

DOCKETED

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MEMORANDUM

TO: 2025 Energy Code Compliance Software, Manuals and Forms (24-BSTD-03)

FROM: California Energy Commission

SUBJECT: Correction to Multifamily Infiltration in Alternative Calculation Method Reference Manual and California Building Energy Code Compliance Software (CBECC)

DATE: July 7, 2026

Executive Summary

The 2025 Alternative Calculation Method (ACM) Reference Manual establishes the rules for modeling building air leakage and infiltration used in CEC-approved Energy Code software when using the flexible performance approach. This includes the 2025 California Building Energy Code Compliance (CBECC) software and approved third-party ACM performance tools. The 2025 Energy Code (California Code of Regulations, Title 24, Part 6) introduced compartmentalization testing requirements for multifamily buildings (Section 160.2(b)2A.ivb), setting a maximum infiltration rate of 0.3 cubic feet per minute at 50 pascals per square foot of dwelling unit envelope surface area (CFM50/ft²). To implement this requirement, the October 2025 publication of the 2025 Nonresidential and Multifamily ACM Reference Manual¹ sets infiltration for the standard and proposed building to 2.3 air changes per hour at 50 pascals (ACH50) for multifamily dwelling units and 7 ACH50 for primarily common use and nonresidential areas.

While preparing the next ACM Reference Manual revision and accompanying CBECC 2025.3.0 release, staff determined that the current version of CBECC (2025.2.0) does not apply the 2.3 ACH50 infiltration rate for multifamily dwelling units specified in the October 2025 ACM Reference Manual. Instead, CBECC incorrectly assigns 7 ACH50 to both multifamily dwelling units and common use and nonresidential areas.

To address this issue, staff propose correcting the 2025.3.0 CBECC software to reconcile the 2025 Energy Code-required 0.3 CFM50/ft² infiltration rate for multifamily dwelling units. Staff also propose revising the 2025 ACM Reference Manual to express multifamily building infiltration in units of CFM50/ft² for both dwelling units, and common use and nonresidential areas. Aligning units and modeling methods across these spaces will improve consistency and prevent modeling issues associated with the current ACH50-based approach. To accomplish this alignment, staff additionally proposes to set infiltration to 0.9 CFM50/ft² for zones with primarily common use and nonresidential areas.

¹ <https://www.energy.ca.gov/sites/default/files/2025-11/CEC-400-2025-007-CMF.pdf>

For primarily common use and nonresidential zones, this is a change in units only and is considered a minor impact to infiltration rates for these zones.

This memo details the method for determining the CFM50/ft² infiltration rate for primarily common use and nonresidential areas, and the compliance impact of correcting multifamily infiltration in CBECC.

The CEC seeks comments on this topic by July 22, 2026 to Docket Number 24-BSTD-03 at <https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=24-BSTD-03>.

Nonresidential Infiltration ACH50 to CFM50/ft² Conversion

To determine the infiltration rate for multifamily building zones, which are primarily common use and nonresidential areas, staff relied on data from the 2025 Codes and Standards Enhancement (CASE) Multifamily Indoor Air Quality report (CASE report)².

To determine the equivalent conversion between ACH50 and CFM50/ft², staff assumed that the exterior surfaces of the common use and nonresidential zones have equivalent leakage rates through the exterior surfaces of a multifamily building with 7 ACH50 total building leakage. Additionally, the CASE proposal states that the 0.3 CFM50/ft² of infiltration through the exterior wall area of dwelling units provides 2.3 ACH50 to those areas. Staff also assumed that ACH50 infiltration varies linearly for a single building with average CFM50/ft² through the exterior surfaces of the building.

Combining these assumptions, staff created the following equation to convert the current 7 ACH50 leakage rate for common use and nonresidential areas to a leakage rate through the exterior surfaces of these zones.

$(7 \text{ ACH50} / 2.3 \text{ ACH50}) \times 0.3 = 0.9 \text{ CFM50/ft}^2$ of exterior wall area for common use and nonresidential area zones

Summary of Proposed Updates to ACM and CBECC

The most recent version of the 2025 Nonresidential and Multifamily ACM Reference Manual published in October 2025 specifies multifamily infiltration rates of 2.3 ACH50 for multifamily dwelling units and 7 ACH50 for primarily common use and nonresidential areas.

