BUILDING AIR LEAKAGE DIAGNOSTIC TEST WORKSHEET
BUILDING ENCLOSURES AND DWELLING UNIT ENCLOSURES

CALIFORNIA ENERGY COMMISSION

CEC-CF2R-MCH-24-H

SAMPLE FORM – NOT VALID FOR SUBMISSION TO BUILDING DEPARTMENTS

CERTIFICATE OF INSTALLATION

Note: This table completed by ECC Registry.

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

A. Enclosure Air Leakage – General Information

01	Test Procedure used	
02	Date of the Diagnostic Test for this Dwelling	
03	Is ECC verification of building enclosure air leakage to outside required by MCH-27?	
04	Default Enclosure Air Leakage	
05	Indoor temperature during test (°F)	
06	Outdoor temperature during test (°F)	
07	Blower Door Location	
08	Building Elevation Above Sea Level (ft)	
09	Dwelling Unit Volume	

B. Diagnostic Equipment Information

01	Number of Manometers Used to Measure Home Pressurization				
02	03	04	05	06
Manometer Make	Manometer Model	Manometer Serial Number	Manometer Calibration Date	Manometer Calibration Status

07	Number of Fans Used to Pressurize Home		
08	09	10	11
Fan Make	Fan Model	Fan Serial Number	Fan Configuration (rings)

C1. Enclosure Air Leakage Diagnostic Test for a Single-Point Test with Manual Meter

01	Time Average Period of Meter (seconds)	
02	Test Methodology	
03	Pre-Test Baseline Enclosure Pressure (Pa) (May be positive or negative)	
04	Unadjusted Enclosure Pressure Target (Pa)	
05	Unadjusted Enclosure Pressure Measured (Pa) (Pressurization is positive; Depressurization is negative)	
06	Induced Enclosure Pressure Difference (Pa) Goal = 50 ± 3 or -50 ± 3 (Pressurization is positive; Depressurization is negative)	
07	Induced Enclosure Pressure Check	
08	Measured Nominal Fan Flow at Above Fan Pressure (cfm) at the Induced Enclosure Pressure Difference (in C06 above)	
09	Calculated Nominal CFM50	

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C2. Enclosure Air Leakage Diagnostic Test for Single Point Air Tightness Test with Automatic Meter

01	Time Average Period of Meter (seconds)	
02	Test Methodology	
03	Pre-Test Baseline Enclosure Pressure (Pa) (May be positive or negative)	
04	Induced Enclosure Pressure from Manometer (Pa) Goal = 50 ± 3 or -50 ± 3 (Pressurization is positive; Depressurization is negative)	
05	Induced Enclosure Pressure Check	
06	Nominal CFM50	

C3. Enclosure Air Leakage Diagnostic Test for a Multi-Point Test

01	Time Average Period of Meter (seconds)	
02	Test Methodology	
03	Pre-Test Baseline Enclosure Pressure (Pa) (May be positive or negative)	
04	Unadjusted Enclosure Pressure Target (Pa)	
05	Unadjusted Enclosure Pressure Measured (Pa) (Pressurization is positive; Depressurization is negative)	
06	Induced Enclosure Pressure from Manometer (Pa) Goal = 60 ± 3 or -60 ± 3 (Pressurization is positive; Depressurization is negative)	
07	A minimum of five readings were taken spaced evenly between 10 Pa and 60 Pa (or highest attainable pressure)	
08	Post-Test Baseline Enclosure Pressure (Pa)	
09	Name and Version of ASTM E779 Compliant Software used for Multi-Point Test	
10	Corrected Nominal CFM50 (from software)	

D1. Altitude and Temperature Correction for a Single-Point Test Data

01	Altitude and Temperature Correction Factor	
02	Corrected CFM50	
03	ACH50	

D2. Altitude and Temperature Correction for Multi-Point Test Data

Performed by blower door software For Multi-Point Test

E1. Accuracy Adjustment for Single-Point Test Data

01	Adjusted CFM50 (measured air leakage rate)	

E2. Accuracy Adjustment for Multi-Point Test Data

01	Percent Uncertainty @ 95% Confidence Level (from software)	
02	Accuracy Level	
03	Accuracy Adjustment Factor	
04	Adjusted CFM50 (measured air leakage rate)	

