

2022 Energy Code - What's New For Mechanical

Nonresidential & Multifamily Overview



California Energy Commission
Christopher Olvera
ASHRAE Golden Gate Chapter & Sigler
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Agenda

- 2022 Energy Code Basics
- All buildings overview
- Nonresidential mandatory, prescriptive, and alterations updates
- Multifamily mandatory, prescriptive, and alterations updates
- Resources



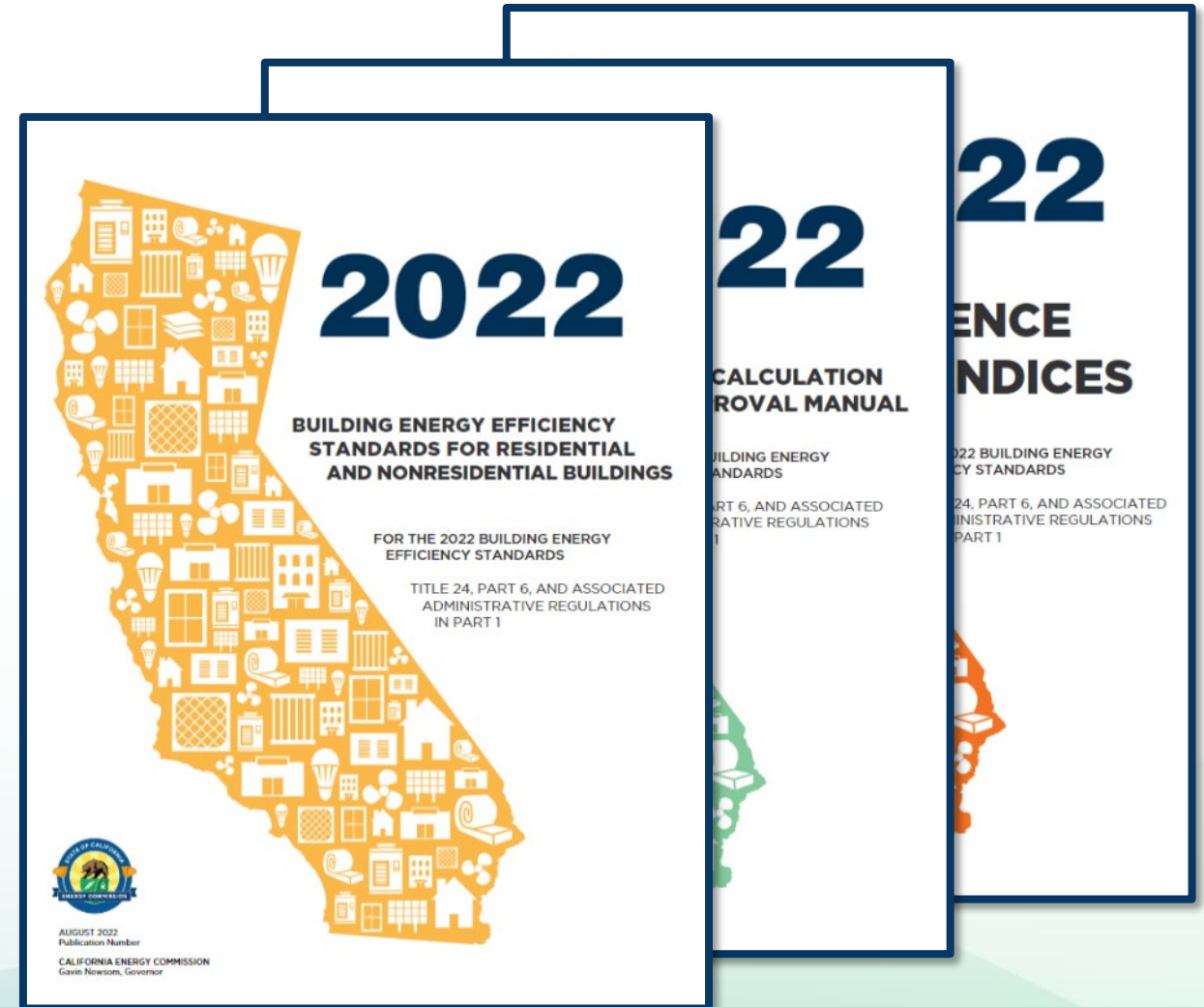
2022 Energy Code Basics



2022 Energy Code

Effective January 1, 2023

- Building permit applications submitted on or after effective date
- Must use 2022 software and forms





2022 Documents Online

2022 Building Energy Efficiency Standards

The Building Energy Efficiency Standards (Energy Code) apply to newly constructed buildings, additions, and alterations. They are a vital pillar of California's climate action plan. The 2022 Energy Code will produce benefits to support the state's public health, climate, and clean energy goals.

The California Energy Commission (CEC) updates the Energy Code every three years. On August 11, 2021, the CEC adopted the 2022 Energy Code. In December, it was approved by the California Building Standards Commission for inclusion into the California Building Standards Code. The 2022 Energy Code encourages efficient electric heat pumps, establishes electric-ready requirements for new homes, expands solar photovoltaic and battery storage standards, strengthens ventilation standards, and more. Buildings whose permit applications are applied for on or after January 1, 2023, must comply with the 2022 Energy Code.



[2022 Energy Code](#)

Expand All

Supporting Documents - Appendices, Compliance Manuals, and Forms

Software - Compliance Software, Manuals, and Tools

BUILDING ENERGY EFFICIENCY STANDARDS - TITLE 24

2022 Building Energy Efficiency Standards

2022 Building Energy Efficiency Standards

— Workshops, Notices, and Documents

2022 Building Energy Efficiency Standards

2022 Building Energy Efficiency Standards

Final Building Energy Efficiency Standards

Climate Zoning, maps, and information supporting the California Energy Code

Online Resource Center

Solar Assessment Tools

RELATED LINKS

Workshops, Notices, and Documents

CONTACT

[Building Energy Efficiency Standards - Title 24](#)

Toll-Free in California: 800-772-3090
Outside California: 916-654-5876

SUBSCRIBE

Building Energy Efficiency Standards

Email *

SUBSCRIBE

- Energy Code
- Reference Appendices
- Compliance Manuals
- Software
- Forms



Performance Metrics

Source energy performance calculations

- Single-family
 - EDR1: hourly source energy
 - EDR2: time dependent valuation (TDV)
 - Efficiency EDR, PV + flexibility EDR, total EDR
- Nonresidential and multifamily
 - Hourly source energy
 - TDV efficiency
 - TDV total
 - Efficiency, PV + battery