² <https://efiling.energy.ca.gov/GetDocument.aspx?tn=255321-6&DocumentContentId=91028>

6.6 Air Leakage and Infiltration

The compliance software distributes the leakage over the envelope surfaces in accordance with the building configuration and constructs a pressure flow network to simulate the airflows between the conditioned zones, unconditioned zones, and outside.

6.6.1 Building Air Leakage and Infiltration

The airflow through a blower door at 50 pascals (Pa) of pressure measured in cubic feet per minute is called CFM50. CFM50 multiplied by 60 minutes, divided by the volume of conditioned space, is the air changes per hour at 50 Pa, called ACH50.

PROPOSED DESIGN

The proposed design for primarily dwelling unit zones in multifamily buildings shall be 2.3 ACH50. The proposed design for zones in multifamily buildings that are primarily common use and nonresidential areas shall be modeled as 7 ACH50.

STANDARD DESIGN

The standard design multifamily dwelling and common area air leakage and infiltration is the same as the proposed.

Figure 1: October 2025 Nonresidential and Multifamily ACM Reference Manual Air Leakage and Infiltration Rules

For the upcoming revision to the ACM, staff is proposing to change the multifamily dwelling unit infiltration rate to reconcile the 2025 Energy Code-required 0.3 CFM50/ft^2 and convert the 7 ACH50 rate for common use and nonresidential areas to 0.9 CFM50/ft^2 to align the units and modeling methods of infiltration in multifamily buildings.

6.6 Air Leakage and Infiltration

The compliance software distributes the leakage over the envelope surfaces in accordance with the building configuration and constructs a pressure flow network to simulate the airflows between the conditioned zones, unconditioned zones, and outside.

6.6.1 Building Air Leakage and Infiltration

The airflow through a blower door at 50 pascals (Pa) of pressure measured in cubic feet per minute is called CFM50. CFM50 divided by the area of all boundary surfaces of a dwelling or zone is called CFM50/ft². ~~CFM50 multiplied by 60 minutes, divided by the volume of conditioned space, is the air changes per hour at 50 Pa, called ACH50.~~

PROPOSED DESIGN

Boundary surfaces of primarily dwelling unit zones that are exposed to air on the outside shall be modelled with leakage of 0.3 CFM50/ft^2 . Boundary surfaces of other common use and nonresidential zones that are exposed to air on the outside shall be modelled with leakage of 0.9 CFM50/ft^2 . ~~The proposed design for primarily dwelling unit zones in multifamily buildings shall be 2.3 ACH50. The proposed design for zones in multifamily buildings that are primarily common use and nonresidential areas shall be modeled as 7 ACH50.~~

STANDARD DESIGN

The standard design multifamily dwelling and common area air leakage and infiltration is the same as the proposed.

Figure 2: Proposed Edits to Multifamily Infiltration ACM Reference Manual Language

CBEECC Compliance Impacts

Correcting the dwelling unit infiltration rate from the incorrect current value of 7 ACH50 to 0.3 CFM/ft² reduces dwelling unit infiltration and this results in a significant impact to space heating and cooling loads. The infiltration rate unit conversion for common use and nonresidential zones (from ACH50 to CFM50/ft²) also affects the total building infiltration rate and resulting HVAC loads, but its impact is minor. Both changes are represented in the following compliance impact tables.

Depending on the climate zone (CZ), the new (corrected) heating and cooling loads are higher or lower than the previous incorrect values. As expected, the Long-term System Cost (LSC) loads are impacted more in extreme climates and less in mild climates. However, because milder climates have smaller HVAC loads, the small change in LSC energy for these areas results in a larger percent change than in the more extreme climate zones.

While the direct impact on the HVAC loads is significant, the overall change in Long Term System Cost (LSC) is much smaller with an average change across climate zones of -2%, 0%, and -3% respectively for the 36, 88, and 117 unit multifamily prototypes. Source Energy impacts were similar with an average change across climate zones of -2%, -1%, and -3% respectively for the 36, 88, and 117 unit prototypes.

