

**DUCT LEAKAGE DIAGNOSTIC TEST**

CEC-CF2R-MCH-20-H (Revised MM/YY)

CALIFORNIA ENERGY COMMISSION



CERTIFICATE OF INSTALLATION		CF2R-MCH-20-H
Duct Leakage Diagnostic Test		(Page 1 of 3)
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City:	Zip Code:

**A. System Information**

01	Space Conditioning System Identification or Name:	
02	Space Conditioning System Location or Area Served:	
03	Building Type from CF1R:	
04	Verified Low Leakage Ducts in Conditioned Space (VLLDCS) Credit from CF1R?	
05	Verified Low Leakage Air-handling Unit Credit from CF1R?	
06	Duct System Compliance Category:	

**MCH-20c - Low Leakage Air-Handling Unit (LLAHU)****B. Duct Leakage Diagnostic Test**

01	Condenser Nominal Cooling Capacity (ton)	
02	Heating Capacity (kBtu/h)	
03	Conditioned Floor Area Served by this HVAC System (ft <sup>2</sup> )	
04	Duct Leakage Test Conditions	
05	Duct Leakage Test Method?	
06	LeakageFactor (+)	
07	Air-Handling Unit Airflow (AHU Airflow) Determination Method	
08	Measured AHU Airflow (cfm)	
09	Calculated Target Allowable Duct Leakage Rate (cfm)	
10	Actual Duct Leakage Rate from Leakage Test Measurement (cfm)	
11	Air-Handling Unit Manufacturer Name	
12	Air-Handling Unit Model Number	
13	Compliance Statement:	

Registration Number:

Registration Date/Time:

HERS Provider:

CA Building Energy Efficiency Standards - 2013~~6~~ Residential Compliance

&lt;Date&gt;

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**C. Additional Requirements for Compliance**

01	The Low Leakage Air-handling Unit Model identified on this compliance document is included in the list of certified Low Leakage Air-Handling Units published on the Energy Commission Website at: <a href="http://www.energy.ca.gov/title24/equipment_cert/llahu/low_leakage_air_handling_units.pdf">http://www.energy.ca.gov/title24/equipment_cert/llahu/low_leakage_air_handling_units.pdf</a>
02	System was tested in its normal operation condition. No temporary taping allowed.
03	Outside air (OA) ducts for Central Fan Integrated (CFI) ventilation systems, shall not be sealed/taped off during duct leakage testing. CFI OA ducts that utilize controlled motorized dampers, that open only when OA ventilation is required to meet ASHRAE Standard 62.2, and close when OA ventilation is not required, may be configured to the closed position during duct leakage testing.
04	All supply and return register boots were sealed to the drywall.
05	Building cavities were not used as plenums or platform returns in lieu of ducts.
06	If cloth backed tape was used it was covered with Mastic and draw bands.
07	All connection points between the air handler and the supply and return plenums are completely sealed.
<b>The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.</b>	

Registration Number:

Registration Date/Time:

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&lt;Date&gt;

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<b>CERTIFICATE OF INSTALLATION</b>		<b>CF2R-MCH-20-H</b>
Duct Leakage Diagnostic Test		(Page 3 of 3)
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City:	Zip Code:

<b>DOCUMENTATION AUTHOR'S DECLARATION STATEMENT</b>		
1. I certify that this Certificate of Installation documentation is accurate and complete.		
Documentation Author Name:	Documentation Author Signature:	
Documentation Author Company Name:	Date Signed:	
Address:	CEA/CEPE/HERS certification identification (if applicable):	
City/State/Zip:	Phone:	
<b>RESPONSIBLE PERSON'S DECLARATION STATEMENT</b>		
I certify the following under penalty of perjury, under the laws of the State of California:		
<ol style="list-style-type: none"> <li>The information provided on this Certificate of Installation is true and correct.</li> <li>I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the scope of construction or installation, in the applicable classification, for the scope of work specified on this Certificate of Installation (responsible builder/installer), otherwise I am an authorized representative of the responsible builder/installer.</li> <li>The constructed or installed features, materials, components or manufactured devices (the installation) identified on this Certificate of Installation conforms to all applicable codes and regulations, and the installation conforms to the requirements given on the plans and specifications approved by the enforcement agency.</li> <li>I understand that a HERS rater will check the installation to verify compliance, and that if such checking identifies defects; I am required to take corrective action at my expense. I understand that Energy Commission and HERS Provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.</li> <li>I reviewed a copy of the Certificate of Compliance approved by the enforcement agency that identifies the specific requirements for the scope of construction or installation identified on this Certificate of Installation, and I have ensured that the requirements that apply to the construction or installation have been met.</li> <li>I will ensure that a registered copy of this Certificate of Installation shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a registered copy of this Certificate of Installation is required to be included with the documentation the builder provides to the building owner at occupancy.</li> </ol>		
Responsible Builder/Installer Name:	Responsible Builder/Installer Signature:	
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)	Position With Company (Title):	
Address:	CSLB License:	
City/State/Zip:	Phone:	Date Signed:
Third Party Quality Control Program (TPQCP) Status:	Name of TPQCP (if applicable):	

Registration Number:

Registration Date/Time:

HERS Provider:

