DUCT LEAKAGE DIAGNOSTIC TEST

CERTIFICATE OF INSTALLATION		NRCV-MCH-04-H
Duct Leakage Diagnostic Test		(Page 1 of 2)
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City:	Zip Code:

A. System Information		
01	HVAC System Identification or Name	
02	HVAC System Location or Area Served	
03	Verified Low Leakage Air-handling Unit Credit from NRCC-PRF-01-E	
04	Duct System Compliance Category	

B. Duct Leakage Diagnostic Test - MCH-04e – Altered Duct System using Smoke Test		
01	Condenser Nominal Cooling Capacity (ton)	
02	Heating Capacity (kBtu/h)	
03	Leakage Factor	
04	Air-Handling Unit Airflow (AHU Airflow) Determination Method	
05	Calculated Target Allowable Duct Leakage Rate (cfm25)	
06	Actual ~~d~~Duct ~~l~~Leakage ~~r~~Rate from ~~l~~Leakage ~~t~~Test ~~m~~Measurement (cfm25)	
07	Compliance Statement:	

C. Additional Requirements for Compliance	
01	If method of compliance is by use of smoke testing, then no visible smoke shall exit the accessible portions of the duct system. Note – Accessible is defined as having access thereto, but which first may require removal or opening of access panels, doors, or moving similar obstructions.- If access to the ducts requires an object to be demolished or deconstructed then sealing of those ducts is not required
02	If method of compliance is by use of smoke testing, smoke is only emanating from air-handling unit (AHU) cabinet and non-accessible portions of the duct system
03	System was tested in its normal operation condition.
04	All supply and return register boots sealed to the surrounding material.
05	Cloth backed rubber adhesive duct tape may not be used as the primary air sealing method for duct connections.
06	All connection points between the air handler and the supply and return plenums are completely sealed.
07	Verification Status:
08	Correction Notes:
The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met unless otherwise noted in the Verification Status and the Corrections Notes in this table.	

D. Determination of HERS Verification Compliance	
All applicable sections of this document shall indicate compliance with the specified verification protocol requirements in order for this Certificate of Verification as a whole to be determined to be in compliance.	
01	

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Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City:	Zip Code:

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT	
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/HERS Certification Identification (If applicable):
City/State/Zip:	Phone:

RESPONSIBLE PERSON'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 Installation is true and correct.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.

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):	

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NRCV-MCH-04e User Instructions

A. System Information

1. *HVAC System Identification or Name*: Provide an identification name or tag name that uniquely identifies the duct system. If there is a mechanical plan for the system, the tag name may be given on the plans.
2. *HVAC System Location or Area Served*: Provide a brief description of the area served by the duct system (e.g. upstairs; downstairs) to help distinguish one system from another in buildings with multiple systems.
3. *Verified Low Leakage Air-handling Unit (VLLAHU) Credit*: Indicate whether or not VLLAHU is required per PRF-01. For prescriptive alterations (change outs), choose "no".
4. *Duct System Compliance Category*: Choose from Completely New, Complete Replacement, or Alteration.
   a. New: For new buildings with a new HVAC system or replacement of at least 75 percent of the duct system and up to 25 percent consisting of reused parts from the existing duct system (i.e. registers, grilles, boots, air handler, coil, plenums, duct material).
   b. Alteration: For HVAC change outs or when the air handler, condensing unit of a split system, or cooling coil or any amount of duct is added to an existing system but does not constitute a new duct system.
   c. Alteration using Smoke Test: For alterations that are unable to pass the leakage test and a smoke test is used to confirm that all accessible leaks have been sealed.

B. Duct Leakage Diagnostic Test - MCH-04e

1. *Condenser Nominal Cooling Capacity (ton)*: Enter the condenser nominal cooling capacity, refer to the manufacturer documentation. Example: if manufacture lists air conditioner total nominal output of 60,000 Btu/h, the user would divide this number by 12,000 and enter 5. Tonnage may also be determined by the model number. 018 = 1.5 tons, 024 = 2 tons, 030 = 3 tons, etc.)
2. *Heating Capacity (kBtu/h)*: Enter the system heating capacity (output) in thousands Btu/h, refer to the manufacturer documentation. Example if manufacture lists furnace output of 90,000 Btu/h, the user would divide this number by 1,000 and enter 90.
3. *Leakage Factor*: Based on answers to questions A03 and A04 the leakage factor will be set at 0.06 (6% leakage).
4. *Air-Handling Unit Airflow (AHUAirflow) Determination Method*: User will select from the following options:
   a. Cooling System Method: For systems with cooling, this selection must be made. The nominal air handler airflow shall be 400 CFM per nominal ton of condensing unit cooling capacity (See Section NA2.1.4.1 of the 2013 Nonresidential Appendices).
   b. Heating System Method: For heating only systems this selection must be made. The nominal air handler airflow shall be 21.7 CFM per kBtu/hr of rated heating output capacity (See Section NA2.1.4.1 of the 2013 Nonresidential Appendices).
5. *Calculated Target Allowable Duct Leakage Rate (cfm)*: This value will be automatically calculated. For systems with cooling, the target allowable duct leakage rate will be the leakage factor multiplied by the nominal air handler airflow of 400 CFM per nominal ton of condensing unit cooling capacity. For heating only systems, the target allowable duct leakage rate will be the leakage factor multiplied by the nominal air handler airflow of 21.7 CFM per kBtu/hr of rated heating output capacity.
6. *Actual Duct Leakage Rate from Leakage Test Measurement (cfm)*: User will input this value from actual measurements from leakage test.
7. *Compliance Statement*: If Actual Duct Leakage Rate from leakage test is less than or equal to Calculated Target Allowable Duct Leakage Rate, "System passes leakage test" will automatically populate. If not, select from "System Fails Smoke Test" or "System Passes Smoke Test".

