

# Proposal Summary



## Multifamily Compartmentalization and Balanced Ventilation

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### Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during a utility-sponsored stakeholder meeting on February 21, 2023. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. To provide your comments, email [info@title24stakeholders.com](mailto:info@title24stakeholders.com) by May 24, 2023.

### Measure Description

The 2019 and 2022 version of Title 24 requires multifamily units to comply with either of the following: providing balanced ventilation or meeting a compartmentalization maximum of 0.3 cfm/sf @50 Pa. This proposed measure would add a mandatory measure for all multifamily units to:

- Use supply-only or balanced ventilation as a whole dwelling unit strategy. In other words, use of exhaust-only ventilation could not be used for whole dwelling unit ventilation.  
and
- Require a mandatory compartmentalization at a maximum of level of 0.3 cfm/sf @50Pa.

Local exhaust systems should still be used to meet local exhaust requirements, such as in bathrooms, kitchens, and dryers, and exhaust fans could be used as part of a balanced ventilation approach. The proposed requirement would affect all new construction multifamily units.

In addition to these changes to the mandatory requirements, the Statewide CASE Team proposes the following changes to the prescriptive requirements and compliance options to promote energy savings:

- Revising the prescriptive requirement in the 2022 Title 24, Part 6 that requires multifamily dwelling units in Climate Zones 1, 2, and 11-16 that use the balanced ventilation path to include an HRV or ERV. The proposed change is to



prescriptively require all multifamily dwelling units in Climate Zones 1, 2, 4, 11 through 14, and 16 to use balanced ventilation with an HRV or ERV. Multifamily dwelling units in these climate zones that use a performance path could use supply-only or ventilation without heat recovery, but would need to compensate by exceeding code requirements for another measure.

- Adding:
  - A mandatory requirement that the supply air filter be accessible, and (where applicable) the HRV/ERV energy recovery core be accessible or have a fault indicator display (FID).
  - A prescriptive requirement for an FID. Projects that do not meet the FID prescriptive requirements could use the performance path and incur a 10% fan energy penalty and – for projects with a heat recovery ventilator (HRV) -- incur a 10% reduction in the sensible recovery efficiency.
- While the focus of this proposed measure is multifamily IAQ, the proposed changes for the filter accessibility, HRV/ERV heat/energy recovery core accessibility, and FID are proposed for both single-family and multifamily dwelling units. In addition, single-family homes must meet a mandatory requirement for outdoor air intake accessibility or have an FID. These requirements follow ACM requirements for the 2022 Title 24, Part 6.

The primary purpose for the proposed mandatory measure (compartmentalization and balanced / supply-only ventilation) is to promote good indoor air quality (IAQ).

Compartmentalization reduces pollutant transfer between units and particle infiltration. A mechanical source of supply air for ventilation is important for IAQ as a unit's envelope is tightened to ensure adequate outdoor air. The two components of the measure also work hand-in-hand. Because compartmentalization tightens a unit's envelope on all sides—with the exterior, and with adjacent spaces (e.g., corridor, adjacent units, trash chutes, etc.), the measure also saves energy by reducing leakage to the exterior, thereby reducing heating and cooling energy. In addition, compartmentalization reduces noise transfer between units and with the exterior.

The prescriptive H/ERV requirement is proposed for energy savings, and is cost effective in the proposed climate zones.

The proposal does not make changes for additions or alterations. But since the additions and alterations sections reference the new construction requirements, the Statewide CASE Team proposes revised language so the technical requirements remain the same for additions and alterations.

## **Data Needs/Stakeholder Information Requests**

Data needs may include:

- **Energy Savings** – quantifiable savings (in BTUs, kW, etc.) that can be attributed to each measure.
- **Technical Feasibility** – how well-established the technology or practice is in the industry
- **Market Readiness** – availability in the market, and certainty regarding performance, reliability and cost
- **Non-energy Benefits** – consumer or societal benefits such as improved health and safety, reduced water use, and GHG emission reductions
- **Costs** –
  - Life Cycle Costs
  - First Costs
  - Operational Costs
  - FID costs
- **Economic Impacts** – job creation, environment and social justice, equity

Data may be provided anonymously. To participate or provide information, please email Marian Goebes [MGoebes@trccompanies.com](mailto:MGoebes@trccompanies.com) directly and cc [info@title24stakeholders.com](mailto:info@title24stakeholders.com).

## Draft Code Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2022 documents are marked with red underlining (new language) and ~~strikethroughs~~ (deletions). Expected sections or tables of the proposed code (but not specific changes at this time) are highlighted in **yellow**.

