B	2013 Building Energy Efficiency Standards Residential HVAC Alterations	CITY OF STOCKTON

BUSINESS AND PROFESSIONS CODE, SECTION 7110

Willful or deliberate disregard and violation of the building laws, including the California Building Code, and local permit requirements constitutes a cause for disciplinary action from the Contractors State License Board working in conjunction with the local building department. This action may consist of fines up to $5,000 per violation or suspension/revocation of a contractor's license.

WHEN IS A PERMIT REQUIRED?

A written construction permit shall be obtained from the enforcement agency prior to the erection, construction, reconstruction, installation, relocation, or alteration of any mechanical system, except as permitted in Chapter 1, Section 111.2 of the 2013 California Mechanical Code. Projects requiring permits include, but are not limited to:

- New HVAC installation
- HVAC Changeout
- Replacement of furnace, coil, FAU, or condenser
- Relocation of an existing HVAC unit

2013 BUILDING ENERGY EFFICIENCY STANDARDS (Title 24, Part 6) REQUIREMENTS INCLUDE:

1. Heating equipment must have a minimum 78% AFUE (Exception: Wall & floor furnaces; room heaters).
2. Central air conditioners & heat pumps less than 65,000 Btu/hr must have a minimum 13 SEER.
3. Newly installed or replaced ducts must have a minimum insulation value of R-6.
4. A setback type thermostat (24 hr clock with four set points) is required for all alterations.
5. New or replacement ducts must meet the mandatory requirements of Section 150(m):
   - All joints and openings in the in the HVAC system must be sealed.
   - Only UL 181, UL 181A, or UL 181B approved tapes or mastic shall be used to seal duct openings.
   - Connections of metals ducts and the inner core of flex ducts shall be mechanically fastened. Flex ducts must be connected using a metal sleeve/coupling.
   - Flex ducts that are suspended must be supported every 4ft. max for horizontal runs with no more than 2" of sag between supports and 6 ft. max for vertical runs.

WHAT FORMS ARE REQUIRED?

The CF1R-ALT-04-E andCF2R-MCH-01-H is required for all HVAC alterations. HERS verification is required for **all** HVAC alterations. CF3R's are the forms that are provided through the HERS verification process. A HERS rater is a special inspector for the building department. The building inspector may also request to be on site to witness testing by the contractor and/or HERS rater.

The installer picks one of the four options on the CF1R-ALT-04-E Form that describe the work being conducted. Each option lists the forms required to be at the job site for final inspection.

The attached Ace Resources Residential Trigger Sheet for HVAC alterations provides detailed information for requirements that apply to HVAC alterations.

For Final inspection ALL compliance forms (CF-1Rs, CF-2Rs, and CF-3Rs) shall be registered with an approved HERS Provider.

Ace Resources | Title 24 Part 6 Residential Triggers Sheet

HVAC Alterations

Split Systems and Packaged Systems	Mandatory Measures					Prescriptive Requirements	
	Setback Thermostat	Cooling Load Calcs	Heating Load Calcs	HERS: Duct Seal and Test	HERS: Cooling Coil Airflow and Fan Watt Draw	Duct Insulation	HERS: Refrigerant Charge
Change this (and nothing else)	§110.2(c) §150.2(b)F	§150.0(h), §150.2(b)1C	§150.0(h), §150.2(b)1C	§150.0 (m)1-3 & 11 §150.2(b)1C,D, & E	§150.0(m)12, 13 & 15 §150.2 (b)1C, D	§150.1(c)9 §150.2(b)1D	§150.1(f)7 A §150.2(b)1 F
Whole split or packaged system (no ducts added or replaced)	**YES**	no	no [A]	**YES** [B]	no	no	**YES** [C, D]
Evaporator coil (cooling coil)**, condenser coil, or outdoor condensing unit**	**YES**	no	no [A]	**YES** [B]	no	no	**YES** [C, D]
Furnace (air handler)	**YES**	no	no [A]	**YES** [B]	no	no	**YES** [C, D]
Compressor, refrigerant metering device	**YES**	no	no [A]	no	no	no	**YES** [C, D]
Some ducts	no	**maybe** [E]	**maybe** [A, E]	**YES** [B]	no	**YES** [F]	no
"All new" ducts [G]	no	**maybe** [E]	**maybe** [A, E]	**YES** [H]	**YES** [I]	**YES** [F]	no
Whole split or packaged system and all new ducts	**YES**	**YES** [E]	**YES** [A, E]	**YES** [H]	**YES** [I]	**YES** [F]	**YES** [C, D]

NOTE:
- Replacing the blower wheel fan is considered a repair and does NOT trigger the Standards.
- All new HVAC equipment must meet minimum federal efficiency requirements
- Cooling line insulation is triggered if the line set (cooling system, suction line) is replaced or repaired. Line sets ≤1.5" in diameter must have 0.5" thick insulation.

