

HERS Rating

Residential Alteration Requirements

If you do not know the correct procedures for the required HERS tests, download this [Reference Appendices \(Section RA3\)](#).

Inside you will learn how to perform the contractor's tests for filling out the CF-6R-MECH-xx-HERS forms.

Residential Alterations in certain [climate zones](#) fall under the HERS guidelines. We recommend that you download these [change-out flow charts](#) and print all four pages to help guide you before reading further.

The first page breaks the inspection requirements down for you by climate zones and points you to the appropriate chart or charts to follow.

The climate zone your client's home is in will determine which tests are required.

Next the Refrigerant Charge field verification Requirements.

If the job is in climate zone 2, 8, 9, 10, 11, 12, 13, 14, or 15, Refrigerant Charge Method field verification may be required.

As of Jan 1, 2010 there are no longer exemptions to avoid Refrigerant Charge field verification by a HERS Rater.

If the job includes adding or replacing any of the following items Refrigerant Charge Method field verification may be required.

- An air handler (yes a furnace is an air handler)
- A heat pump
- A coil (condensing or evap coils)
- An outdoor condensing unit.

Now on to the duct testing requirements.

If the job is in climate zone 2, 9, 10, 11, 12, 13, 14, 15, or 16, duct sealing and testing may be required.

and

If 40 feet or more of the ductwork is outdoors or in unconditioned airspace, duct sealing and testing may be required.

and If the ductwork has no asbestos (most will not have asbestos) duct sealing and testing may be required.

and

If your system has not previously been sealed, tested and certified by a HERS Rater, duct sealing and testing may be required.

and If the job includes adding or replacing any of the following items duct sealing and testing may be required:

- An air handler (a furnace is an air handler).
- A coil (condensing or evap coils)
- A heat exchanger (even under warranty)
- An outdoor condensing unit.
- A package A/C and or heating unit.

● 40 or more feet of ductwork. (This means that if you added or replaced 40 feet or more ductwork) . Follow the flowcharts and if you determine that duct testing and/or Refrigerant Charge Verification is required you will need some forms to take you to the next step.

First download these [Change-out Contractors Forms.](#)

In May 2010 the California Energy Commission (CEC) came up with new forms for residential HVAC Alterations. The new CF-1R-ALT-HVAC forms are climate zone specific and can be filled in on your computer and printed as needed. They are two page documents where the first page is instructional and the second page is the form itself. The CF-1R-ALT-HVAC is the form that spells out just what work you are going to do for your customer.

CF-1R-ALT-HVAC

All the forms start out the same. You enter the Site Address, The Enforcement Agency (building department), and date. Next you check off exactly what type of equipment you intend to install. If this is to be a complete change out you would check off; Furnace, Indoor Coil, and Condensing Unit. Next you list the efficiencies. Check AFUE and type the corresponding number. You do the same with all pertinent items there. Type in the Conditioned Floor Area in square feet, check off if you are installing over 40 feet of ducts in unconditioned space and the Thermostat check box as well. Each climate zone has different requirements and the forms reflect that. Check off all items that are Appropriate for the job and print as many copies as needed. Fill in and print the CF-1R-ALT-HVAC form for the climate zone you're job is in. This is the form you need before you pull the building permits. It will help you determine if a HERS Rater will be required for the job and which forms you will need for the rater and building department . The CF-1R-ALT-HVAC is part of the building permit. You should keep a stamped copy with the permit on the job and one for your records as well. If a HERS rater is required the rater will require a copy as well.

CF-6R-MECH-25-HERS

This the form you will use if Refrigerant Charge field verification is required

This is one of the forms that you fill out once you have installed the equipment for the job.

If you do not know the correct procedures for the required HERS tests, download this [Reference Appendices \(Section RA3\).](#) Inside you will learn how to perform the contractor's tests for filling out the CF-6R-MECH-xx-HERS forms.

Page 1

Enter the Site address, Enforcement Agency (building department) and Permit number at the top.

Enter the system name on the next line. This form can be used for up to four systems in the same house.

Next, lines 1 & 2 are required and 3-8 are for new systems that utilize the prescriptive compliance method.

Page 2

On page 2 you will need to enter all the information about what equipment you have installed (manufacturer, model #'s, efficiency and so on).

It is important that you enter the data for the equipment you actually installed because this is a legal document and your signature is required.

Next we go to the Calibration segment. **Your gauges and thermocouples must be calibrated MONTHLY.**

Next you start gathering / measuring and recording the temperatures line by line.

Page 3

Page 3 is for the minimum airflow requirement. You may calculate by temperature or measure the airflow. If the system has a fixed orifice metering device fill in the bottom section. If not go to Page 4.

Page 4

Page 4 is to be used if the system has a TXV or EXV. Both sections must be completed.

Page 5

Here you enter the pass/fail for each unit. At the bottom of the page you enter the HVAC contractor's information and the installer's signature. Once all units pass this form is complete. Make multiple copies of this form as you will need to give one each to; the homeowner, HERS Rater, Building inspector, and keep one for your records.

If the CF-1R-ALT requires a Duct Leakage Test you will need either a CF-6R-MECH-20-HERS (for completely new or replacement duct system) or a CF-6R-MECH-21-HERS (for existing duct systems).

The HERS Rater will need information from this form in order to do the Duct Leakage Test. You will need a **Duct Blaster** to test the system in order to fill this out. If you do not own a Duct tester you may hire a HERS Rater to do the "contractors test" for you to complete the forms but we recommend that you purchase a duct tester for yourself. It will save you lots of money in the long run.

