

*Duct Sealing and Testing for  
HVAC System Change-outs*

Procedures to Comply  
with Change-out Rules

## Title 24 Information

- Energy Hotline (Title 24 Questions)
  - 1-800-772-3300
  - Monday – Friday 8:00-12:00 and 1:00-4:30
  - [title24@energy.state.ca.us](mailto:title24@energy.state.ca.us)
  
- Title 24 Home Page
  - [www.energy.ca.gov/title24](http://www.energy.ca.gov/title24)

## Why Seal the Leaks

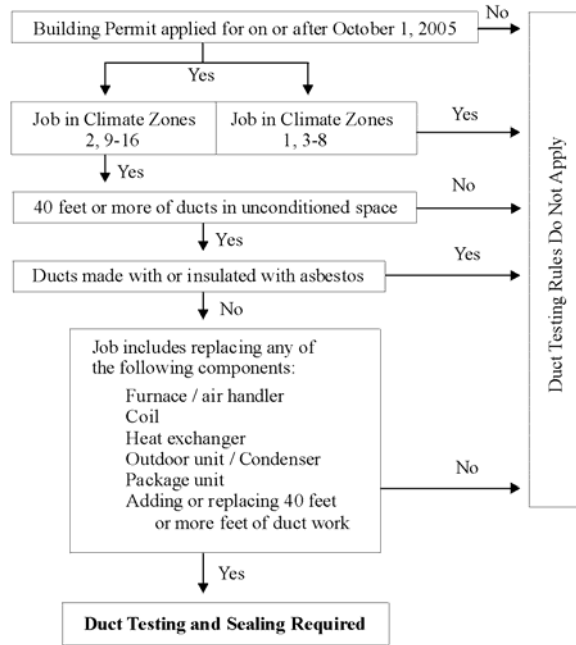
- Average 30% leakage for existing ducts
  - 2.5 Ton System
- With No Leaks – 21,600 BTUH to the home
- Supply Leaks 30% - 15,120 BTUH to the home
- Return leaks 30% - 3,780 BTUH to the home

Assuming 130 Deg. Attic air

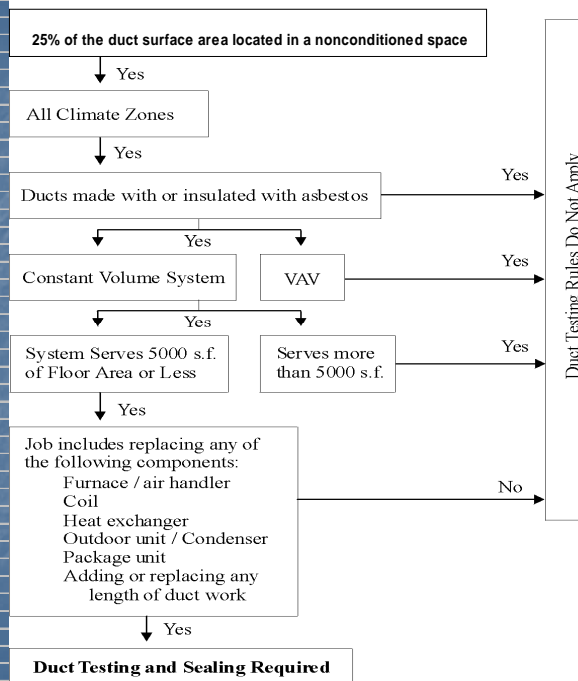
## How long does it take

- Most jobs take an additional 2 hours to seal the ducts

### Residential HVAC Change-Outs



### NonResidential HVAC Change-Outs





LETTER TO HOMEOWNERS:

NEW DUCT SEALING REQUIREMENTS - YOU WILL BENEFIT

Beginning October 1, 2005, you must have your home's ducts tested for leaks when you have a central air conditioner or furnace installed or replaced. Ducts that leak 15 percent or more must be repaired to reduce the leaks. After your contractor tests and fixes the ducts, you choose whether to have an approved third-party field verifier check to make sure the duct testing and sealing was done properly or to have your house included in a random sample where one in seven duct systems are checked.