[A] Heating equipment must meet CBC minimum capacity requirements.

[B] Duct systems must be sealed and verified if >40 feet of ducts in unconditioned space. Duct system leakage must be ≤15% in total, or ≤10% to the outside. Or, if unable to meet the sealing requirements, all accessible leaks must be sealed and verified by a HERS rater.

[C] HERS verification of refrigerant charge is required in **climate zones 2 and 8–15 only** when a refrigerant containing component of an air conditioner or heat pump is replaced or installed in an existing building.

[D] Although there are no commercially available HVAC systems with approved Charge Indicator Display (CID) devices at the time of publication (October 2013), the Standards do allow use of a CEC-approved CID should such equipment become available during the 2013 code cycle.

[E] Cooling and heating load calculations are required when ducts are added to **serve new conditioned space**, such as an addition.

[F] Mandatory duct insulation requirements (R-6) apply to all new or replacement ducts (not existing or unaltered ducts). When replacing >40 feet of ducts in unconditioned space: CZ 1-10 and 12-13: R-6; CZ 11 and 14-16: R-8. HERS verification is required for insulated ducts in conditioned space.

[G] The system is considered to have "all new" ducts when 75% or more of the ducts are new material and up to 25% reused parts from the existing duct system ((e.g., registers, grilles, boots, air handler, coil, plenums, duct material) if the reused parts are accessible and can be sealed to prevent leakage.

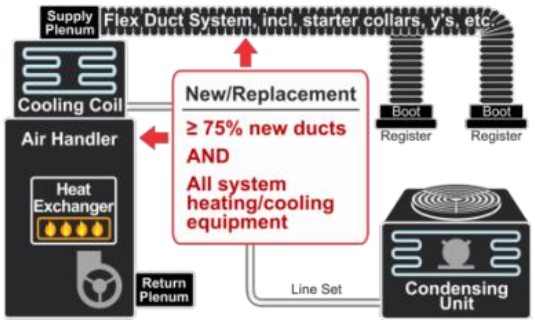
[H] In all climate zones, when new duct systems are installed in unconditioned space, leakage must be ≤6% of the air handler airflow.

[I] When new duct systems are installed, cooling coil airflow must be >350 CFM per ton, and fan watt draw must be ≤0.58W/CFM. Alternatively, the system can meet the requirements in Table 150.0-C or Table 150.0-D (Return Duct Sizing and Filter Sizing).

This program is funded by California utility customers under the auspices of the California Public Utilities Commission and in support of the California Energy Commission.

DOCUMENT 2014-03-24

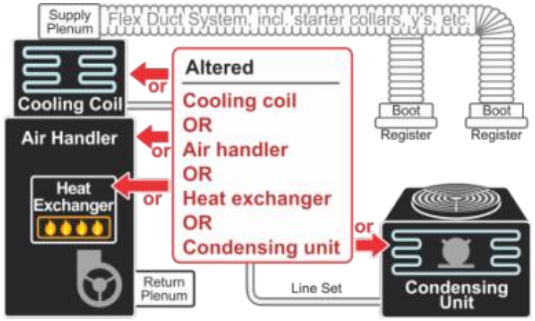
2013 Entirely New or Complete Replacement Space-Conditioning System §150.2(b)1C



A space-conditioning system is considered entirely new or a complete replacement when all of the following are installed or replaced:

- All the system heating/cooling equipment
- ≥75% new duct material [G]

2013 Altered Space-Conditioning System §150.2(b)1E, F

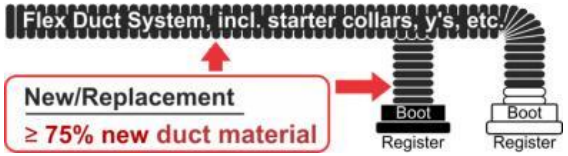


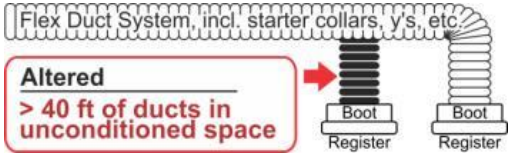
A space-conditioning system is considered altered when it is not a new or replacement system and any of the following components is installed or replaced:

- Evaporator coil (cooling coil)
- Compressor
- Condenser coil
- Air handler
- Outdoor condensing unit
- Refrigerant metering device

Replacing other components is considered a repair — not an alteration. For example, replacing the blower wheel fan, but not the heat exchanger or air handler in the furnace, is a repair.