Heat pump baselines

- Requires heat pump for either space heating or water heating
 - Depends on climate zone and occupancy type
- Ability to go all-electric prescriptively
 - Must use heat pumps for both space heating and water heating



Demonstrating Compliance

Compliance forms confirm Energy Code is met

- Completed by designers, consultants, builders, contractors, technicians, HERS raters, etc.
- Submitted to enforcement agencies for verification

Type of form	Single-family	Multifamily 3 or less habitable stories	Nonresidential Multifamily 4 or more habitable stories
Certificate of compliance	CF1R	LMCC	NRCC
Certificate of installation	CF2R	LMCI	NRCI
Certificate of verification	CF3R	LMCV	NRCV
Certificate of acceptance	-	-	NRCA



2022 Compliance Software

Performance approach must use approved compliance software versions

- Nonresidential and multifamily
 - CBECC 2022.2.0
 - v 2022.1.0 decertified on 1/16/22
 - Additional software approvals coming soon



All Occupancies HVAC Updates

Mandatory: §110.2(a)

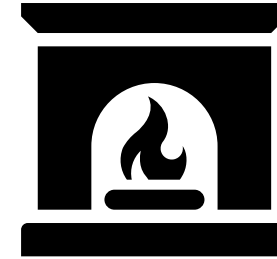
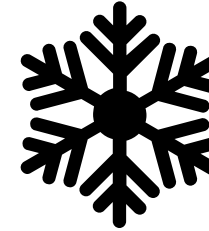


Mandatory Requirements for Space-Conditioning Equipment

All occupancies § 110.2(a)

Revised Efficiency for the tables

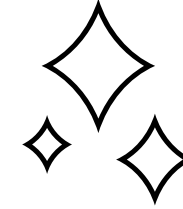
- 110.2-A Air Conditioners and Condensing Units
- 110.2-B Heat Pumps
- 110.2-C Air-cooled Gas Engine Heat Pumps
- 110.2-D Water Chilling Packages
- 110.2-E Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps
- 110.2-F (formerly 110.2-G) Heat Rejection Equipment
- 110.2-G (formerly 110.2-H) VRF air conditioners
- 110.2-H (formerly 110.2-I) Electrically Operated Variable Refrigerant Flow Air-to-Air and Applied Heat Pumps
- 110.2-I (formerly 110.2-J) Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units
- 110.2-J (formerly 110.2-K) Gas and Oil-Fired Boilers





Mandatory Requirements for Space-Conditioning Equipment

All occupancies § 110.2(a)



New tables

- 110.2-K DX-DOAS Units, Single Package and Remote Condenser
- 110.2-L Floor-Mounted Air conditioners and condensing units for computer rooms
- 110.2-M Ceiling-Mounted Air conditioners and condensing units for computer rooms
- 110.2-N Heat Pump and Heat Recovery Chillers



Mandatory Requirements for Space-Conditioning Equipment

All occupancies § 110.2(a)



DOE Requirements

- SEER2/EER2/HSPF2 requirements effective January 1, 2023

System Type		New SEER	New SEER2	NEW SEER/HSPF	NEW SEER2/HSPF2
Split System AC	AC < 45K Btu/h	14.0 SEER 12.2 EER*	14.3 SEER2 11.7 EER2**	-	-
	AC ≥ 45K Btu/h	14.0 SEER 11.7 EER*	13.8 SEER2 11.2 EER2**	-	-
Split System Heat Pump	-	-	-	14.0 SEER 8.2 HSPF	14.3 SEER2 7.5 HSPF2
Single Packaged Unit	-	-	-	14.0 SEER 8.0 HSPF	13.4 SEER2 6.7 HSPF2

* 10.2 EER if SEER > 16.0 SEER

** 9.8 EER if SEER2 > 15.2 SEER



Nonresidential HVAC Updates

Mandatory §§ 120.1, 120.2, 120.4, 120.6, 120.10



Nonresidential Defined

All Buildings § 100.1

Nonresidential building

- All buildings in California Building Code (CBC) occupancies of group A, B, E, F, H, I, M, S, U
 - Not occupancy group I-3 or I-4
- No longer includes high-rise residential multifamily

- Assembly and conference areas
- Commercial or industrial storage
- Financial institutions
- Hotels and motels
- Healthcare facilities
- Industrial and manufacturing
- Museums
- Offices
- Retail and wholesale stores
- Restaurants
- Schools and churches
- Theaters



Ventilation and Indoor Air Quality Mandatory Requirements

Nonresidential § 120.1(c)1

Air filtration

- Systems below must have air filters
 - HVAC systems with ducts greater than 10 feet long
 - Supply-only ventilation and make-up air systems
 - Supply side of balanced ventilation systems
 - HRV and ERV
- Air filter efficiency $\geq$ MERV 13
- Systems equipped with air filter must meet
 - Nominal 2" minimum depth filter OR
 - Nominal 1" minimum depth filter if system sized per equation 120.1-A
- Use of gaskets, sealing or other means to close gaps around filters



Ventilation and Indoor Air Quality Mandatory Requirements

Nonresidential §§ 120.1(c)3, 120.1(d)5

Mechanical Ventilation: Ventilation rate based on Eq 120.1-F or 120.1-G

- For fixed seating, expected occupants per CBC

Occupant Sensor Ventilation control devices: Occupant sensor ventilation controls required when both

- HVAC zones where ventilation air is reduced to zero in occupied standby mode per Table 120.1-A and
- Installed occupant sensors to meet §130.1(c)5-7

Occupant sensors comply:

- Room vacant after 20 minutes max
- Independent sensor in each room
- Allow pre-occupancy purge per §120.1(d)2
- Sensor overridden when zone scheduled for Occupied mode
 - Ventilation shut off after 5 minutes



Ventilation and Indoor Air Quality Mandatory Requirements

Nonresidential § § 120.1(f),(h)

Design and control requirements for quantities of Outdoor Air

- Designed outdoor air rates operated at minimum levels per section 120.1(c)3 or at the rate required for exempted or covered process make up system
- VAV capable of maintaining measured outside air rates within 10% of designed minimum
- **All mechanical ventilation** and space conditioning systems confirmed to operate within 10% of design minimum outside air rate.

