

Nonresidential Small Commercial HVAC – Alterations

Packaged Units — Single-zone, Constant Air Volume (CAV) — and Split Systems

Change This (and nothing else)	Mandatory Requirements								Prescriptive Requirements						
	Tstat ^B §110.2(c) §120.2(a), (b), (c) & (e)	Supply & Exhaust Dampers (ventilation provided by HVAC) §120.2(f)	Min. Cooling Efficiency §110.2(a)	Min. Heating Efficiency §110.2(a)	Ventilation Calcs §120.1	Demand Control Ventilation ^P §120.1(c) 3 & 4	Duct Insulation §120.4	Demand Shed Controls ^E §120.2(b), (h)	Cooling Load Calcs §140.4(b)	Heating Load Calcs §140.4(b)	Equipment Sizing (per load calcs) §140.4(a)	Fan Power ^F §140.4(c)	Economizer ^G §140.4(e)	Duct Seal & Test ^H §140.4(l)	Fan Control §140.4(m)
Whole Pkg Unit or Split System NO DUCTS	YES	YES	YES	YES	YES	YES	no	YES	YES	YES	YES	YES	YES	YES	YES ^I
Cooling Coil of Packaged System	YES	no	YES	no	no	no	no	YES	no	no	no	no	no	YES	no
Split System Outdoor Condensing Unit	YES	no	YES	YES ^C	no	no	no	YES	no	no	no	no	no	YES	no
Split System, Air Handler, or Cooling or Heating Coil	YES	no	YES	YES ^C	no	no	no	YES	no	no	no	YES	no	YES	no
Ductwork ^A	no	no	no	no	no	no	YES	no	no	no	no	no	no	YES	no
≥75% New Ducts and Whole Pkg Unit or Split System	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES ^I

NOTE: For Nonresidential HVAC systems, a change in blower motor, compressor or condenser coil is considered a repair and does not trigger the Title 24, Part 6 Standards. However, repairs shall not increase the preexisting energy consumption of the repaired component, system, or equipment.

- A Check with your local building department to see if changes to duct work only will require a permit
- B Thermostats also must comply with requirements of Reference Joint Appendix JA5 per §120.2(b)4 (mandatory for single zone air conditioners and heat pumps) and §141.0(b)2Ei (Prescriptive).
- C If split system operates as a heat pump, heating efficiency must meet meet mandatory requirements in §110.2(a) plus the supplemental electric resistance heater control requirements of §110.2(b).
- D If system is single-zone with any controls or multi-zone with direct digital control, and has airside economizer, and serves a high-density space (≥25 people per 1,000 ft²)
- E If the altered unit has direct digital controls (DDC) to the zone level, 120.2(h) is required. Otherwise, the altered unit's thermostatic controls must comply with JA5, which includes demand shed control requirements as well.
- F If total system fan power is >25 hp
- G If >54,000 Btu/h cooling capacity (4.5 tons)
- H If system is CAV single-zone and serves <5,000 ft² conditioned floor area, and >25% of the duct surface is outdoors or in unconditioned space including under a roof that does not meet current prescriptive insulation requirements
- I DX cooling systems with ≥65,000 Btu/hr cooling capacity and chilled water and evaporative systems with fan motors ≥1/4 hp require a minimum of 2 stages of fan control. Systems that include an air side economizer require a minimum of 2 stages of fan control during economizer operation. All other systems that control the space temperature by modulating the airflow to the space have fan power limitations at half speed.

Acceptance Tests: Packaged Units — Single-zone, Constant Air Volume (CAV) — and Split Systems

Change This (and nothing else)	2016-NRCA-MCH-02-A: Ventilation Systems Adequate OSA (when ventilation provided by HVAC)	2016-NRCA-MCH-03-A: Constant-volume, Single-zone Unitary A/C and HP Temperature Scheduling & Controls for DX units Proper system temperature scheduling & controls for DX units	2016-NRCA-MCH-04-H: Air Distribution Systems ^c Duct leakage rate	2016-NRCA-MCH-05-A: Air Economizer Controls Proper operation of economizer controls	2016-NRCA-MCH-06-A: Demand Control Ventilation Proper operation of DCV controls	2016-NRCA-MCH-11-A: Demand Shed Controls Demand response ^e
Whole Package Unit	YES	YES	YES	YES ^b	YES ^d	YES
Air Handler, or Cooling or Heating Coil, or Outdoor Condensing Unit	no	YES	YES	no	no	YES
Entire Split System	YES	YES	YES	YES	YES	YES
Ductwork ^a	no	no	YES	no	no	no
≥75% New Ducts and Whole Pkg Unit or Split System	YES ^b	YES	YES	YES ^b	YES ^d	YES

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- A Check with your local building department to see if changes to duct work only will require a permit
- B If the system has a factory-installed economizer that is certified operational by the manufacturer to the CEC's economizer quality control requirements, the in-field functional tests do not have to be conducted. Regardless of whether the economizer is field- or factory-installed, complete the construction inspection, including the compliance with high temperature lockout temperature setpoints.
- C If ducts are for a single-zone CAV unit serving <5,000 ft², and if >25% duct surface area is in unconditioned space or outdoors
- D If system is single-zone with any controls or multi-zone with direct digital control, and has airside economizer, and serves a high-density space (≥25 people per 1,000 ft²)
- E The acceptance test requirement only applies if the unit has DDC controls



For More Information

Primary Sources

- Energy Standards Section 110.2 – Mandatory Requirements for Space-Conditioning Equipment:
energycodeace.com/site/custom/public/reference-ace-2016/index.html#!Documents/section1102mandatoryrequirementsforspaceconditioningequipment.htm
- Energy Standards Section 120.1 – Requirements for Ventilation:
energycodeace.com/site/custom/public/reference-ace-2016/index.html#!Documents/section1201requirementsforventilation.htm
- Energy Standards Section 120.2 – Required Controls for Space-Conditioning Systems:
energycodeace.com/site/custom/public/reference-ace-2016/index.html#!Documents/section1202requiredcontrolsforspaceconditioningsystems.htm
- Energy Standards Section 120.4 – Requirements for Air Distribution System Ducts and Plenums:
energycodeace.com/site/custom/public/reference-ace-2016/index.html#!Documents/section1204requirementsforairdistributionsystemductsandplenums.htm
- Energy Standards Section 140.4 – Prescriptive Requirements for Space Conditioning Systems:
energycodeace.com/site/custom/public/reference-ace-2016/index.html#!Documents/section1404prescriptiverequirementsforspaceconditioningsystems.htm

California Energy Commission Information & Services

- Energy Standards Hotline: 1-800-772-3300 (Free) or Title24@energy.ca.gov
- Online Resource Center:
energy.ca.gov/title24/orc/
 - The Energy Commission’s main web portal for Energy Standards, including information, documents, and historical information

Additional Resources

- Energy Code Ace:
EnergyCodeAce.com
 - An online “one-stop-shop” providing free resources and training to help appliance and building industry professionals decode and comply with Title 24, Part 6 and Title 20. The site is administered by California’s investor-owned utilities.
Please register with the site and select an industry role for your profile in order to receive messages about all our free offerings!



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