Proposal Summary

CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

Multifamily Compartmentalization and Balanced Ventilation

Updated: April 25, 2023
Prepared by: Marian Goebes and MF IAQ Team, TRC

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 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 (such that the filter access panel is within 10 feet of a walking surface), and a prescriptive requirement for an accessible outdoor air intake and a fault indicator display (FID). Projects that do not meet these 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, outdoor air intake accessibility, and FID are proposed for both single-family and multifamily buildings. 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 directly and cc 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(b) – Definitions: Recommends revised definitions for the following terms:

VENTILATION SYSTEM, BALANCED is ~~a~~ one or more mechanical device intended to remove air from buildings, and simultaneously replace it with outdoor air.

VENTILATION SYSTEM, EXHAUST is ~~a~~ one or more 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 ~~a~~ one or more 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.

…

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

iv. Requirements for balanced and supply only ventilation systems

IAQ Filter Accessibility. Unobstructed access shall be provided for servicing supply air filters, which may be located in conditioned space, unconditioned basements, balconies, or mechanical closets.

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

b. Outdoor Air Intake Design. Outdoor air intakes shall be covered with a screen having not less than ¼ inch and not more than ½ inch opening and shall be designed to manage rain entrainment, to prevent rain intrusion, and manage water from snow in accordance with California Mechanical Code Section 402.4.1.

c. Outdoor Air Intake Location and Accessibility. Outdoor intakes may be located at exterior walls, soffits, or gable ends. To provide access for cleaning, air Intakes shall be located not more than 10 feet above a walking surface or no more than 24 inches from a window opening. If located on roofs, they shall meet the requirements of California Mechanical Code Section 304.3.1.

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.

Table 150.1-A

HVAC System	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	REQ
	Ducts[10]	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	R-8
		Roof/Ceiling Options B — §150.1(c)9A	NA	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	R-6
		Roof/Ceiling Option C — §150.1(c)9B	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
	Ventilation Systems		System Shall meet Section 150.1(c)15																
Water Heating	All Buildings		System Shall meet Section 150.1(c)8																

…..

Section 160.2(b)2A.iv

iv. Whole-Dwelling Unit Mechanical Ventilation. Multifamily attached dwelling units shall comply with subsections a, ~~and~~ b, and c 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].

   $Qtot = 0.03Afloor + 7.5(Nbr + 1)$ (Equation 160.2-B)

   WHERE:

   Qtot = total required ventilation rate, cfm

   Afloor = dwelling-unit floor area, ft^2

   Nbr = 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.

c. The dwelling unit shall comply with ~~one of the following~~ subsections 1 and ~~or~~ 2 below.

   1. Balanced or supply ventilation.

      a. A balanced or supply ventilation system shall provide the required whole-dwelling unit ventilation airflow.

      b. Balanced ~~S~~systems with heat recovery or energy recovery that serve a single dwelling unit shall have a fan efficacy of ≤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 t~~ 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 ft2 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 only ventilation systems shall meet the following requirements for accessibility:

a. IAQ Filter Accessibility. Unobstructed access shall be provided for servicing supply air filters, which may be located in conditioned space, unconditioned basements, balconies, mechanical closets, or accessible attics or rooftops.

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

…

Section 170.2(c)3B Prescriptive Requirements

iii. Dwelling Unit Ventilation System Requirements. All balanced and supply ventilation systems serving individual dwelling units ~~that have supply ducts~~ shall meet both of the following requirements:

a. Outdoor intakes may be located at exterior walls, soffits, gable ends, or roofs. To provide access for cleaning, air intakes shall be located not more than 10 feet above a walking surface or no more than 24 inches from a window opening.

b. The ventilation system shall have a Fault Indicator Display (FID) that meets the requirements of Reference Appendix Section JA15.

~~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 16. ~~When~~ A balanced ventilation system~~s~~ with heat or energy recovery shall be ~~are~~ used to meet Section 160.2(2)Aivb, ~~they~~ and shall meet the applicable requirements of a~~,~~ or b~~, or c~~ below.

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

1. Be an energy recovery ventilator (ERV) or heat recovery ventilator (HRV),

2. Have a minimum sensible recovery efficiency of 67 percent, rated at 32°F (0°C), and

3. Have a fan efficacy less than or equal to 0.6 W per cfm

b. In Climate Zones 1, 2, 4, 11-146, and 16, balanced ventilation systems serving multiple dwelling units in buildings with four or more habitable stories shall:

1. Be an ERV or HRV

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

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

4. 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.

vi.c. In buildings with three habitable stories or less in Climate Zones 45-10 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.

…

Section 180.1(a)2. for Additions. [*The following revisions are needed so that the proposed change to the new construction sections do not affect additions.*]

1. **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. 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. Mechanical ventilation systems in additions shall be exhaust, supply, or balanced ventilation systems.

…

Section 180.2(b)5 for Alterations [*The following revisions are needed so that the proposed change to the new construction sections do not affect 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. 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: 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.

b. ~~**A**~~ **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.

i. 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.

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

d. ~~**c.**~~ **Air filters**. [*No changes except to numbering*]

…

Section 180.2(c) Performance approach. [*No changes needed. The performance approach refers users to the prescriptive alterations requirements for ventilation.]*

ACM Reference Manual Changes

Under development

Reference Appendices

Under development