2013 Altered or Replaced Duct Systems (Duct Sealing) §150.2(b)1D





Entirely New or Complete Replacement Ducts

Entirely new or complete replacement duct systems are those that contain at least 75% new duct material. Existing duct system components (up to 25%) may be reused if they are accessible and can be sealed.[G]

The Duct Sealing and Testing HERS measure must demonstrate a leakage rate less than or equal to 6% of the system air handler airflow.

In addition, verification of Cooling Coil Airflow and Fan Watt Draw (HERS measure) is required. The system must have airflow >350 CFM per ton of nominal cooling capacity through the return grilles, and an air-handling unit fan efficacy ≤0.58 W/CFM.

Alteration or Extension of Existing Ducts

In all climate zones when more than 40 feet of new or replacement system ducts are installed as an extension of an existing duct system, Duct Sealing and Testing (HERS measure) is required, and the measured leakage shall be equal to or less than 15%.

(There are alternatives to meeting the maximum 15% leakage. Consult your Building Department or §150.2(b)1Diib in the Standards.)

Required Documentation

For All HVAC Alterations

All HVAC alterations require:

- Permit — for all HVAC changeouts
- CF1R: Certificate of Compliance: Alteration to an HVAC System (CF1R-ALT-02*-E, or CF1R-ALT-03-E or CF1R-ALT-04-E)
  Submitted to the building department by the contractor or the home owner
- CF2R-MCH-01-H: Certificate of Installation for Space Conditioning Systems, Ducts and Fans
  Completed and signed by the installing contractor and made available for final inspection by building department

For HERS Measures

Projects with HERS measures require:

- Registration of the CF1R, via HERS Provider
- CF2R-MCH…H: Certificates of Installation for mechanical system with HERS measures
  Completed and signed by the installing contractor; must be submitted to a HERS Provider Registry after the contractor has signed it, and made available for inspection by the building department
- CF3R-MCH…H: Certificates of Field Verification for mechanical system with HERS measures
  Completed and registered by a HERS Rater for each CF2R-H; the HERS Rater or contractor ensures the relevant CF3Rs are available for final inspection by the building department.
- HERS: Duct Leakage Diagnostic Test
  - CF2R-MCH-20*-H and CF3R-MCH-20*-H
- HERS: Fan Efficacy (Fan Watt Draw)
  - CF2R-MCH-22-H and CF3R-MCH-22-H

  and

  HERS: Space Conditioning System Airflow Rate
  - CF2R-MCH-23*-H and CF3R-MCH-23*-H
- HERS: Refrigerant Charge Verification
  - CF2R-MCH-25*-H and CF3R-MCH-25*-H

  or
  - CF2R-MCH-25f-E (for packaged systems with refrigerant charge certified by manufacturer)

* *Correct version (e.g., "a" or "b" or "c") varies depending upon the project scope and approach used to demonstrate compliance*

For Projects with New or Replacement Duct Systems using Duct and Filter Sizing

Projects that use Duct and Filter Sizing instead of the Cooling Coil Airflow and Fan Watt Draw HERS Measure require:

- CF2R-MCH-28-H and CF3R-MCH-28-H

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STATE OF CALIFORNIA

ALTERATIONS - HVAC

CEC-CF1R-ALT-04-E (Revised 06/14) CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	CF1R-ALT-04-E
Alterations - HVAC CZ 2, and 8-15 (formerly CF-1R-ALT-HVAC)	(Page 1 of 1)

Site Address:				Enforcement Agency:	Date Prepared:	Permit#:
Equipment Type		Equipment Efficiency		New Ducting, *Plenums, Lineset:* Required R-value	Conditioned Floor Area (sq ft)	Thermostat
☐ Packaged System ☐ Split System ☐ Mini Split ☐ Furnace	☐ Evaporator Coil ☐ Condensing Unit ☐ Compressor ☐ Lineset ☐ TXV	_____AFUE _____SEER _____EER	_____COP _____HSPF	☐ R-6 *(CZ 2, 8-13)* Ducting ☐ R-8[1] *(CZ 11, 14, 15)* Ducting ☐ R-6 (*all CZ's*) Plenums ☐ R-5 or R7.5) Lineset[4]	Served by system _____sqft	☐ Setback *(If not already present, must be installed)*

HERS VERIFICATION SUMMARY Installer determines work to be completed and matches to one of the options below. At permit application this form is allowed to be filled out by hand. For final inspection all forms are to be registered (no hand filled forms allowed) and a copy left on site.

