.6(c)2A through F, the building may add additional lighting power allowances for qualifying lighting systems as specified in the Qualifying Lighting Systems column in TABLE 140.6-C under the following conditions:

...

viii. Floor displays shall not qualify for wall display allowances.

ix. Qualifying wall lighting shall:

a. Be mounted within 10 feet of the wall having the wall display. When track lighting is used and where portions of the lighting track are more than 10 feet and other portions are within 10 feet of the wall, the portions of track more than 10 feet shall not be used for the wall display allowance.

b. Be a lighting system type appropriate for wall lighting. Lighting systems appropriate for wall lighting are lighting track adjacent to the wall, wall-washer luminaires, luminaires behind a wall valance or wall cove, or accent light. (Accent luminaires are adjustable or fixed luminaires providing directional display light.)

x. Additional allowed power for wall display lighting is available only for lighting that illuminates walls having wall displays. The length of display walls shall include the length of the perimeter walls, including but not limited to closable openings and permanent full height interior partitions. Permanent full height interior partitions are those that (I) extend from the floor to within two feet of the ceiling or are taller than ten feet and (II) are permanently anchored to the floor.

viii- xi. Mounting height shall be the luminaire mounting height measured from the finished floor to the bottom of the luminaire. As an alternative, if luminaires are mounted at more than one mounting height in the same space, the average mounting height of the luminaires qualified for the additional lighting power allowances in Table 140.6-C can be used to determine the mounting height of the qualified luminaires for calculations of the additional lighting power allowances.

(Excerpt of) *Table 140.6-C AREA CATEGORY METHOD – LIGHTING POWER DENSITY VALUES (WATTS/FT²)*

...				
Convention, Conference, Multipurpose and Meeting Area		0.75	Decorative/ Display	0.25
...				
Dining Area	Bar/Lounge and Fine Dining	0.45	Decorative/ Display	0.35
...				
Lobby, Main Entry		0.70	Decorative/ Display	0.25
...				
Retail Sales Area	Grocery Sales	1.00	-	-
			Decorative/ Display	0.35
...				
Retail Sales Area	Retail Merchandise Sales	0.95	-	-
			Decorative/ Display	0.35
...				

Remark #57 (Non-Substantive) | Multifamily Pipe Insulation Enhancements

(ef) Pipe Insulation for piping and tanks

All piping for multifamily domestic hot water systems shall be insulated and meet the applicable requirements 1 through 4 below:

1. General Requirements.

- A. The first 8 feet of inlet cold water piping from the storage tanks, including piping between a storage tank and a heat trap shall be insulated.
- B. Insulation on the piping and plumbing appurtenances shall be continuous.
- C. Pipe supports, hangers, and pipe clamps shall be attached on the outside of rigid pipe insulation to prevent thermal bridges.
- D. All pipe insulation seams shall be sealed.
- E. Insulation for pipe elbows shall be mitered, preformed, or site fabricated with PVC covers.
- F. Insulation for tees shall be notched, preformed, or site fabricated with PVC covers.
- G. Extended stem isolation valves shall be installed.
- H. All plumbing appurtenances on hot water piping from a heating source to heating plant, at the heating plant, and distribution supply and return piping shall be insulated to meet the following requirements:
 - 1. Where the outer diameter of the plumbing appurtenance is less than the outer diameter of the insulated pipe that it is attached to, the plumbing appurtenance shall be insulated flush with the insulation surrounding the pipe.
 - 2. Where the outer diameter of the plumbing appurtenance is greater than the outer diameter of the insulated pipe that it is attached to, the appurtenance shall be insulated with a minimum thickness of 1 inch.
 - 3. The insulation shall be removable and re-installable to ensure maintenance or replacement services can be completed.
 - 4. Valves shall be fully functional without impediment from the insulation.

...

32. Insulation Protection. Pipe Insulation shall be protected from damage due to sunlight, moisture, equipment maintenance and wind. Protection shall, at minimum, include the following:

- A. Pipe and plumbing 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. Plumbing appurtenance insulation covers shall be removable and re-installable re-installable. Adhesive tape shall not be used to provide this protection.
 - B. Pipe insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space shall include, or be protected by, a Class I or Class II vapor retarder. All penetrations and joints shall be sealed.
 - C. Pipe insulation buried below grade must be installed in a waterproof and noncrushable casing or sleeve.
- 4 **Insulation Quality Verification.** Insulation for hot water pipes and plumbing appurtenances shall be field verified as specified in Residential Reference Appendix RA3.6.38.