Table 1 - Summary of LSC Impacts from Proposed Multifamily Infiltration Updates

LSC	Multifamily 36 Unit Prototype		
	Max Increase	Max Decrease	Average Change
Heating	-30%	-68%	-46%
Cooling	24%	-5%	7%
Efficiency	1%	-4%	-2%
	Multifamily 88 Unit Prototype		
	Max Increase	Max Decrease	Average Change
Heating	1%	-19%	-7%
Cooling	17%	-2%	5%
Efficiency	1%	-2%	0%
	Multifamily 117 Unit Prototype		
	Max Increase	Max Decrease	Average Change
Heating	-13%	-36%	-23%
Cooling	33%	-6%	6%
Efficiency	0%	-6%	-3%

Table 2 - Summary of Source Energy Impacts from Multifamily Infiltration Updates

Source	Multifamily 36 Unit Prototype		
	Max Increase	Max Decrease	Average Change
Heating	-30%	-68%	-46%
Cooling	24%	-5%	6%
Efficiency	1%	-4%	-2%
	Multifamily 88 Unit Prototype		
	Max Increase	Max Decrease	Average Change
Heating	1%	-19%	-6%
Cooling	13%	-2%	4%
Efficiency	1%	-2%	-1%
	Multifamily 117 Unit Prototype		
	Max Increase	Max Decrease	Average Change
Heating	-13%	-36%	-23%
Cooling	16%	-6%	4%
Efficiency	0%	-6%	-3%

Table 3 - LSC Impacts from Multifamily Infiltration Updates

CZ	LSC	Multifamily 36 Unit Prototype			Multifamily 88 Unit Prototype			Multifamily 117 Unit Prototype		
		Current (2025.2.0)	Revised (2025.3.0)	Change	Current (2025.2.0)	Revised (2025.3.0)	Change	Current (2025.2.0)	Revised (2025.3.0)	Change
1	Space Heating	1.7	1.1	-35%	2.2	2.0	-8%	1.9	1.4	-25%
	Space Cooling	0.0	0.1	10%	0.2	0.2	17%	0.1	0.1	33%
	Efficiency	23.2	22.5	-3%	24.1	23.9	0%	19.7	19.1	-3%
2	Space Heating	1.3	0.8	-37%	1.7	1.6	-10%	1.6	1.1	-28%
	Space Cooling	0.2	0.3	22%	1.5	1.6	9%	0.6	0.7	13%
	Efficiency	20.9	20.3	-3%	24.4	24.4	0%	19.3	18.8	-3%
3	Space Heating	0.3	0.1	-50%	1.0	1.0	-1%	0.8	0.7	-17%
	Space Cooling	0.2	0.3	21%	1.1	1.2	12%	0.5	0.5	16%
	Efficiency	19.4	19.2	-1%	22.0	22.1	1%	17.6	17.4	-1%
4	Space Heating	0.9	0.5	-43%	1.6	1.4	-10%	1.4	1.0	-27%
	Space Cooling	1.5	1.5	2%	3.5	3.6	3%	2.2	2.2	3%
	Efficiency	20.9	20.3	-3%	25.7	25.6	0%	20.4	19.8	-3%
5	Space Heating	0.2	0.1	-47%	0.9	0.9	1%	0.8	0.6	-15%
	Space Cooling	0.2	0.3	24%	1.1	1.3	13%	0.6	0.7	16%
	Efficiency	19.1	19.0	-1%	22.2	22.3	1%	17.8	17.7	-1%
6	Space Heating	0.0	0.0	-43%	0.3	0.3	0%	0.2	0.2	-15%
	Space Cooling	1.0	1.2	17%	2.9	3.1	7%	1.3	1.5	11%
	Efficiency	18.4	18.5	1%	21.7	22.0	1%	16.7	16.7	0%
7	Space Heating	0.0	0.0	-46%	0.2	0.2	0%	0.2	0.2	-14%
	Space Cooling	1.6	1.7	10%	3.6	3.8	5%	1.9	2.1	8%
	Efficiency	19.1	19.3	1%	22.6	22.8	1%	17.2	17.3	0%
8	Space Heating	0.0	0.0	-42%	0.3	0.3	1%	0.3	0.2	-13%
	Space Cooling	2.8	2.9	4%	5.0	5.1	3%	3.6	3.7	3%
	Efficiency	20.0	20.1	0%	24.1	24.2	0%	19.3	19.2	0%

Table 4 - LSC Impacts from Multifamily Infiltration Updates (Continued)