F. Measured Enclosure Air Leakage Rate

01	

G. Additional Requirements for Worksheet Compliance

01	The procedure for preparing the enclosure for testing is detailed in RESNET 380-2019 Section 4.2.
02	The procedure for installation of the test apparatus, and preparations for measurement shall conform to RESNET 380-2019 Section 4.3
03	The procedure for the conduct of the enclosure air leakage test shall conform to the One-Point Airtightness Test specified in RESNET 380-2019 Section 4.4.1
04	The procedure for the conduct of the enclosure air leakage test shall conform to the Multi-Point Airtightness Test specified in RESNET 380-2019 Section 4.4.2

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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/AEA/ECC 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 either: a) a responsible person eligible under division 3 of the business and professions code in the applicable classification to accept responsibility for the system design, construction, or installation of features, materials, components, or manufactured devices for the scope of work identified on this certificate of installation, and attest to the declarations in this statement, or b) I am an authorized representative of the responsible person and attest to the declarations in this statement on the responsible person's behalf.
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 certificate of compliance, plans, and specifications approved by the enforcement agency.
4. I understand that an ECC-Rater will check the installation to verify compliance and if such checking determines the installation fails to comply, I am required to offer any necessary corrective action at no charge to the building owner.
5. I understand 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 shall be made available to the enforcement agency for all applicable inspections. I will take the necessary steps to fulfill this requirement.
6. 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. I will take the necessary steps to fulfill this requirement.

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):	

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

CF2R-MCH-24-H User Instructions

Section A. Enclosure Air Leakage – General Information

1. Select the appropriate test procedure. This selection will determine what sections are required in this report. Not that newer manometers have automatic functions for compensating baseline (automatic baseline) and compensating for house pressures other than the target (50 Pa). It is preferable to use these when available.
2. Enter the date that the enclosure air leakage test data was collected.
3. This field is automatically filled from the MCH-27 which determines if a $2ACH_{50}$ value is required.
4. This field displays the $2ACH_{50}$ default enclosure air leakage.
5. Enter the indoor temperature measured at the time that the enclosure air leakage test was performed.
6. Enter the outdoor temperature measured at the time that the enclosure air leakage test was performed.
7. Provide a brief description of the location where the blower door was installed for the test. Examples: “front entry door on west side of house”, “door between house and garage”, “large window in family room”.
8. Enter the building elevation above sea level. Use the value for the closest city found in Joint Appendix JA2.2.
9. This field is automatically calculated unless the CF1R is an NCB or ADD.

Section B. Diagnostic Equipment Information

1. Enter the number of manometers used to measure the enclosure pressurization. If more than one system is used, the fan flow numbers need to be manually added together, unless blower door software is used that will accommodate multiple fan systems running simultaneously.
2. Enter the make (brand) of the manometer used to collect the enclosure air leakage data. Examples: Retrotec, Energy Conservatory.
3. Enter the model of the manometer used to collect the enclosure air leakage data. Examples: DM-2 Mark II, DG700.
4. Enter the serial number of the manometer used to collect the enclosure air leakage data.
5. Enter the most recent date that the manometer was calibrated by following manufacturer’s calibration specifications.
6. This field is automatically filled. If the calibration date was more than 12 months prior to the test date entered in Row A02 above, an error will appear.
7. Enter the number of blower door fan systems required to run simultaneously to pressurize the enclosure for the enclosure air leakage test. If more than one system is used, the fan flow numbers need to be manually added together, unless blower door software is used that will accommodate multiple fan systems running simultaneously.
8. Enter the make (brand) of the fan used to collect the enclosure air leakage data. Examples: Retrotec, Energy Conservatory.
9. Enter the model of the fan used to collect the enclosure air leakage data. Examples: US1000, Q46, BD3, BD4.
10. Enter the serial number of the fan used to collect the enclosure air leakage data.
11. Enter the fan configuration shown on the meter. This is sometimes referred to as “range configuration”, “CONFIG” or “rings”. Examples: Open, A, B, C8.

Section C1. Enclosure Air Leakage Test (This section is required if A01 test procedure is single point manual)

1. Enter the Time Average Period used on the manometer during the test. Must be at least 10 seconds.

2. Select the type of test being performed: Pressurization (air blowing into house) or depressurization (air blowing out of house).
3. Enter the pre-test baseline enclosure pressure. This is the reading on the manual manometer with no fans turned on.
4. This field is automatically calculated. This is the enclosure pressure target value the enclosure needs to achieve during the test.
5. Enter the unadjusted enclosure pressure
6. This field is automatically calculated. This value is the difference of the unadjusted enclosure pressure measured and the pre-test baseline enclosure pressure. The goal is to achieve 50 ± 3 Pa.
7. This field is automatically calculated. This field determines if the pressure achieved is acceptable to proceed with the enclosure air leakage test.
8. Enter the measured nominal fan flow at above fan pressure from the manometer that corresponds to the induced enclosure pressure difference.
9. This field is automatically calculated. The induced enclosure pressure difference is converted to a nominal airflow at 50 Pa.