### SECTION 100.1—DEFINITIONS AND RULES OF CONSTRUCTION

— **Section 100.1(b)—Definitions: Recommends new or revised definitions for the following terms:**

**VENTILATION SYSTEM, BALANCED** is at least one mechanical device intended to remove air from buildings, and simultaneously replace it with outdoor air.

**VENTILATION SYSTEM, EXHAUST** is at least one mechanical device intended to remove air from buildings, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope.

**VENTILATION SYSTEM, SUPPLY** is at least one mechanical device intended to bring outdoor air into buildings, causing indoor air to flow out of the building through ventilation relief outlets or normal leakage paths through the building envelope.

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**150.0(o)1C Whole-dwelling unit mechanical ventilation for single-family detached and townhouses.**

iv. Requirements for balanced and supply only ventilation systems

a. IAQ Filter and HRV/ERV Accessibility. System air filters and HRV/ERV heat / energy recovery cores shall be located such that they are accessible for regular service from within occupiable space, basements, garages, balconies, or accessible rooftops. Filters and heat / energy recovery cores behind access panels, access doors, or grilles located no more than 10 ft above a walking surface comply with this requirement.

Exception: IAQ filters and heat or energy recovery cores for ventilation systems located in an accessible attic and having an FID meeting the requirements of Reference Appendix JA15.

b. IAQ System Component Accessibility. Fans, motors, heat exchangers, and other serviceable components shall meet all applicable requirements of California Mechanical Code Section 304.0 Accessibility for Service.

c. Outdoor Air Intake Design. Outdoor air intakes shall comply with California Mechanical Code Section 402.4.1.

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

Exception: Outdoor air intakes serving equipment with an FID meeting the requirements of Reference Appendix JA15.

**150.1(c) Prescriptive standards/component packages.**

15. **Ventilation system Fault Indicator Display (FID).** All balanced and supply ventilation systems serving individual dwelling units shall have a Fault Indicator Display (FID) that meets the requirements of Reference Appendix JA15, as confirmed by HERS field verification.

**Table 150.1-A COMPONENT PACKAGE – Single-Family Standard Building Design**

			Climate Zone																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
<b>HVAC System</b>	<b>Space Heating<sup>9</sup></b>	Electric-Resistance Allowed	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	
		If gas, AFUE	MIN	MIN	NA	NA	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	NA	NA	MIN	MIN
		If Heat Pump, HSPF <sup>7</sup> /HSPF2	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
	<b>Space Cooling</b>	SEER/SEER2	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN
		Refrigerant Charge Verification or Fault Indicator Display	NR	REQ	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR
		Whole-house fan <sup>8</sup>	NR	NR	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR	NR
	<b>Central System Air Handlers</b>	Central Fan Integrated Ventilation System Fan Efficacy	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
	<b>Ducts<sup>10</sup></b>	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	REQ
<b><u>Ventilation Systems</u></b>			<u>System Shall meet Section 150.1(c)15</u>																
<b>Water Heating</b>	<b>All Buildings</b>		System Shall meet Section 150.1(c)8																

## Section 160.2(b)2A

**iv. Whole-Dwelling Unit Mechanical Ventilation.** Multifamily attached dwelling units shall comply with subsections a and b below.

- a. Mechanical ventilation airflow shall be provided at rates greater than or equal to the value determined in accordance with Equation 160.2-B.

Total Required Ventilation Rate [ASHRAE 62.2:4.1.1].

$$Q_{tot} = 0.03A_{floor} + 7.5(N_{br} + 1) \quad (\text{Equation 160.2-B})$$

WHERE:

$Q_{tot}$  = total required ventilation rate, cfm

$A_{floor}$  = dwelling-unit floor area, ft<sup>2</sup>

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

- b. All dwelling units in a multifamily building shall use the same whole-dwelling unit ventilation system type. ~~The system type installed throughout the building shall be only one of the following three types: supply, exhaust, or balanced.~~ The dwelling unit shall comply with ~~one of the following~~ subsections 1 ~~and~~ 2 below.
  1. ~~Balanced~~ or supply ventilation. A balanced or supply ventilation system shall provide the required whole-dwelling unit ventilation airflow. ~~Balanced~~ Systems with heat recovery or energy recovery that serve a single dwelling unit shall have a fan efficacy of  $\leq 1.0$  W/cfm. ~~or~~
  2. ~~Supply or Exhaust Ventilation with~~ Compartmentalization ~~Testing.~~ ~~Continuously operating supply ventilation systems, or continuously operating exhaust ventilation systems shall be allowed to be used to provide the required whole-dwelling unit ventilation airflow only if~~ The dwelling unit envelope leakage ~~shall be is~~ less than or equal to 0.3 cubic feet per minute at 50 Pa (0.2 inch water) per ft<sup>2</sup> of dwelling unit envelope surface area as confirmed by HERS field verification and diagnostic testing in accordance with the procedures specified in Reference Appendix RA3.8 or NA2.3 as applicable.