CZ	LSC	Multifamily 36 Unit Prototype			Multifamily 88 Unit Prototype			Multifamily 117 Unit Prototype		
		Current (2025.2.0)	Revised (2025.3.0)	Change	Current (2025.2.0)	Revised (2025.3.0)	Change	Current (2025.2.0)	Revised (2025.3.0)	Change
9	Space Heating	0.1	0.0	-61%	0.5	0.5	-1%	0.4	0.3	-18%
	Space Cooling	2.6	2.7	3%	4.8	4.9	2%	3.5	3.5	2%
	Efficiency	20.0	19.9	0%	24.3	24.3	0%	19.4	19.2	-1%
10	Space Heating	0.1	0.0	-63%	0.5	0.5	-2%	0.4	0.4	-19%
	Space Cooling	3.3	3.3	1%	5.6	5.7	1%	4.3	4.3	0%
	Efficiency	20.6	20.5	-1%	25.2	25.1	0%	20.5	20.1	-2%
11	Space Heating	1.1	0.6	-45%	1.7	1.5	-15%	1.7	1.1	-36%
	Space Cooling	4.1	4.0	-2%	6.1	6.0	0%	5.2	5.0	-2%
	Efficiency	23.6	22.8	-4%	28.2	27.7	-2%	23.6	22.5	-5%
12	Space Heating	1.2	0.7	-38%	1.6	1.4	-13%	1.6	1.1	-32%
	Space Cooling	2.1	2.1	2%	4.0	4.1	2%	2.8	2.8	2%
	Efficiency	21.9	21.3	-3%	26.0	25.8	-1%	21.0	20.3	-3%
13	Space Heating	0.7	0.4	-45%	1.3	1.2	-10%	1.2	0.8	-28%
	Space Cooling	4.9	4.8	-2%	6.9	6.8	-1%	6.0	5.8	-3%
	Efficiency	23.7	23.1	-3%	28.1	27.8	-1%	23.5	22.7	-4%
14	Space Heating	1.2	0.7	-45%	1.8	1.5	-17%	1.7	1.1	-35%
	Space Cooling	3.5	3.3	-4%	5.4	5.4	-1%	4.5	4.3	-5%
	Efficiency	22.4	21.4	-4%	28.0	27.6	-2%	23.3	22.1	-5%
15	Space Heating	0.0	0.0	-68%	0.3	0.3	-1%	0.2	0.2	-16%
	Space Cooling	9.9	9.4	-5%	12.1	11.9	-2%	11.3	10.7	-6%
	Efficiency	25.6	25.0	-2%	31.0	30.5	-2%	27.1	25.9	-4%
16	Space Heating	3.1	2.2	-30%	3.5	2.8	-19%	3.8	2.4	-36%
	Space Cooling	0.8	0.8	7%	1.6	1.7	5%	1.0	1.0	6%
	Efficiency	24.4	23.4	-4%	29.2	28.5	-2%	24.7	23.2	-6%

Table 5 - Source Energy Impacts from Multifamily Infiltration Updates

CZ	Source	Multifamily 36 Unit Prototype			Multifamily 88 Unit Prototype			Multifamily 117 Unit Prototype		
		Current (2025.2.0)	Revised (2025.3.0)	Change	Current (2025.2.0)	Revised (2025.3.0)	Change	Current (2025.2.0)	Revised (2025.3.0)	Change
1	Space Heating	0.5	0.3	-38%	1.6	1.5	-6%	1.1	0.9	-18%
	Space Cooling	0.3	0.3	3%	0.5	0.6	3%	0.4	0.4	2%
	Efficiency	16.9	16.7	-1%	11.3	11.2	-1%	10.5	10.3	-3%
2	Space Heating	1.3	0.8	-37%	1.7	1.6	-10%	1.6	1.1	-28%
	Space Cooling	0.2	0.3	22%	1.5	1.6	9%	0.6	0.7	13%
	Efficiency	20.9	20.3	-3%	24.4	24.4	0%	19.3	18.8	-3%
3	Space Heating	0.3	0.1	-50%	1.0	1.0	-1%	0.8	0.7	-17%
	Space Cooling	0.2	0.3	21%	1.1	1.2	12%	0.5	0.5	16%
	Efficiency	19.4	19.2	-1%	22.0	22.1	1%	17.6	17.4	-1%
4	Space Heating	0.9	0.5	-43%	1.6	1.4	-10%	1.4	1.0	-27%
	Space Cooling	1.5	1.5	2%	3.5	3.6	3%	2.2	2.2	3%
	Efficiency	20.9	20.3	-3%	25.7	25.6	0%	20.4	19.8	-3%
5	Space Heating	0.2	0.1	-47%	0.9	0.9	1%	0.8	0.6	-15%
	Space Cooling	0.2	0.3	24%	1.1	1.3	13%	0.6	0.7	16%
	Efficiency	19.1	19.0	-1%	22.2	22.3	1%	17.8	17.7	-1%
6	Space Heating	0.0	0.0	-43%	0.3	0.3	0%	0.2	0.2	-15%
	Space Cooling	1.0	1.2	17%	2.9	3.1	7%	1.3	1.5	11%
	Efficiency	18.4	18.5	1%	21.7	22.0	1%	16.7	16.7	0%
7	Space Heating	0.0	0.0	-46%	0.2	0.2	0%	0.2	0.2	-14%
	Space Cooling	1.6	1.7	10%	3.6	3.8	5%	1.9	2.1	8%
	Efficiency	19.1	19.3	1%	22.6	22.8	1%	17.2	17.3	0%
8	Space Heating	0.0	0.0	-42%	0.3	0.3	1%	0.3	0.2	-13%
	Space Cooling	2.8	2.9	4%	5.0	5.1	3%	3.6	3.7	3%
	Efficiency	20.0	20.1	0%	24.1	24.2	0%	19.3	19.2	0%