Section C2. Enclosure Air Leakage Test (This section is required if A01 test procedure is single point automatic)

1. Enter the Time Average Period used on the manometer during the test. Must be at least 10 seconds.
2. Select the type of test being performed: Pressurization (air blowing into house) or depressurization (air blowing out of house).
3. Enter the pre-test baseline enclosure pressure. This is the reading on the manual manometer with no fans turned on.
4. Enter the induced enclosure pressure from the automatic manometer. The goal is to achieve 50 ± 3 Pa.
5. This field is automatically calculated. This field determines if the pressure achieved is acceptable to proceed with the enclosure air leakage test.
6. Enter the measured nominal CFM50 from the automatic manometer.

Section C3. Enclosure Air Leakage Test (This section is required if A01 test procedure is multi-point)

1. Enter the Time Average Period used on the manometer during the test. Must be at least 10 seconds.
2. Select the type of test being performed: Pressurization (air blowing into house) or depressurization (air blowing out of house).
3. Enter the pre-test baseline enclosure pressure. This is the reading on the manual manometer with no fans turned on.
4. This field is automatically calculated. This is the enclosure pressure target value the enclosure needs to achieve during the test.
5. Enter the unadjusted enclosure pressure measured. This value is read from the manual manometer during the test.
6. This field is automatically calculated. This value is the difference of the unadjusted enclosure pressure measured and the pre-test baseline enclosure pressure. The goal is to achieve 50 ± 3 Pa.
7. When using the software for a multi-point test, a minimum of five measures must be taken over a range of pressures. This is where the user acknowledges that this was done.
8. Enter the Post Test Baseline Enclosure Pressure from the manometer
9. Multi-Point procedure requires use of an ASTM E779-19 compliant software, typically provided by the blower door manufacturer. Confirm with the software vendor that it is compliant. Enter the name and version here.
10. Enter the final Corrected CFM50 reading from the software.

Section D1. Altitude and Temperature Correction (This section is required if A01 test procedure is single point manual or automatic)

1. This field is automatically calculated. This factor is determined based on the altitude and temperature of the building location using equation 4 in Section 9 of ASTM E779-10.

2. This field is automatically calculated. The corrected CFM50 is the nominal CFM50 from Section C multiplied by the altitude and temperature correction factor.

Section D2. Altitude and Temperature Correction (If A01 test procedure is multi-point corrections are performed by the blower door software)

Section E1. Accuracy Adjustment (This section is required if A01 test procedure is single point manual or automatic)

1. This field is automatically calculated. This value is determined from equation 5a from ANSI/RESNET/ICC 380-2016.

Section E2. Accuracy Adjustment (This section is required if A01 test procedure is multi-point

1. The software will provide a "Percent Uncertainty" value based on the readings taken. Enter that value here
2. This field is automatically calculated. If the Percent Uncertainty level is 10% or less, the Accuracy Level is "Standard". If the Percent Uncertainty level is greater than 10%, the Accuracy Level is "Reduced".
3. This field is automatically calculated:
    a. If the Accuracy Level is "Standard", the Accuracy Adjustment Factor will be 1 (no adjustment)
    b. If the Accuracy Level is "Reduced", the Accuracy Adjustment Factor will be adjusted by the Percent Uncertainty.
4. This field is automatically calculated. The Adjusted CFM50 is the Corrected CFM50 multiplied by the Accuracy Adjustment Factor.

Section F. Measured Enclosure Air Leakage Rate

1. This field is automatically calculated. A check is performed to make sure that the meter has been properly calibrated.

Section G. Additional Requirements for Worksheet Compliance

1. This statement must be true (or not applicable) for the test to conform to the protocols.
2. This statement must be true (or not applicable) for the test to conform to the protocols.
3. This statement must be true (or not applicable) for the test to conform to the protocols.
4. This statement must be true (or not applicable) for the test to conform to the protocols.

Documentation Declaration Statements

1. The person who prepared the CF2R will sign and complete the fields for their name, company (if applicable), address, phone number, certification information (if applicable), date and signature.
2. The person who is assuming responsibility for the project being built to comply with Title 24, Part 6, will complete the fields for their name, company (if applicable), address, phone number, license number (if applicable), date and signature.