CF-6R-MECH-20-HERS

This is the form you will use if you have replaced (essentially) the entire duct system. **If you reuse some existing cans the duct system still qualifies as new.** Fill it in once you have completely installed the equipment for the job.

Page 1

As before, fill in the top of the form and go to **Allowed Leakage calculation.**

I will use a 3 ton system with a 75,000 BTU furnace as an example to help guide you through.

Cooling enter 3 in the tons space.

Multiply that by 400 and enter the sum 1200 in the CFM blank.

The next line is for heating units so enter 75000 in the BTU space and multiply that by .0217 .

Enter the sum (1627) to the right in the CFM blank.

If you prefer to actually measure the fan flow and you have the equipment, enter the fan flow CFM on the measured line

Check the box showing the method you used to measure the flow.

in the space to the right enter the highest number from the left.

In this example enter 1627

Now test the system and enter the actual leakage from the duct leakage test.

The unit passes if Actual leakage is less than Allowed leakage.

Page 2

- Fill in the rest of the form and at the bottom of the page you enter the HVAC contractor's information and the installer's signature. Once all units pass this form is complete. Make multiple copies of this form as you will need to give one each to; the homeowner, HERS Rater, Building inspector, and keep one for your records.

CF-6R-MECH-21-HERS: This is the form you will use if you have **NOT** replaced the entire duct system. Fill it in once you have completely installed the equipment for the job.

Page 1 As before fill in the top of the form and go to **Duct Leakage Diagnostic Test**. You have four options here

- Option 1. Measured leakage less than 15% of Fan Airflow.
- Option 2. Measured leakage to outside less than 10% of Fan Airflow.
- Option 3. Reduce leakage by 60% or more, and conduct smoke test to seal all accessible leaks.
- Option 4. Fix all accessible leaks using smoke test, and HERS rater must verify.

(Option 1 must be attempted before utilizing Option 4)

As above I will use a 3 ton system with a 75,000 BTU furnace as an example to help guide you through.

Cooling enter 3 in the tons space.

Multiply that by 400 and enter the sum 1200 in the CFM blank.

The next line is for heating units so enter 75000 in the BTU space and multiply that by .0217 .

Enter the sum (1627) to the right in the CFM blank.

If you prefer to actually measure the fan flow and you have the equipment, enter the fan flow CFM on the measured line
Check the box showing the method you used to measure the flow.

Option 1

●Starting with line #1, enter the Fan airflow of 1627 CFM. Multiply this by 0.15 and enter 24 in the CFM blank

Now test the system and enter the actual leakage from the duct leakage test.

The unit passes if Actual leakage is less than Allowed leakage.

Option 2

Since this will be used so rarely I will not cover it here. If you need to know how to do it go to the CEC website and download the CEC-400-2008-004-CMF. This is the Reference Appendices guide. There you will find instructions for all tests and requirements. It's only 357 pages and it makes a good reference guide for when arguing with the building departments.

Option 3

It is highly recommended that you test the system prior to touching the ductwork and enter the leakage measured on line 3 Initial leakage prior to start of work If the system is old and most likely in poor condition and the owner has no desire to have you replace the ductwork this may get you through the HERS process.

Option 4

(Option 1 must be attempted before utilizing Option 4) This is your last ditch effort to get the system to pass. If all else fails you can use this method. All accessible leaks must be sealed. All registers must be removed and the gap between the drywall and the can must be caulked. A smoke test must be preformed (to show all accessible leaks are sealed) A HERS Rater must verify all of the above.

Page 2

Fill in the rest of the form and at the bottom of the page you enter the HVAC contractor's information and the installers signature. Once the unit passes this form is complete.

Make multiple copies of this form as you will need to give one each to; the homeowner, HERS Rater, Building inspector, and keep one for your records.

Now you need a [HERS Rater to verify the test results.](#)

Once the HERS Rater has completed the testing and provided you a completed CF-R4-ALT form then you will be ready for the building inspector.

As I stated above it is in your best interest that you test the ducts prior to starting the work. Let's assume that you have an old system that is very leaky and possibly has broken or ripped ducts. In this scenario it may be nearly impossible to get the ducts sealed well enough to reach the required 15 % once you replace the furnace condenser and evap coil. That being the case you should pretest the system and enter the results on line 3 of the CF-6RMECH-21-HERS page 1 of 2. It might go like this;

line 3 has your pretest readings of 663.

You install the equipment, seal all accessible leaks, try passing with Option 1 (and if it fails) enter the data on line 3.

Lets say the initial test showed 663 CFM leakage and your final test (after sealing the system) reads 255 CFM.

You enter 663 initial leakage - 255 final leakage = 408 CFM leakage reduction.

Next you take the leakage reduction of 408 and divide that by the initial leakage of 663 then multiply that by 100 and you get 61.5% reduction of leakage.

This system now passes because it is equal to or greater than 60 % reduction of leakage and you check the Pass box and continue to page 2.

Unless you took a pretest reading you cannot use Option 3 and you could spend hours finding and sealing leaks until you get it down to 15 %. Without your own duct tester you have no way to do a pretest without hiring someone else to do it for you. Good Luck.

CF-4R

This is the form you will need for the building inspector before they will sign off final inspection on your HVAC job. The HERS Rater will complete this form on the passing of the sealed duct testing or Refrigerant Charge Verification.

Only a certified HERS Rater can legally complete this document.

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