Ventilation only Mechanical Systems

- **Systems without mechanical cooling or heating shall meet § 120.2(f)**



HVAC Controls Mandatory Requirements

Nonresidential §§ 120.2(e, i, j)

Occupant-sensing zone controls: When space conditioning system also provides ventilation, occupancy zone control must comply with:

- Standby mode per section 120.1(d)
- After **5 min** entering standby mode mechanical ventilation remains off when temperature is between setpoints

Economizer fault detection and diagnostics

- New air handlers with mechanical cooling capacity over **33,000** Btu/hr
- Air economizer include stand-alone or integrated fault detection and diagnostics (FDD) system per § 120.2(i)1-8

Additional Mandatory requirements for direct digital controls (DDC)

- **Sections 110.12(a) and 110.12(b)**



HVAC Duct Leakage Mandatory Requirements

Nonresidential §§ 120.4(b, g)

- Duct and plenum materials with pressure class rating: all ductwork and plenums construction to Seal A
 - Seal A not required for exposed ductwork in occupied space
- New Ducts systems tested by HERS Rater have leakage rate $\leq 6\%$ of nominal air handler airflow rate and
 - Does not serve healthcare facility
 - Provides conditioned air to an occupiable space for constant volume, single zone and space conditioning system
 - Serves single zone $< 5,000$ square ft of conditioned floor area
 - Ducts outdoors or unconditioned space combined surface area $> 25\%$ of entire duct system
- OR, meet testing requirements CMC §603.9.2



Fans

Mandatory Requirements

Nonresidential §120.10

Fans

- Fan Energy Index (FEI) of 1 or greater required for:
 - Each fan or fan array with a combined motor nameplate > 1.0 hp, or
 - Each fan or fan array with combined fan nameplate electrical input power > 0.89 kW
- Variable Air Volume shall have $FEI \geq 0.95$
- Fan arrays calculation accordance with ANSI/AMCA 208-18 Annex C
- All FEI values shall be provided by the manufacturer and third party verified
 - Embedded fans exempted from third party verification



Nonresidential Updates

Performance and Prescriptive: §§ 140.4, 140.9, 140.10



HVAC Prescriptive Requirements

Nonresidential § 140.4(a)2

Single-zone space, DX, conditioning systems 240,000 Btu/hr or less: Heat pump baseline for certain spaces

- Retail, grocery
 - Climate zones 2-15: heat pump
 - Climate zones 1, 16 cooling capacity less than 65,000 Btu/hr: air conditioner with furnace
 - Climate zones 1, 16 cooling capacity 65,000 Btu/hr or greater: dual-fuel heat pump
- Schools
 - Climate zones 2-15: heat pump
 - Climate zones 1, 16: dual-fuel heat pump
- Office, financial institution, library
 - Climate zones 1-15: heat pump
 - Climate zones 16 cooling capacity less than 65,000 Btu/hr: air conditioner with furnace
 - Climate zones 16 cooling capacity 65,000 Btu/hr or greater: dual-fuel heat pump
- Office spaces in warehouses
 - All climate zones: heat pump



HVAC Prescriptive Requirements

Nonresidential § 140.4(c)1A

Fan Systems with electrical input > 1 kW

- Fan power budget (kw): (fan system airflow X sum of the fan power allowance) / 1,000
- Fan power allowance dependent on system type

Fan System Type	Fan System Power Allowance Tables
Single Cabinet	140.4 A and 140.4 B
Supply-Only	140.4 A
Relief	140.4 B
Exhaust, Return, Transfer	140.4 B
Complex Supply, Return/Exhaust	Fan Power – Table 140.4 A Airflow- - Supply – 140.4 A for each fan - Return/Exhaust – 140.4 B for each fan

- Building at elevations > 3,000 ft, use correction factor in 140.4 C



HVAC

Prescriptive Requirements

Nonresidential § 140.4(c)1B

Fan Systems

- Fan system input power depends on:
 - Designed fan power for each fan or fan array in the system
 - Efficiency losses of variable speed drives
 - Clean pressure drop
- Designed fan power be determined by:
 - Using Table 140.4-D
 - Provided by manufacturer
 - Using maximum electrical input power on motor nameplate



HVAC Prescriptive Requirements

Nonresidential § 140.4(e)

Economizers

- Cooling Air handler with mechanical cooling capacity over **33,000 Btu/hr** shall include air or water economizer
- TABLE 140.4-E Chilled water system cooling capacity

Climate Zones	Total Building Chilled Water System Capacity, Minus Capacity of the Cooling units with Air Economizers	
	Building Water-Cooled Chilled Water System	Air-Cooled Chilled Water Systems or District Chilled Water Systems
15	≥ 960,000 Btu/h (280 kW)	≥ 1,250,000 Btu/h (365 kW)
1-14	≥720,000 Btu/h (210 kW)	≥940,000 Btu/h (275 kW)
16	≥1,320,000 Btu/h (385 kW)	≥1,720,000 Bu/h (505 kW)

- Exemptions:
 - Ventilation provided by DOAS with exhaust air heat recovery per section 140.4(p)
 - DOAS unit meet exhaust air heat recovery ratio per section 140.4(q)1 and includes bypass or control per 140.4(q)2
 - DOAS unit provide at least the minimum ventilation air flow rate per section 120.1(c)3 and no less 0.3 cfm/ft² during economizer conditions
 - When use of air economizer in controlled horticulture spaces will affect CO₂ enrichment systems



HVAC

Prescriptive Requirements

Nonresidential § 140.4(k)8

High-capacity space heating gas boiler systems: Gas hot water boiler system for space heating in CZ 1-6, 9-14 and 16 with total system input range from 1 – 10 MMBtu/h must have:

- Minimum thermal efficiency of 90%
- Water temp entering boiler not more than 120°F or flow rate of supply hot water not more than 20% of design flow
- Exemptions
 - Space heating boilers in individual dwelling units
 - When 25% of the annual space heating provided by on-site renewable, site-recovered energy or heat recovery chillers
 - When 50% or more of design heating load uses perimeter convective heating, radiant ceiling panels or both
 - Individual gas boilers with capacity less than 300,000 btu/h



HVAC

Prescriptive Requirements

Nonresidential § 140.4(p)

Dedicate outdoor air systems (DOAS)

- DOAS unit fan system power less than 1kW not exceed total combined fan power 1.0 W/cfm
- DOAS fan power greater than 1kW meets follow requirements in section 140.4(c)
 - DOAS supply air delivered directly to occupied space or at outlet of any terminal heating or cooling coils
 - Active chilled beam systems exempted
 - Equipment fans shut off when no call for heat or cooling
 - Supply and exhaust fans have minimum 3 speeds
 - System must not use heat recovery or heating to warm the supply air above 60°F when majority of zones require cooling



HVAC Prescriptive Requirements

Nonresidential § 140.4(q), Table 140.4-J

Exhaust air heat recovery

- Fan systems designed to criteria in either Table 140.4-J or Table 140.4-K must include exhaust air heat recovery system
 - Must have sensible energy ratio no less than 60% or enthalpy recovery ratio no less than 50%
 - Must have energy recovery bypass or control
- Table 140.4-J: Energy Recovery Requirements by Climate Zone and Percent Outdoor Air at Full Design Airflow (< 8,000 hours per year)