...

**xi. Balanced and supply ventilation component accessibility.** Balanced and supply ventilation systems shall meet the following requirements for accessibility:

- a. IAQ Filter and HRV/ERV Accessibility. All system air filters and HRV/ERV heat / energy recovery cores shall be located such that they are accessible for regular service from within occupiable space, basements, garages, balconies, or accessible rooftops. Filters and heat / energy recovery cores

behind access panels, access doors, or grilles located no more than 10 ft above a walking surface comply with this requirement.

Exception: IAQ filters and heat or energy recovery cores for ventilation systems located in an accessible attic and having an FID meeting the requirements of Reference Appendix JA15.

- b. IAQ System Component Accessibility. Fans, motors, heat exchangers, and other serviceable components shall meet all applicable requirements of California Mechanical Code Section 304.0 Accessibility for Service.

...

### Section 170.2(c)3B

iii. Dwelling Unit Ventilation System Requirements. All balanced and supply ventilation systems serving individual dwelling units shall have a Fault Indicator Display (FID) that meets the requirements of Reference Appendix Section JA15, as confirmed by HERS field verification.

~~iii.~~ iv. Central fan integrated ventilation systems—systems serving individual dwelling units. Central forced air system fans used to provide outside air shall have an air-handling unit fan efficacy less than or equal to the maximum W/cfm specified in a or b below. The airflow rate and fan efficacy requirements in this section shall be confirmed through field verification and diagnostic testing in accordance with all applicable procedures specified in Reference Residential Appendix RA3.3. Central Fan Integrated Ventilation Systems shall be certified to the Energy Commission as Intermittent Ventilation Systems as specified in Reference Residential Appendix RA3.7.4.2.

- a. 0.45 W/cfm for gas furnace air-handling units; or
- b. 0.58 W/cfm for air-handling units that are not gas furnaces:

~~iv.~~ v. Balanced Ventilation Systems with Heat Recovery in Climate Zones 1, 2, 4, 11-14, and 11-16. ~~When~~ A balanced ventilation systems with heat or energy recovery shall be ~~are~~ used to meet Section 160.2(2)Aivb 1, ~~they and~~ shall meet the applicable requirements of a, or b, ~~or c~~ below.

- a. In Climate Zones 1, 2, 4, 11-14, and ~~11-16~~, balanced ventilation systems serving individual dwelling units shall:

- Be an energy recovery ventilator (ERV) or heat recovery ventilator (HRV)
  - Have a minimum sensible recovery efficiency of 67 percent, rated at 32°F (0°C), and
  - Have a fan efficacy less than or equal to 0.6 W/~~per~~cfm

- b. In Climate Zones 1, 2, 4, 11-14, 16, and ~~16~~ balanced ventilation systems serving multiple dwelling units in buildings with four or more habitable stories shall:

- Be an ERV or HRV.

Have a minimum sensible recovery efficiency or effectiveness of 67 percent, rated at 32°F (0° C),

Meet the fan power requirements of Section 170.2(c)4A, and

Have recovery bypass or control to directly economize with ventilation air based on outdoor air temperature limits specified in Table 170.2-G.

These measures shall be field verified in accordance with NA7.18.4.

~~e. vi.~~ In buildings with three habitable stories or less in Climate Zones ~~4~~ 5-10 and 15, when a heat pump space conditioning system is installed to meet the requirements of Section 170.2(c)3Ai, balanced ventilation systems without an ERV or HRV shall have a fan efficacy less than or equal to 0.4 W/cfm.