Table 6 - Source Energy Impacts from Multifamily Infiltration Updates (Continued)

CZ	Source	Multifamily 36 Unit Prototype			Multifamily 88 Unit Prototype			Multifamily 117 Unit Prototype		
		Current (2025.2.0)	Revised (2025.3.0)	Change	Current (2025.2.0)	Revised (2025.3.0)	Change	Current (2025.2.0)	Revised (2025.3.0)	Change
9	Space Heating	0.1	0.0	-61%	0.5	0.5	-1%	0.4	0.3	-18%
	Space Cooling	2.6	2.7	3%	4.8	4.9	2%	3.5	3.5	2%
	Efficiency	20.0	19.9	0%	24.3	24.3	0%	19.4	19.2	-1%
10	Space Heating	0.1	0.0	-63%	0.5	0.5	-2%	0.4	0.4	-19%
	Space Cooling	3.3	3.3	1%	5.6	5.7	1%	4.3	4.3	0%
	Efficiency	20.6	20.5	-1%	25.2	25.1	0%	20.5	20.1	-2%
11	Space Heating	1.1	0.6	-45%	1.7	1.5	-15%	1.7	1.1	-36%
	Space Cooling	4.1	4.0	-2%	6.1	6.0	0%	5.2	5.0	-2%
	Efficiency	23.6	22.8	-4%	28.2	27.7	-2%	23.6	22.5	-5%
12	Space Heating	1.2	0.7	-38%	1.6	1.4	-13%	1.6	1.1	-32%
	Space Cooling	2.1	2.1	2%	4.0	4.1	2%	2.8	2.8	2%
	Efficiency	21.9	21.3	-3%	26.0	25.8	-1%	21.0	20.3	-3%
13	Space Heating	0.7	0.4	-45%	1.3	1.2	-10%	1.2	0.8	-28%
	Space Cooling	4.9	4.8	-2%	6.9	6.8	-1%	6.0	5.8	-3%
	Efficiency	23.7	23.1	-3%	28.1	27.8	-1%	23.5	22.7	-4%
14	Space Heating	1.2	0.7	-45%	1.8	1.5	-17%	1.7	1.1	-35%
	Space Cooling	3.5	3.3	-4%	5.4	5.4	-1%	4.5	4.3	-5%
	Efficiency	22.4	21.4	-4%	28.0	27.6	-2%	23.3	22.1	-5%
15	Space Heating	0.0	0.0	-68%	0.3	0.3	-1%	0.2	0.2	-16%
	Space Cooling	9.9	9.4	-5%	12.1	11.9	-2%	11.3	10.7	-6%
	Efficiency	25.6	25.0	-2%	31.0	30.5	-2%	27.1	25.9	-4%
16	Space Heating	3.1	2.2	-30%	3.5	2.8	-19%	3.8	2.4	-36%
	Space Cooling	0.8	0.8	7%	1.6	1.7	5%	1.0	1.0	6%
	Efficiency	24.4	23.4	-4%	29.2	28.5	-2%	24.7	23.2	-6%

Summary of Proposed Changes to Multifamily Infiltration

Staff propose to correct the multifamily dwelling unit infiltration calculations in the next version of CBECC, version 2025.3.0, to reconcile the 2025 Energy Code required rate of 0.3 CFM50/ft² of exterior wall area. Additionally, staff propose a revised infiltration rate of 0.9 CFM50/ft² of exterior wall area for the primarily common use and nonresidential area zones to unify the two multifamily building areas to the same infiltration units and modeling method.