% Outdoor Air at Full Design Airflow	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
≥10% and <20%	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
≥20% and <30%	≥15,000	≥20,000	NR	NR	NR	NR	NR	NR	NR	NR	≥18,500	≥18,500	≥18,500	≥18,500	≥18,500	≥18,500
≥30% and <40%	≥13,000	≥15,000	NR	NR	NR	NR	NR	NR	NR	NR	≥15,000	≥15,000	≥15,000	≥15,000	≥15,000	≥15,000
≥40% and <50%	≥10,000	≥12,000	NR	NR	NR	NR	NR	NR	NR	≥22,000	≥10,000	≥10,000	≥10,000	≥10,000	≥10,000	≥10,000
≥50% and <60%	≥9,000	≥10,000	NR	≥18,500	NR	NR	NR	NR	NR	≥17,000	≥8,000	≥8,000	≥8,000	≥8,000	≥8,000	≥8,000
≥60% and <70%	≥7,000	≥7,500	NR	≥16,500	NR	NR	NR	NR	≥20,000	≥15,000	≥7,000	≥7,000	≥7,000	≥7,000	≥7,000	≥7,000
≥70% and <80%	≥6,500	≥7,000	NR	≥15,000	NR	NR	NR	NR	≥17,000	≥14,000	≥5,000	≥5,000	≥5,000	≥5,000	≥5,000	≥5,000
≥80%	≥4,500	≥6,500	NR	≥14,000	NR	NR	NR	NR	≥15,000	≥13,000	≥2,000	≥2,000	≥2,000	≥2,000	≥2,000	≥2,000



HVAC Prescriptive Requirements

Nonresidential § 140.(q), Table 140.4-K

- Table 140.4-K: Energy Recovery Requirements by Climate Zone and Percent Outdoor Air at Full Design Airflow ($\geq 8,000$ hours per year)

% Outdoor Air at Full Design Airflow	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
$\geq 10\%$ and $< 20\%$	$\geq 10,000$	$\geq 10,000$	NR	NR	NR	NR	NR	NR	NR	$\geq 40,000$	$\geq 40,000$	$\geq 20,000$	$\geq 10,000$	$\geq 10,000$	$\geq 10,000$	$\geq 10,000$
$\geq 20\%$ and $< 30\%$	$\geq 2,000$	$\geq 5,000$	$\geq 13,000$	$\geq 9,000$	$\geq 9,000$	NR	NR	NR	NR	$\geq 15,000$	$\geq 15,000$	$\geq 5,000$	$\geq 5,000$	$\geq 5,000$	$\geq 5,000$	$\geq 5,000$
$\geq 30\%$ and $< 40\%$	$\geq 2,000$	$\geq 3,000$	$\geq 10,000$	$\geq 6,500$	$\geq 6,500$	NR	NR	NR	$\geq 15,000$	$\geq 7,500$	$\geq 7,500$	$\geq 3,000$	$\geq 3,000$	$\geq 3,000$	$\geq 3,000$	$\geq 3,000$
$\geq 40\%$ and $< 50\%$	$\geq 2,000$	$\geq 2,000$	$\geq 8,000$	$\geq 6,000$	$\geq 6,000$	NR	NR	NR	$\geq 12,000$	$\geq 6,000$	$\geq 6,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$
$\geq 50\%$ and $< 60\%$	$\geq 2,000$	$\geq 2,000$	$\geq 7,000$	$\geq 6,000$	$\geq 6,000$	NR	NR	$\geq 20,000$	$\geq 10,000$	$\geq 5,000$	$\geq 5,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$
$\geq 60\%$ and $< 70\%$	$\geq 2,000$	$\geq 2,000$	$\geq 6,000$	$\geq 6,000$	$\geq 6,000$	NR	NR	$\geq 18,000$	$\geq 9,000$	$\geq 4,000$	$\geq 4,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$
$\geq 70\%$ and $< 80\%$	$\geq 2,000$	$\geq 2,000$	$\geq 6,000$	$\geq 5,000$	$\geq 5,000$	NR	NR	$\geq 15,000$	$\geq 8,000$	$\geq 3,000$	$\geq 3,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$
$\geq 80\%$	$\geq 2,000$	$\geq 2,000$	$\geq 6,000$	$\geq 5,000$	$\geq 5,000$	NR	NR	$\geq 12,000$	$\geq 7,000$	$\geq 3,000$	$\geq 3,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$



Nonresidential Updates

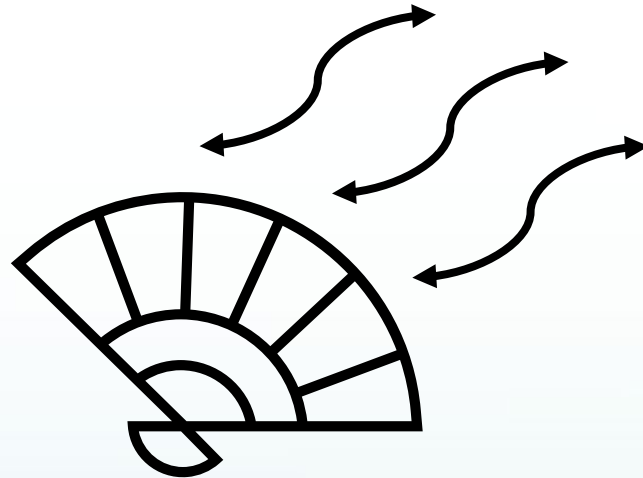
Additions and Alterations: § 141.0



Alterations - Mandatory

Nonresidential § 141.0(b)1D

- Fan energy Index
 - New fan systems serving an existing building must meet requirements per section 120.10





HVAC Alterations - Prescriptive

Nonresidential § 141.0(b)2C

New or replacement space conditioning:

- Additional Fan power adjustment credits per Table 141.0-D
- New exceptions
 - New or replacement space conditioning systems or components exempted from section 140.4(a)2
 - Single package air-cooled unitary AC and heat pumps with cooling capacity < 54,000 Btu/h exempted from requirements of section 140.4(e)
 - New or replaced gas hot water boiler system with total system input between 1 – 10 MMBtu/h exempted from 140.4(k)8