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Section 180.1(a)2. for Additions. [*The following revisions are needed for clarifications and so that the proposed change to the new construction sections affect additions as follows. The proposed changes to FID requirement and balanced and supply ventilation component accessibility are only applicable to additions of more than 1,000 square feet AND which choose to install balanced or supply only ventilation systems. Note that exhaust only systems are permissible in additions for which the FID and component accessibility requirements are not applicable. Dwelling unit air leakage test is not required for additions*]

**2. Mechanical ventilation for indoor air quality.** Additions to existing buildings shall comply with Section 160.2 subject to the requirements specified in Subsections A and B below. When HERS field verification and diagnostic testing are required by Section 180.1(a)2, buildings with three habitable stories or less shall use the applicable procedures in the Residential Appendices, and buildings with four or more habitable stories shall use the applicable procedures in Nonresidential Appendices NA1 and NA2.

**Exception to Section 180.1(a)2.: A dwelling unit air leakage test is not required for additions.**

A. Whole-dwelling unit mechanical ventilation.

- i. Dwelling units that meet the conditions in Subsection a or b below shall not be required to comply with the whole-dwelling unit ventilation airflow specified in Section 160.2(b)2Aiv or 160.2(b)2Av.
  - a. Additions to an existing dwelling unit that increase the conditioned floor area of the existing dwelling unit by less than or equal to 1000 square feet.
  - b. Junior Accessory Dwelling Units (JADU) that are additions to an existing building.



- ii. Additions to an existing dwelling unit that increase conditioned floor area by more than 1,000 square feet shall have mechanical ventilation airflow in accordance with Section 160.2(b)2Aiv or 160.2(b)2Av, as applicable. The mechanical ventilation airflow rate shall be based on the conditioned floor area of the entire dwelling unit comprising the existing dwelling unit conditioned floor area plus the addition conditioned floor area.

**Exception to Section 180.1(a)2.A.ii.: Mechanical ventilation systems in additions shall be exhaust, supply, or balanced ventilation systems.**

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Section 180.2(b)5 for Alterations [*The following revisions are needed for clarification and so that the proposed change to the new construction sections affect alterations as follows. The proposed changes to FID requirement and balanced and supply ventilation component accessibility are only applicable for alterations with entirely new or complete replacement of balanced or supply only ventilation systems. Note that exhaust only systems are permissible in new, replacement or altered ventilation system in alterations for which the FID and component accessibility requirements are not applicable. Dwelling unit air leakage test is not required for alterations.*]

- 5. **Mechanical ventilation and indoor air quality for dwelling units.** Alterations to existing buildings shall comply with subsections A and B below as applicable. When HERS field verification and diagnostic testing is required by Section 180.2(b)5, buildings with three habitable stories or less shall use the applicable procedures in the Residential Appendices, and buildings with four or more habitable stories shall use the applicable procedures in Nonresidential Appendices NA1 and NA2.

**Exception to Section 180.2(b)5.: A dwelling unit air leakage test is not required for alterations.**

- A. **Entirely new or complete replacement ventilation systems.** Entirely new or complete replacement ventilation systems shall comply with all applicable requirements in Section 160.2(b)2. An entirely new or complete replacement ventilation system includes a new ventilation fan component and an entirely new duct system. An entirely new or complete replacement duct system is constructed of at least 75 percent new duct material, and up to 25 percent may consist of reused parts from the dwelling unit's existing duct system, including but not limited to registers, grilles, boots, air filtration devices and duct material, if the reused parts are accessible and can be sealed to prevent leakage.

Exception to Section 180.2(b)5.A.: New or replacement ventilation systems in existing dwelling units shall be an exhaust, supply, or balanced ventilation system.

**B. Altered ventilation systems.** Altered ventilation system components or newly installed ventilation equipment serving the alteration shall comply with Section 160.2(b)2 as applicable subject to the requirements specified in Subsections i and ii below.

**i. Whole-dwelling unit mechanical ventilation**

a. Whole-dwelling unit strategy. The altered ventilation system shall be an exhaust, supply, or balanced ventilation system.

a-b. Whole-dwelling unit airflow. If the whole-dwelling ventilation fan is altered or replaced, then one of the following Subsections 1 or 2 shall be used for compliance as applicable.

1. Dwellings that were required by a previous building permit to comply with the whole dwelling unit airflow requirements in Section 160.2(b)2, 120.1(b) or 150.0(o) shall meet or exceed the whole-dwelling unit mechanical ventilation airflow specified in Section 160.2(b)2Aiva or 160.2(b)2Av as confirmed through HERS field verification and diagnostic testing in accordance with the applicable procedures specified in Reference Appendix RA3.7 or NA2.2.

2. Dwellings that were not required by a previous building permit to have a whole-dwelling unit ventilation system to comply with Section 160.2(b)2, 120.1(b) or 150.0(o) shall not be required to comply with the whole-dwelling unit ventilation airflow specified in Section 160.2(b)2Aiv or 160.2(b)2Av.

b-c. Replacement ventilation fans. [No changes except to numbering]

e-d. Air filters. [No changes except to numbering]

...