Duct sealing is not required in the following situations: 1) when homes are in specific coastal climates; 2) when systems have less than 40 feet of ductwork in unconditioned spaces like attics, garages, crawlspaces, basements or outside the building, or 3) when ducts are constructed, insulated or sealed with asbestos. There also are specific alternatives that allow high efficiency equipment and added duct insulation to be installed instead of fixing duct leaks.

You also should know that any contractor failing to obtain a required building permit and failing to test and repair your ducts is violating the law and exposing you to additional costs and liability. Real estate law requires you to disclose to potential buyers and appraisers whether or not you obtained required permits for work done on your house. If you do not obtain a permit, you may be required to bring your home into compliance with code requirements for that work and you may have to pay penalty permit fees and fines prior to selling your home.

The greatest energy use in California homes is for central air conditioning and heating. Most homes with central air conditioning and heating systems have ducts that were never properly sealed. The average home's ducts leak around 30 percent of the conditioned air outside the home. These leaks are taking money straight out of your pocketbook. Properly sealed ducts will lower your energy bills, reduce pollution inside your home, and help to avoid a repeat of the inconvenience and health and safety risks that we suffered during the power blackouts in 2000.

For more information, please contact the Energy Commission Efficiency Hotline at (800) 772-3300, or visit our website at [www.energy.ca.gov/title24/changes04](http://www.energy.ca.gov/title24/changes04).

Date: August 2, 2005

  
JACK LYNE PFANNENSTIEL  
Vice Chair

  
ARTHUR H. ROSENFELD, Ph. D.  
Commissioner

## What forms are required?

- Contractor fills out
  - MECH-5A (page 1 and 2) for nonres
  - CF-1R (page 1,2, and 3) and turned in at time of application.
  - CF-6R (page 3, 4, and 5 if needed) before final.
- Building Department before permit finalized
  - MECH-5A (page 3 from HERS rater) for nonres
  - CF-1R
  - CF-6R
  - CF-4R (page 1 and 3 if TXV required)
    - TXV required in CZ 2 and 8 through 15

## Submit Bid to Owner

- Contractor is responsible for completing work per code.
- Code required that a permit is pulled and the ducts are tight and that HERS verification is conducted.
- Contractor bid should include costs for sealing the ducts and HERS verification. If this information is not included in the bid contractor is required to do work to code for original bid.

## Contractor Test & Seal

Test and seal the ductwork as necessary.

Contractor does not have to be certified to perform this test. Homeowner can seal ducts.

After sealing contractor tests ducts and fills out CF-6R and gives to HERS rater

## Contractor Test & Seal (cont)

The sealing and testing does not have to be performed at the same time as the change-out work.

It must be completed before the building permit is "signed-off".

## Allowed Leakage

- New Duct Systems – less than 6%
- Existing Duct Systems
  - Option 1 – less than 15%
  - Option 2 – less than 10% to outside
  - Option 3 – Reduce leakage by 60% must smoke and fix all accessible ducts.
  - Option 4 – Fix all accessible ducts **and** smoke test. No sampling allowed

## CF-6R Res.

MECH-5-A Pg 2 Nonres

After the system is sealed contractor fills out CF-6R for every system.

CF-6R is given to building owner, HERS rater, and building department (or left on site).

## HERS Rater

Contractor facilitates the hiring of a HERS rater to verify test results.

HERS rater can do sampling or test every system.

## Independent Third Party

The HERS rater may NOT be an employee of the installing HVAC contractor.

HVAC contractors may be HERS raters, but they may NOT test their own work.

## CF-4R Res

MECH-5-A Pg 3 Nonres

The HERS rater will fill out a CF-4R on every CF-6R they receive from the installer. All CF-4R's are entered in to a database to verify that HERS inspection was conducted.