Multifamily HVAC Updates

Mandatory: §§ 160.0 – 160.9



Multifamily Defined

All Buildings § 100.1

Multifamily building

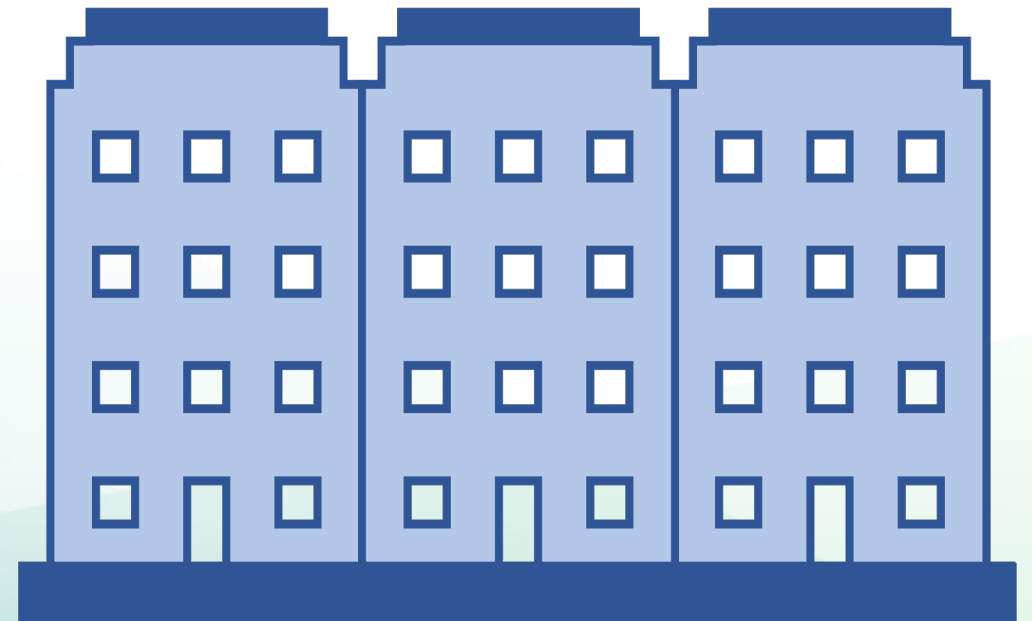
Occupancy group R-2

- Not hotel/motel building or timeshare property

Occupancy group R-3 non-transient congregate residence

- Not boarding houses of more than 6 guests
- Not alcohol or drug abuse recovery homes of more than 6 guests

Occupancy group R-4





Dwelling Unit Ventilation and IAQ Mandatory Requirements

Table 160.2-E: Demand-Controlled Local Ventilation Exhaust Airflow Rates and Capture Efficiency

Application	Compliance Criteria
Enclosed Kitchen or Nonenclosed Kitchen	Vented range hood, including appliance-range hood combinations shall meet either the capture efficiency (CE) or the airflow rate specified in Table 160.2-G as applicable
Enclosed Kitchen	Other kitchen exhaust fans, including downdraft: 300 cfm (150 L/s) or a capacity of 5 ACH
Nonenclosed Kitchen	Other kitchen exhaust fans, including downdraft: 300 cfm (150 L/s)
Bathroom	50 cfm (25 L/s)

Table 160.2-F: Continuous Local Ventilation Exhaust Airflow Rates

Application	Airflow
Enclosed kitchen	5 ach, based on kitchen volume
Bathroom	20 cfm (10 L/s)

Table 160.2-G: Kitchen Range Hood Airflow Rates (cfm) and ASTM E3087 Capture Efficiency (CE) Ratings According to Dwelling Unit Floor Area and Kitchen Range Fuel Type

Dwelling Unit Floor Area (ft ²)	Hood Over Electric Range	Hood Over Natural Gas Range
>1500	50% CE or 110 cfm	70% CE or 180 cfm
>1000 – 1500	50% CE or 110 cfm	80% CE or 250 cfm
750 – 1000	55% CE or 130 cfm	85% CE or 280 cfm
<750	65% CE or 160 cfm	85% CE or 280 cfm



Dwelling Unit Ventilation and IAQ Mandatory Requirements

Multifamily § §160.2(b)2B,C

HERS field verification and diagnostic testing

- Whole dwelling unit ventilation airflow performance: verified per RA3.7.4.1.2 or NA2.2.4.1.2
- Kitchen local mechanical exhaust vented range hoods: verified per RA3.7.4.3 or NA2.2.4.1.4
- HRV and ERV Fan Efficacy: fan efficacy ≤ 1.0 W/cfm HERS verified

Central ventilation system duct sealing

- Duct sealed per CMC §603.10, leakage $\leq 6\%$ of rooftop or central fan designed airflow



Common Use Area IAQ Mandatory Requirements

Multifamily §§160.2(c)7, 160.2(d)

Design and control requirements for quantities of Outdoor Air

- Designed outdoor air rates operated at minimum levels per section 160.2(c)3 or at the rate required for exempted or covered process make up system
- VAV capable of maintaining measured outside air rates within 10% of designed minimum
- Measured outside air rate of constant volume mechanical ventilation and space conditioning systems be within 10% of required outside air rate.

Parking Garages

- Enclosed parking garages comply with 120.6(c)



Dwelling Unit HVAC Systems Mandatory Requirements

Multifamily § 160.3(b)5A, J-K

- Air ducts and plenums insulation
 - Minimum R-6.0
 - No duct insulation required if enclosed in conditioned space and HERS verified
- Porous inner core flex duct have non-porous layer or air barrier
- Duct system sealing and leakage testing
 - Total leakage of duct not more than 12% of the air handler airflow
 - Duct system leakage to outside not more than 6% of air handler airflow

Buildings with 4 or more habitable stories exempted from HERS verification; installing contractor conducts the testing

Buildings with 4 or more habitable stories in Climate Zone 1,3,5 and 7 exempted



Dwelling Unit HVAC Systems Mandatory Requirements

Multifamily § 160.3(b)5L

System Airflow rate and fan efficacy:

- Static pressure probe: HSPP or PSPP conform to RA3.3.1.1
- Single Zone/zonally controlled central forced air systems: Verified per RA3.3
 - Fan efficacy $\leq 0.45\text{W/cfm}$ for Gas furnace air handling unit
 - Fan efficacy $\leq 0.58\text{W/cfm}$ without Gas furnace
 - Small duct high velocity forced air system $\leq 0.62\text{ W/cfm}$ verified per RA3.3

Buildings with 4 or more habitable stories exempted from HERS verification;
installing contractor conducts the testing

Buildings with 4 or more habitable stories in Climate Zone 1 exempted

Number of Habitable Stories	Verifier
Three or less	HERS rater
Four or more	Installing contractor