☐ **1. HVAC Changeout/Repair**	**Required Compliance Documents to be left on site for Final:**
All Equipment, Condenser Unit, Evaporator Coil, Compressor, TXV, Lineset, Air Handler/Furnace[2] **(Can include new ducting)**	CF1R-ALT-02-E CF2R: MECH-01, MECH-20-HERS, MECH-(23 or 24)[2]-HERS, MECH-25-HERS[2] CF3R: MECH-20-HERS, MECH-(23 or 24)-HERS[2], MECH-25-HERS[2]

Installer Requirement: Duct leakage (≤ 15%, or ≤ 10% to outside, or seal all accessible leaks), Air Flow ≥ 300 CFM/ton, Refrigerant Charge.
Exempted from duct leakage testing if:
☐ 1. Duct system registered with HERS provider as previously sealed, or ☐ 2. There is less than 40 linear feet of duct in unconditioned space, or
☐ 3. Existing duct systems are constructed, insulated or sealed with asbestos (list manufacture date of building _____)

☐ 2. **New HVAC System**	**Required Compliance Documents to be left on site for Final:**
All new equipment and All New Ducts[3] including Mini Split	CF1R-ALT-02-E CF2R: MECH-01, MECH-20-HERS, MECH-22-HERS, MECH-(23 or 24)-HERS[2], MECH-25-HERS[2] CF3R: MECH-20-HERS, MECH-22-HERS, MECH-(23 or 24)-HERS[2], MECH-25-HERS[2] Mini Splits require CF1R-ALT-02-E, CF2R-MECH-01, and (CF2R-CF3R) MECH-25-HERS

Installer Requirement: Duct leakage ≤ 6%, Fan Efficacy (.58W/CFM), Air Flow ≥ 350 CFM/ton (or alternative), Refrigerant Charge

☐ 3. **All New Ducts with Replacement**	**Required Compliance Documents to be left on site for Final:**
All New Ducts[3] and one or more of the following replaced: Condenser Unit, Evaporator Coil, Compressor, TXV, Lineset, Furnace[2]	CF1R-ALT-02-E CF2R: MECH-01, MECH-20-HERS, MECH-(23 or 24)-HERS, MECH-25-HERS CF3R: MECH-20-HERS, MECH-(23 or 24)-HERS, MECH-25-HERS

Installer Requirement: Duct leakage ≤ 6%, Air Flow ≥ 350 CFM/ton (or alternative), Refrigerant Charge
Exempted from duct leakage testing if: ☐ 1. Existing duct systems are constructed, insulated or sealed with asbestos

☐ 4. **New Ducting over 40 feet**	**Required Compliance Documents to be left on site for Final:**
New ducting but less than All New Ducts[3]	CF1R-ALT-02-E, CF2R: MECH-20-HERS, CF3R: MECH-20-HERS

Installer Required to: Duct leakage (≤ 15% or, ≤ 10% to outside or, or seal all accessible leaks)
☐ EXCEPTION: Existing duct systems constructed, insulated or sealed with asbestos.

[1] All **new** ducting R-8 required when more than 40 ft installed and R-6 when less than 40 ft installed. This includes in walls, between floors etc.
[2] Heating only systems and Air Handler/Furnace changes do not require Air Flow MECH-(23 or 24), or Refrigerant Charge verification MECH-25
[3] All New Ducts is when at least 75 percent of the duct system is new duct material, and up to 25 percent may consist of reused parts from the dwelling unit's existing duct system (e.g., registers, grilles, boots, air handler, coil, plenums, duct material)
[4] R-5 (1" thick insulation) for linesets 1" and less. R-7.5 (1.5" thick insulation) for linesets over 1 inch. Most mfg will require Suction line Diameter with insulation as the following 1.5-2T-2⅝", 2.5-3T-2¾", 3.5 to 4T-2⅞", 5T-4⅛"

Contractor (Documentation Author's /Responsible Designer's Declaration Statement)

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the California Business and Professions Code to accept responsibility for the information on this document.
3. That the energy features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 1 and 6 of the California Code of Regulations (CCR).
4. That the energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the CCR.
5. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.

Responsible Designer Name:	Responsible Designer Signature:	Date Signed:	License:
Company :	Address:	City/State/Zip:	Phone:

For assistance or questions regarding the Energy Standards, contact the Energy Hotline at: 1-800-772-3300