Section 180.2(c) Performance approach. [No changes needed. As shown below, the performance approach refers users to the prescriptive alterations requirements for ventilation.]

**C. Performance approach.** The altered component(s) and any newly installed equipment serving the alteration shall meet the applicable requirements of Subsections 1, 2, and 3 below.

i. The altered components shall meet the applicable requirements of Sections 110.0 through 110.9, 160.0, 160.1, 160.2(c) and (d), 160.3(a) through

160.3(b)5J, 160.3(b)6, 160.3(c), and 160.5. Entirely new or complete replacement mechanical ventilation systems as these terms are used in Section 180.2(b)5A shall comply with the requirements in Section 180.2(b)5A. Altered mechanical ventilation systems shall comply with the requirements of Sections 180.2(b)5B. Entirely new or complete replacement space-conditioning systems, and entirely new or complete replacement duct systems, as these terms are used in Sections 180.2(b)2Ai and 180.2(b)2Aia, shall comply with the requirements of Sections 160.2(a)1 and 160.3(b)5L.

## ACM Reference Manual Changes

The purpose and necessity of proposed changes to the Nonresidential and Multifamily ACM Reference Manual are described below. The changes would not affect common use areas and the existing language would remain the same for those spaces.

### — ACM Reference Manual—Section 6.6 Air Leakage and Infiltration

**Specific Purpose:** The purpose of the proposed change is to update the default leakage value, so it more accurately reflects air leakage with compartmentalized dwelling units.

**Necessity:** Because compartmentalization (i.e., dwelling unit air sealing) will almost always reduce leakage from all surfaces, including the exterior, the software must be updated to reflect reduced air leakage due to compartmentalization.

For the compartmentalization requirements, Section 6.6 would be revised to reflect a lower ACH50 for the Standard Design that aligns with the proposed mandatory leakage requirement. For the Proposed Design, the language would be revised to default the ACH50 to the same value as the Standard Design. The language would clarify that HERS verification is required.

### — ACM Reference Manual—Section 6.8.6 IAQ System Type

**Specific Purpose:** The purpose is to update the software to reflect the ventilation systems that would be allowed under the proposed code change and remove prohibited systems.

**Necessity:** These changes are necessary, so the software allows users to only choose systems that comply with the proposed change.

**IAQ System Type:** Currently, the user selects one of the following ventilation system types for the proposed design: exhaust-only, supply-only, or balanced, and the software assumes the same ventilation system type in the standard design. Under the proposed

changes, the reference to an exhaust-only option would be removed in this section, and there would no longer be an option to select exhaust-only. For the proposed design, the user would be able to select between a supply-only or balanced system.

- In Climate Zones 3, 5 through 10, and 15, the software would continue to assume the same standard design as the proposed design. For example, if the user selected supply-only for proposed design, the software would assume supply-only for the standard design. If the user selected balanced for proposed Design, the standard design would be balanced.
- In Climate Zones 1, 2, 4, 11 through 14, and 16, the software would assume balanced with HRV for the standard design, because of the proposed change to the prescriptive requirement. For the proposed design, the user could select a supply-only system or balanced system without an HRV, which would generate negative energy savings, or they can select a balanced system with HRV (same as standard design).

Table 38: Add a column for Supply Only and qualify that the exhaust only option is for common use areas only.

Table 39: Qualify that the exhaust only option is for common use areas only.

This section would also be modified to remove the specific criteria for the FID and reference those criteria in Joint Appendix 15.

#### — **ACM Reference Manual—Section 6.6.1 Building Air Leakage and Infiltration**

**Specific Purpose:** The specific purpose is to change the infiltration value in the ACM Reference manual for residential zones (which primarily include dwelling units) from 7 ACH50 to 2.3 ACH50 to reflect the reduced infiltration due to compartmentalization.

**Necessity:** These changes are necessary to provide project teams with an option for claiming energy savings for tightening the dwelling unit envelope beyond the mandatory requirement.

## Reference Appendices

The following sections of the Title 24, Part 6 Appendices would be modified under this proposal:

- Joint Appendix JA15, to add FID criteria
- Residential Appendix 3.8.3
- Residential Appendix 3.8.4
- Nonresidential Appendix 1.9.1
- Nonresidential Appendix 2.3.3
- Nonresidential Appendix 2.3.4