Common Use area HVAC Systems

Mandatory Requirements

Multifamily §160.3(c)2H, §160.3(d)1

- New **ducts systems tested by HERS Rater have leakage** rate $\leq 6\%$ of nominal air handler airflow rate and
 - Provides conditioned air to an occupiable space for constant volume, single zone and space conditioning system
 - Serves single zone $< 5,000$ square ft of conditioned floor area
 - Ducts combined surface area $> 25\%$ of entire duct system
- OR; meet testing requirements CMC §603.10.1

Mechanical Acceptance testing

- Equipment certified per NA7 and comply with section 160.3(d)3



Multifamily HVAC Updates

Prescriptive: §§ 170.0 – 170.2



Dwelling Unit HVAC Prescriptive Requirements

Multifamily § 170.2(c)3A

Heating System type: Space conditioning systems must meet either requirement shown in table below or comply with performance requirements per §170.1

Multifamily Buildings		Space Conditioning System Type
≤ 3 Habitable Stories	CZ 1 – 15	Heat pump
	CZ 16	Air conditioner with furnace
	Balanced Ventilation	Per requirements of §170.2(c)3Bivc
≥ 4 Habitable Stories	CZ 2 – 15	Heat pump
	CZ 1, 16	Dual-fuel heat pump

Exception: Supplemental heating unit serving directly or indirectly with unit thermal capacity not more than 2 kW or 7,000 Btu/hr and controlled by time-limiting device not exceeding 30 minutes.



Dwelling Unit HVAC Prescriptive Requirements

Multifamily § 170.2(c)3Bi, Table 170.2-K

Refrigerant charge testing for dwelling units:

- Climate zones 2, 8-15 per Table 170.2-K

Exception

- Buildings with 4 or more habitable stories exempted from HERS verification; installing contractor conducts the testing



Multifamily § 170.2(c)3, Table 170.2-K

[illegible]



Dwelling Unit HVAC Prescriptive Requirements

Multifamily § 170.2(c)3Biii

Central Fan Integrated Ventilation Systems – Systems Serving Individual Dwelling Units

- CFI fan efficacy less than or equal:
 - 0.45 W/cfm for gas furnace air-handling units; or
 - 0.58 W/cfm for air-handling units that are not gas furnaces.
- Confirmed per RA3.3
 - Intermittent systems per RA3.7.4.2

Exception

- Dwelling units with 4 or more habitable stories exempted from HERS verification; installing contractor conducts the testing



Dwelling Unit HVAC Prescriptive Requirements

Multifamily § 170.2(c)3Biv

Balanced ventilation systems

- Energy recovery ventilator (ERV) or heat recovery ventilator (HRV)
 - Climate zones 1, 2, 11-16
 - Minimum sensible recovery efficiency of 67%
 - Fan efficacy no more than 0.6 Watts per cfm – Serving individual dwelling unit
- Serving multiple dwelling units - four or more habitable stories
 - Fan power requirements of Section 170.2(c)4A
 - Recovery bypass or control to directly economize with ventilation air based on outdoor air temperature limits per Table 170.2-G
- No ERV or HRV
 - Climate zones 4-10 three habitable stories or less
 - Heat pump space conditioning system
 - Fan efficacy no more than 0.4 Watts per cfm

Buildings with 4 or more habitable stories exempted from HERS verification; installing contractor conducts the testing



Common Use Area HVAC Prescriptive Requirements

Multifamily § 170.2(c)4Aia

Fan Systems with electrical input ≥ 1 kW

- Fan power budget (kw): (fan system airflow X sum of the fan power allowance) / 1,000
- Fan power allowance dependent on system type

Fan System Type	Fan System Power Allowance Tables
Single Cabinet	170.2 B and 170.2 C
Supply-Only	170.2 B
Relief	170.2 C
Exhaust, Return, Transfer	170.2 C
Complex Supply, Return/Exhaust	Fan Power – Table 170.2 B Airflow- - Supply – 170.2 B for each fan - Return/Exhaust – 170.2 C for each fan

- Building at elevations > 3,000 ft use correction factor in 170.2-D



Common Use Area HVAC Prescriptive Requirements

Multifamily § 170.2(c)4C

Economizers

- Cooling Air handler with mechanical **cooling capacity over 33,000 Btu/hr** shall include air or water economizer.
- TABLE 170.2-E Chilled water system cooling capacity

Climate Zones	Total Building Chilled Water System Capacity, Minus Capacity of the Cooling units with Air Economizers	
	Building Water-Cooled Chilled Water System	Air-Cooled Chilled Water Systems or District Chilled Water Systems
15	≥ 960,000 Btu/h (280 kW)	≥ 1,250,000 Btu/h (365 kW)
1-14	≥720,000 Btu/h (210 kW)	≥940,000 Btu/h (275 kW)
16	≥1,320,000 Btu/h (385 kW)	≥1,720,000 Bu/h (505 kW)



Common Use Area HVAC Prescriptive Requirements

Multifamily § 170.2(c)4N

Dedicate outdoor air systems (DOAS)

- **DOAS configurations: Each space include one of the following**
 - DOAS unit complies with exhaust air heat recovery requirements and separate independent space-conditioning system complies with economizer requirements
 - DOAS unit and separate space cooling system
 - Provides at least the minimum ventilation air flow rate per Section 120.1(c)3 at least 0.3cfm/ft² during economizer operation
 - Ventilation sensible energy recovery ratio not less than 60% or enthalpy recovery ratio of at least 50%
 - Energy recovery bypass or control to directly economize with ventilation air based on outdoor air temperature limits per TABLE 170.2-G
 - DOAS units with airflow rate > 1,000 cfm meet demand ventilation control requirements
- Fan speed control for ventilation fan systems
- Equipment fans shut off when no call for heat or cooling.
- DOAS supply air delivered directly to occupied space or downstream of terminal heating or cooling coils.
- DOAS with total fan system power less than 1kW not exceed total combined fan power 1.0W/cfm and if it exceeds then needs to follow requirements in section 170.2(c)4A



Common Use Area HVAC Prescriptive Requirements

Multifamily § 170.2(c)4O, Table 170.2-I

Exhaust air heat recovery

- Fan systems designed to criteria in either Table 170.2-I or Table 170.2-J must include exhaust air heat recovery system
 - Must have sensible energy ratio no less than 60% or enthalpy recovery ratio no less than 50%
 - Must have energy recovery bypass or control
- Table 170.2-I: Energy Recovery Requirements by Climate Zone and Percent Outdoor Air at Full Design Airflow (< 8,000 hours per year)