CA Building Energy Efficiency Standards - 2013~~6~~ Residential Compliance

&lt;Date&gt;

**CF2R-MCH-20c-H User Instructions****A. System Information**

1. *HVAC System Identification or Name*: This field is filled out automatically. -It is referenced from the CF2R-MCH-01, which must be completed prior to this document.
2. *HVAC System Location or Area Served*: This field is filled out automatically. -It is referenced from the CF2R-MCH-01, which must be completed prior to this document.
3. *Building Type*: This field is filled out automatically.- It is referenced from the Certificate of Compliance (CF1R), which must be completed prior to this document.
4. *Verified Low Leakage Ducts in Conditioned Space (VLLDCS)*: This field is filled out automatically. It is referenced from the Certificate of Compliance (CF1R), which must be completed prior to this document.
5. *Verified Low Leakage Air-handling Unit (VLLAHU) Credit* This field is filled out automatically. It is referenced from the Certificate of Compliance (CF1R), which must be completed prior to this document.
6. *Duct System Compliance Category*: Choose from New, Replacement, Alteration, Replacement Using Smoke Test, Alteration Using Smoke Test.
  - a. New: Use this choice for newly constructed buildings, additions with all-new systems dedicated to the addition, or new systems installed in existing homes where the equipment is newly installed and the ducts are at least 75 percent or more newly installed duct material (up to 25 percent of the finished system may consist of reused parts from the dwelling unit's previously existing duct system, such as registers, grilles, boots, air handler, coil, plenums, duct material).
  - b. Replacement: For existing buildings where the equipment is not newly installed but the ducts are at least 75 percent or more newly installed duct material (up to 25 percent of the finished system may consist of reused parts from the dwelling unit's previously existing duct system, such as registers, grilles, boots, air handler, coil, plenums, duct material). Sometimes referred to as a "re-ducted" system.
  - c. Alteration: For existing buildings where any of the following are newly installed or replaced as part of the project and the system does not meet one of the other compliance categories:
    - i. 40 feet of space-conditioning system ducts are installed in unconditioned space or indirectly conditioned space.
    - ii. Air conditioning or heat pump condenser
    - iii. Heating or cooling coil
    - iv. Air handler (e.g., furnace, fan coil, package unit)
  - d. Replacement using Smoke Test: Similar to "Replacement" but the target leakage could not be met due to the equipment not being new. -Smoke is used to show that leaks are only coming from the previously existing equipment. All accessible leaks visible by smoke must be sealed.
  - e. Alteration using Smoke Test: Similar to "Alteration" but the target leakage could not be met due to the equipment not being new or due to inaccessible leaks. -Smoke is used to show that leaks are only coming from the previously existing equipment or are inaccessible. All accessible leaks visible by smoke must be sealed.

**B. Duct Leakage Diagnostic Test - Low Leakage Air-Handling Unit (LLAHU)**

1. *Condenser Nominal Cooling Capacity (ton)*: Same data given on MCH-01.
2. *Heating Capacity (kBtu/h)*: Same data given on MCH-01;
3. *Conditioned Floor Area Served by this HVAC System (ft<sup>2</sup>)*: User will input CFA for zone which should be consistent with the value from the CF1R. User will have the option to leave this field blank because the zone CFA is only required for the default airflow calculation.
4. *Duct Leakage Test Conditions*: User must select from the following options:
  - a. Test Final: Test conducted at final inspection (testing at rough is not an option with this test. See Section RA3.1.4.3.1 of the ~~2013~~2016 Reference Appendices).
5. *Duct Leakage Test Method?*: User will select from the following options: Total Leakage.
6. *Leakage Factor*: value will be automatically populated from in CF1R.
7. *Air-Handling Unit Airflow (AHU Airflow) Determination Method*: User will select from the following options:

- a. **Cooling System Method:** For systems with cooling, this selection must be made, and the nominal air handler airflow shall be 400 CFM per nominal ton of condensing unit cooling capacity as specified by the manufacturer or the heating only value, whichever is greater (See Section RA3.1.4.2.2 of the ~~2013~~2016 Reference Appendices).
  - b. **Heating System Method:** For heating only systems the nominal air handler airflow shall be 21.7 CFM per kBtu/hr of rated heating output capacity.
  - c. **Measured Airflow Method:** The system airflow can be used as the air handler airflow for the purpose of establishing duct leakage percentage (See Section RA3.1.4.2.3 of the ~~2013~~2016 Reference Appendices).
8. **Measured AHU Airflow (cfm):** If "Measured Airflow Method" is selected in row 7, user must input measured airflow.
  9. **Calculated Target Allowable Duct Leakage Rate (cfm):** This value will be automatically populated depending on values in B6, B7, and B8.
  10. **Actual Duct Leakage Rate from Leakage Test Measurement (cfm):** User will input this value from actual measurements from leakage test.
  11. **Air-Handling Unit Manufacturer Name:** This will be automatically populated from information entered in the MCH-01.
  12. **Air-Handling Unit Model Number:** This will be automatically populated from information entered in the MCH-01.
  13. **Compliance Statement:** If Actual Duct Leakage Rate from leakage test (B10) is less than or equal to Calculated Target Allowable Duct Leakage Rate (B9), "System passes leakage test" will automatically populate. If not, "System fails leakage test will automatically populate.