## Building Department

The building department must receive a properly completed CF-4R prior to "signing-off" the building permit for each HERS measure.

## Sampling

At the option of the HVAC contractor:

The HERS rater will verify 100% of the jobs or

The HERS rater will verify a sample of the installers jobs. To do sampling the HERS rater must have a CF-6R on every home .

## Sampling Rules

Out of each SEVEN systems that the contractor tests (CF-6R), the HERS rater will test ONE system. If the sampled job passes no more testing for that group. If it fails another from the group must be tested. If the second fails all SEVEN must be tested. I

## Sampling Rules

The jobs do not have to be in the same jurisdiction (city or county).

They must be verified by the same HERS rater.

Group may be less than SEVEN system.

## CF-4R For Every Job

The HERS Rater will complete a CF-4R for each System.

This includes tested and sampled houses.

Thus, the building department will get a CF-4R for every job.

## HERS Providers

Three HERS Providers in California

1. CHEERS [www.cheers.org](http://www.cheers.org)
2. CalCerts [www.calcerts.com](http://www.calcerts.com)
3. CBPCA [www.cbpca.org](http://www.cbpca.org)

# Duct Testing Equipment

The Energy Conservatory  
(612) 827-1117

[www.energyconservatory.com](http://www.energyconservatory.com)

Retrotec Energy Innovations Ltd.

[info@retrotec.com](mailto:info@retrotec.com)

(604) 732 0142

**Table 8-3 – Alternatives to Duct Sealing and Refrigerant Charge Measurement**

	Option 1, Heating Option,	Option 2, Cooling Option	Option 3, Combo Heating and Cooling Option
Climate Zone	0.92 AFUE	SEER14/ EER-12, plus TXV (or refrigerant charge measurement), plus Increased Duct Insulation	SEER- 14/ EER- 12 with TXV (or refrigerant charge measurement), plus either 0.92 AFUE or 0.82 AFUE plus Increased Duct Insulation
CZ2	Yes	No	Yes
CZ9	No	No	Yes
CZ10	No	Yes	Yes
CZ11	No	No	Yes
CZ12	Yes	No	Yes
CZ13	No	Yes	Yes
CZ14	No	No	Yes
CZ15	No	Yes	Yes
CZ16	Yes	No	Yes

1. Increased duct insulation refers to an additional R-4 insulation wrap on existing ducts and R-8 duct insulation for all new ducts.

2. In climate zone 8, to avoid TXV or refrigerant charge measurement requirements, a SEER 14 or a 0.82 AFUE may be used.

3. Package systems may use Option 2 or 3 without meeting the TXV (or refrigerant charge measurement)

Note - There are no duct sealing requirements in climate zones 1 and 3-8.

## Option 1

Climate Zones 2, 12, & 16 only

0.92 AFUE Furnace and 13 SEER

Heat Pump with 9 HSPF in CZ 2 and 12  
and 12 HSPF in CZ 16

Less than a 13 SEER requires duct testing  
and TXV in CZ 2, and 8 -15.

## Option 3 All Climate Zones

SEER 14

EER 12 – HERS Verified

TXV – HERS Verified

Plus

0.92 AFUE Furnace

## New Residential Ducts All New Ducts

- Climate Zone 6 to 8 – R4.2
- Climate Zone 1 to 5 and 9 to 13 – R6
- Climate Zone 14 to 16 – R8
  
- All new ducts must comply with above unless modeled R 4.2 in computer program

## Nonresidential Ducts All New Ducts

- Unconditioned Space (Outdoors and attic with insulation on the T-Bar) – R8
  
- Indirectly Conditioned (Attic with insulation on the roof)– R4.2 Supply Only
  
- Enclosed Conditioned Space – No Insulation Required

## Contractors State License Board

- The CSLB wants to hear about contractors who are not: pulling permits, following code requirements, honoring their bid and , who are taking advantage of owners.
- Contact Karen Nicely with the CSLB
- Phone Number 707-887-9191

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