% Outdoor Air at Full Design Airflow	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
≥10% and <20%	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
≥20% and <30%	≥15,000	≥20,000	NR	NR	NR	NR	NR	NR	NR	NR	≥18,500	≥18,500	≥18,500	≥18,500	≥18,500	≥18,500
≥30% and <40%	≥13,000	≥15,000	NR	NR	NR	NR	NR	NR	NR	NR	≥15,000	≥15,000	≥15,000	≥15,000	≥15,000	≥15,000
≥40% and <50%	≥10,000	≥12,000	NR	NR	NR	NR	NR	NR	NR	≥22,000	≥10,000	≥10,000	≥10,000	≥10,000	≥10,000	≥10,000
≥50% and <60%	≥9,000	≥10,000	NR	≥18,500	NR	NR	NR	NR	NR	≥17,000	≥8,000	≥8,000	≥8,000	≥8,000	≥8,000	≥8,000
≥60% and <70%	≥7,000	≥7,500	NR	≥16,500	NR	NR	NR	NR	≥20,000	≥15,000	≥7,000	≥7,000	≥7,000	≥7,000	≥7,000	≥7,000
≥70% and <80%	≥6,500	≥7,000	NR	≥15,000	NR	NR	NR	NR	≥17,000	≥14,000	≥5,000	≥5,000	≥5,000	≥5,000	≥5,000	≥5,000
≥80%	≥4,500	≥6,500	NR	≥14,000	NR	NR	NR	NR	≥15,000	≥13,000	≥2,000	≥2,000	≥2,000	≥2,000	≥2,000	≥2,000



Common Use Area HVAC Prescriptive Requirements

Multifamily § 170.2(c)4O, Table 170.2-J

- Table 170.2-J: Energy Recovery Requirements by Climate Zone and Percent Outdoor Air at Full Design Airflow ($\geq 8,000$ hours per year)

% Outdoor Air at Full Design Airflow	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
$\geq 10\%$ and $< 20\%$	$\geq 10,000$	$\geq 10,000$	NR	NR	NR	NR	NR	NR	NR	$\geq 40,000$	$\geq 40,000$	$\geq 20,000$	$\geq 10,000$	$\geq 10,000$	$\geq 10,000$	$\geq 10,000$
$\geq 20\%$ and $< 30\%$	$\geq 2,000$	$\geq 5,000$	$\geq 13,000$	$\geq 9,000$	$\geq 9,000$	NR	NR	NR	NR	$\geq 15,000$	$\geq 15,000$	$\geq 5,000$	$\geq 5,000$	$\geq 5,000$	$\geq 5,000$	$\geq 5,000$
$\geq 30\%$ and $< 40\%$	$\geq 2,000$	$\geq 3,000$	$\geq 10,000$	$\geq 6,500$	$\geq 6,500$	NR	NR	NR	$\geq 15,000$	$\geq 7,500$	$\geq 7,500$	$\geq 3,000$	$\geq 3,000$	$\geq 3,000$	$\geq 3,000$	$\geq 3,000$
$\geq 40\%$ and $< 50\%$	$\geq 2,000$	$\geq 2,000$	$\geq 8,000$	$\geq 6,000$	$\geq 6,000$	NR	NR	NR	$\geq 12,000$	$\geq 6,000$	$\geq 6,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$
$\geq 50\%$ and $< 60\%$	$\geq 2,000$	$\geq 2,000$	$\geq 7,000$	$\geq 6,000$	$\geq 6,000$	NR	NR	$\geq 20,000$	$\geq 10,000$	$\geq 5,000$	$\geq 5,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$
$\geq 60\%$ and $< 70\%$	$\geq 2,000$	$\geq 2,000$	$\geq 6,000$	$\geq 6,000$	$\geq 6,000$	NR	NR	$\geq 18,000$	$\geq 9,000$	$\geq 4,000$	$\geq 4,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$
$\geq 70\%$ and $< 80\%$	$\geq 2,000$	$\geq 2,000$	$\geq 6,000$	$\geq 5,000$	$\geq 5,000$	NR	NR	$\geq 15,000$	$\geq 8,000$	$\geq 3,000$	$\geq 3,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$
$\geq 80\%$	$\geq 2,000$	$\geq 2,000$	$\geq 6,000$	$\geq 5,000$	$\geq 5,000$	NR	NR	$\geq 12,000$	$\geq 7,000$	$\geq 3,000$	$\geq 3,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$	$\geq 2,000$



Multifamily HVAC Updates

Additions and Alterations: §§ 180.0 - 180.4



Addition Requirements

Multifamily §180.1

Additions to existing multifamily buildings

- Meet mandatory §§110.0-110.9, §§160.0-160.1, §160.2(c, d), §§ 160.3-160.7
- Meet either §180.1(a) or (b)
- **Exception: Space conditioning system ducts**
 - Any length of ducts extended from existing duct system to serve the addition to meet duct sealing and duct insulation requirements per Sections 180.1(b)2ai and 180.1(b)2aii
- **Exception: Dwelling Unit Space heating system**
 - New or replacement space heating systems serving addition may be heat pump or gas



Addition Requirements

Multifamily §180.1(a)2, §180.1(b)3

Whole dwelling unit mechanical ventilation: Additions to an existing building exempt if additions are:

- Not more than 1,000 sq ft or
- **Junior accessory dwelling units**

Local Mechanical Exhaust

- Local exhaust fan requirements comply to §160.2(b)2Avi and §160.2(b)2B



Alterations Requirements – Dwelling Unit (Prescriptive)

Multifamily § 180.2(b)2Ai-ii, Table 180.2-C

Entirely New or complete replacement: comply with §160.2(a)1, §160.3(a)1, §160.3(b)1-3, §160.3(b)5-6, §160.3(c)1, §170.2(c)3B, §180.2(b)2Av and Table 180.2-C

Altered duct systems – duct sealing: If **more than 25 feet** of new or replacement ducts are installed

- Duct sealing required
- **Duct insulation per Table 180.2-C**
- **Entirely new ducts and air handler in vented attic comply with attic insulation requirements of § 180.2(b)1Bi**

Exception

- **Buildings with 4 or more habitable stories exempted from HERS verification; installing contractor conducts the testing**

TABLE 180.2-C DUCT INSULATION R-VALUE

Climate Zone	3, 5 through 7	1, 2, 4, 8 through 16
Duct R-Value	R-6	R-8



Alterations Requirements – Dwelling Unit (Prescriptive)

Multifamily §§ 180.2(b)2Aiii, v

Altered duct systems – duct sealing: Duct sealing verified per RA3.1 and meet one of the criteria below

- Measured duct leakage not more 15% of air handler airflow
- Duct leakage to outside not more than 10% of air handler airflow
- All leaks sealed and verified by HERS rater per RA3.1.4.3.5