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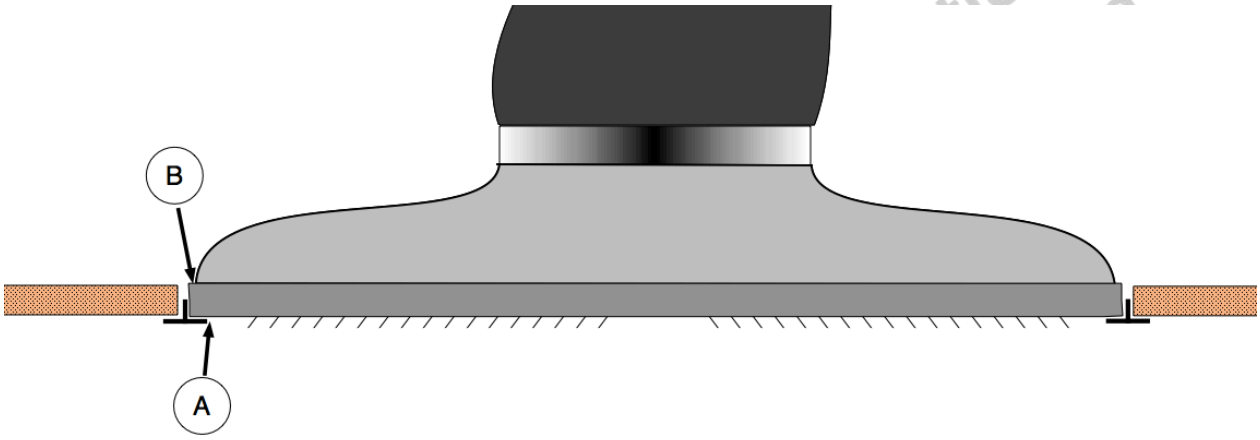
C. Additional Requirements for Compliance

1. This must be a true statement for the system to comply.
2. This must be a true statement for the system to comply.
3. This must be a true statement (or not applicable) for the system to comply. The duct leakage test must be performed on the system while in its normal operating condition. Temporary taping of the supply registers, return grilles, outside air damper, outside air intake and economizers is allowed for the duct leakage test on non-residential buildings. Parts of the duct system may not be isolated for the test.
4. This must be a true statement (or not applicable) for the system to comply. For new systems and systems passing by the smoke test, all registers must be sealed to the air barrier when mounted in the air barrier. Note: T-bar ceiling is not an acceptable air barrier in newly constructed buildings. In existing buildings a T-bar ceiling might define the conditioned boundary (insulation sits on T-bar ceiling), but it would not be effective to seal the register to the T-bar ceiling (location A in the diagram below). In this situation it is recommended but not required that the conditioned boundary be modified so that the insulation is aligned with an appropriate air barrier. When using the smoke test to pass an existing system with registers mounted in a T-bar ceiling, the register should sealed to the register boot (location B in the diagram below).



5. This must be a true statement (or not applicable) for the system to comply. Cloth back rubber adhesive duct tape (old style duct tape) does not meet the UL181 requirements for any new connections and may not be used as the primary method of sealing a duct connection. It may be used in conjunction with UL181 rated mastic, draw bands, mesh, etc. On existing systems, it is recommended that old duct tape be covered with mastic to prevent further degradation. It is recommended that it not be used at all on new connections.
6. This must be a true statement (or not applicable) for the system to comply. All connection points between the supply and return plenums shall be completely sealed using approved materials. For newly installed equipment and systems passing by the smoke test, this is mandatory. On existing systems where the air handler and/or plenums have not been disconnected as part of the project these points do not need to be resealed as long as the system passes the 15% leakage rate, however it is recommended that they be resealed with approved materials to prevent further degradation.
7. User to select one of the following:
   a. Pass – select this when all of the additional requirements listed above have been met.
   b. Fail – select this when one or more of the additional requirements listed above cannot be met. Use Row 6 to explain reason for non-compliance. Non-compliance must be corrected prior to passing.
   c. All n/a – select this when **all** of the additional requirements listed above do not apply. This is not a common situation. Selecting this option may subject the project to additional scrutiny.
8. When "Fail" is selected in Row 5, use this row to explain why. Be as detailed as possible.

D. Determination of HERS Verification Compliance

1. When all requirements of Section B and Section C comply, "System Passes Leakage Test" will display here, otherwise "System Does not Comply" will display here and corrections will need to be made.