Exception

- Buildings with 4 or more habitable stories exempted from HERS verification; installing contractor conducts the testing

Altered Space-Heating System:

- No electric resistance when heating system is part of new or replacement ducted cooling system
- Exceptions if the existing heat system is electric resistance
 - Non-ducted electric resistance heating systems
 - If only electric resistance heating equipment is being replaced
 - Climate zones 6, 7, 8 or 15



Alterations Requirements – Common Use area (Prescriptive)

Multifamily §180.2(b)2Bi

Space conditioning systems

New or replacement space conditioning: System ducts meet §170.2(c)1,2 and 4

- Additional Fan power adjustment credits per Table 180.2-D
- A few exceptions for specific requirements
 - Economizers



Alterations Requirements – Dwelling Unit (Prescriptive)

Multifamily §180.2(b)5A

Mechanical ventilation systems and IAQ

New or complete replacement ventilation systems: Meet mandatory ventilation requirements in §160.2(b)2 and

- Entirely new or complete replacement duct system with at least 75% new duct material
 - Up to 25% may be reused parts from existing system



Alterations Requirements – Dwelling Unit (Prescriptive)

Multifamily §180.2(b)5Bi

Mechanical ventilation systems and IAQ

Altered dwelling unit ventilation: Meet mandatory ventilation requirements in section 160.2(b)2

Whole dwelling unit mechanical ventilation

- Unit Airflow: If airflow **requirements required previously**, the new airflow requirements must meet or exceed specified in section 160.2(b)2Aiv or 160.2(b)2Av
 - No requirements if not required previously
- **Replacement ventilation fans:** Fans rated for airflow and sound and no less than required airflow rate and meets ASHRAE 62.2 section 7.1 and 7.2
- Air Filters: **If air filtration requirements required previously**, the new air filtration requirements must meet specified in section 160.2(b)1
 - No requirements if not required previously



Alterations Requirements – Dwelling Unit (Prescriptive)

Multifamily §180.2(b)5Bii

Mechanical ventilation systems and IAQ

Altered dwelling unit ventilation: Meet mandatory ventilation requirements in section 160.2(b)2

Local mechanical exhaust

- Bathroom fans must comply with local ventilation requirements per section 160.2(b)2Avi
- Kitchen exhaust: meet one of the following
 - If **kitchen local exhaust requirements required previously**, the new requirements must meet or exceed specified in section 160.2(b)2Avi and no requirements if not required previously.
 - **Replacement fan meet or exceed the airflow required previously or 100 cfm**; which ever is greater.
 - Comply with section 160.2(b)2Avi
- Replacements ventilation fans: Fans rated for airflow and sound and no less than required airflow rate and meets ASHRAE 62.2 section 7.1, section 160.0(b)2Avi



Resources



Online Resource Center

www.energy.ca.gov/orc



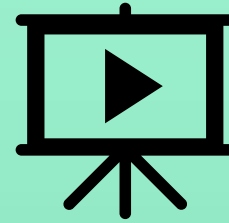
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Links

- Internal resources
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HERS Program

HERS Program information

- 2022 Energy Code approvals in process
- Providers for 2019 Energy Code



- Newly constructed buildings
- Additions
- Alterations of residential and nonresidential buildings
- California whole-house home energy ratings
- HERS building performance contractors



- Newly constructed buildings
- Additions
- Alterations of residential and nonresidential buildings



ATTCP Program

ATTCP Program Information

Mechanical Systems

- California State Pipe Trades Council (CSPTC)
- National Energy Management Institute Committee (NEMIC)
- National Environmental Balancing Bureau (NEBB)
- Refrigeration Service Engineers Society (RSES)





Blueprint Newsletter

Energy Code quarterly newsletter

- Updates
- Clarifications
- Frequently asked questions

Issue 138 | April - June 2022

BLUEPRINT

CALIFORNIA ENERGY COMMISSION
EFFICIENCY DIVISION



IN THIS ISSUE

- 2022 Energy Code: Multifamily Summary
- 2022 Energy Code: Compliance Software
- 2019 Energy Code: HERS Verifications
- Q&A
 - Solar PV for Multifamily Buildings
 - Multifamily Water Heating
 - Multifamily Common Use Areas

2022 Energy Code: Multifamily Summary

The 2022 Building Energy Efficiency Standards (Energy Code) reorganizes low-rise (three or fewer habitable stories) and high-rise (four or more habitable stories) multifamily buildings into one building type, updates the multifamily buildings definition in § 100.1, and moves all requirements for multifamily buildings to §§ 160.0-180.4. This and other significant changes include:

Mandatory Requirements

- Updates minimum efficiencies for HVAC equipment; adds minimum efficiency requirements for dedicated outdoor air systems (DOAS), heat pump, and heat recovery chiller packages. § 110.2
- Changes demand responsive lighting controls trigger to 4,000 watts or more; adds requirements for controlled receptacles. §§ 110.12, 160.5(b)4E

- Unifies envelope insulation, vapor retarder, and fenestration requirements. § 160.1
- For dwelling units
 - Adds requirements for central fan integrated ventilation systems requiring a motorized controlled damper, damper controls, and variable ventilation. § 160.2(b)2Aii
 - Requires vented kitchen range hoods ventilation rates or capture efficiencies based on conditioned floor area and fuel type per Tables 160.2-E, F, G. § 160.2(b)2Avic2
 - Requires a HERS-verified maximum fan efficacy of 1.0 Watts per cfm for heat recovery ventilation (HRV) and energy recovery ventilation (ERV) systems. § 160.2(b)2Biii
 - Adds mechanical acceptance testing requirements. § 160.3(d)2
 - Adds electric-ready requirements when gas equipment is installed for space heating, cooking, and clothes dryers. § 160.9(a-c)

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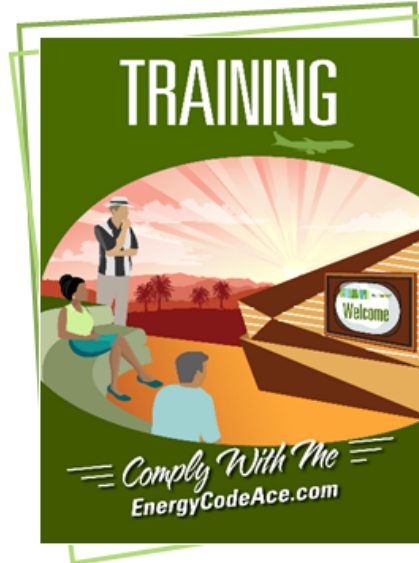


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