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STATE OF CALIFORNIA

# SPACE CONDITIONING SYSTEM AIRFLOW RATE

CEC-CF3R-MCH-23-H (Revised 09/18) CALIFORNIA ENERGY COMMISSION

| CERTIFICATE OF VERIFICATION | | CF3R-MCH-23-H |
|---|---|---|
| Space Conditioning System Airflow Rate | | (Page 1 of 3) |
| Project Name: | Enforcement Agency: | Permit Number: |
| Dwelling Address: | City: | Zip Code: |

| **A. Ducted Cooling System Information** | | |
|---|---|---|
| 01 | System Identification or Name | |
| 02 | System Location or Area Served | |
| 03 | System Installation Type | |
| 04 | Nominal Cooling Capacity (tons) of Condenser | |
| 05 | Condenser Speed Type | |
| 06 | Cooling System Zonal Control Type | |
| 07 | Central Fan Integrated (CFI) Ventilation System Status | |
| 08 | System Bypass Duct Status | |
| 09 | Date of System Airflow Rate Measurement | |
| 10 | Airflow Rate Protocol Utilized | |

| **B. Hole for the Placement of a Static Pressure Probe (HSPP), and Permanently Installed Static Pressure Probe (PSPP) in the Supply Plenum**<br>Procedures for installing HSPP or PSPP are specified in RA3.3.1.1. | | |
|---|---|---|
| 01 | Method Used to Demonstrate Compliance with the HSPP/PSPP Requirement | |

| **C. Airflow Rate Measurement Apparatus and Procedure Information**<br>Instrument Specifications are given in RA3.3.1.1, and system airflow rate measurement apparatus information is given in RA3.3.2. | | |
|---|---|---|
| 01 | Airflow Rate Measurement Type Used for this Airflow Rate Verification | |
| 02 | Manufacturer of Airflow Measurement Apparatus | |
| 03 | Model Number of Airflow Measurement Apparatus | |
| 04 | Certification Status of the Airflow Measurement Apparatus Accuracy | |

**MCH-23b Forced Air System Airflow Rate Measurement – Newly Installed Zoned Single-Speed Compressor Systems**

| **D. Forced Air System Airflow Rate Measurement – All Zones Calling**<br>The procedures for System Airflow Rate Verification are specified in Reference Residential Appendix RA3.3. | | |
|---|---|---|
| 01 | Required All Zones Calling Minimum System Airflow Rate (cfm/ton) | |
| 02 | Required All Zones Calling Minimum System Airflow Target (cfm) | |
| 03 | Actual System Airflow Rate Measurement (cfm) | |
| 04 | Compliance Statement: | |

**E. Forced Air System Airflow Rate Measurement – All Other Zonal Control Modes**

The procedures for System Airflow Rate Verification are specified in Reference Residential Appendix RA3.3.

For compliance with verification in all zonal control modes, it is sufficient to verify airflow rate for operation of each individual zone when the individual zone is the sole zone calling for conditioning. It is not necessary to verify airflow rate for combinations of 2 or more zones that are less than all zones calling (e.g., 2 out of three zones calling).

| | | |
|---|---|---|
| 01 | Number of Independently Controlled Zones<br>(i.e., number of thermostats or temperature sensors that independently control one or more dampers.) | |
| 02 | Required Minimum Cooling System Airflow Rate (cfm/ton) | |
| 03 | Required Minimum Airflow in all Zonal Control Modes (cfm) | |

| 04 | 05 | 06 | 07 |
|---|---|---|---|
| Zone Name | Zone Description | Measured Airflow with All Other Zones Off (CFM) | Zone Compliance Status |
| | | | |
| | | | |

| 08 | Compliance Statement: | |
|---|---|---|

| CERTIFICATE OF VERIFICATION | | CF3R-MCH-23-H |
|---|---|---|
| Space Conditioning System Airflow Rate | | (Page 2 of 3) |
| Project Name: | Enforcement Agency: | Permit Number: |
| Dwelling Address: | City: | Zip Code: |

| **F. Additional Requirements** | | |
|---|---|---|
| 01 | Air filters that meet the applicable requirements of Standards Section 150.0(m)12 or 150.0(m)13 were properly installed in the system during system air flow rate measurement identified on this Certificate of Verification. | |
| 02 | The airflow rate measurement apparatus used to perform the airflow rate measurement identified on this Certificate of Verification was calibrated in accordance with the apparatus manufacturer's specifications and conforms to the instrumentation specifications given in RA3.3.1. | |
| 03 | A visual inspection shall confirm that bypass ducts that deliver conditioned supply air directly to the space conditioning system return duct airflow are not used on newly constructed zonally controlled systems unless the Performance Certificate of Compliance indicates an allowance for use of a bypass duct. When a bypass duct is accounted for on the Performance Certificate of Compliance, the airflow rate shall conform to the specifications listed on the Certificate of Compliance. | |
| 04 | All registers were fully open during the diagnostic test. | |
| 05 | System fan was set at maximum speed during the diagnostic test. | |
| 06 | If fresh air duct is part of the HVAC system it was not closed during the diagnostic test. | |
| 07 | Airflow rate and fan watt draw shall be simultaneous measurements when used to calculate the Fan Efficacy tested value. | |
| 08 | Multi-speed compressor space cooling systems or variable speed compressor systems shall verify airflow (cfm/ton) and fan efficacy (Watt/cfm) with system operating in cooling mode at the maximum compressor speed and the maximum air handler fan speed. | |
| 09 | Verification Status: | ☐ Pass - all applicable requirements are met; or<br>☐ Fail - one or more applicable requirements are not met. Enter reason for failure in corrections notes field below; or<br>☐ All N/A - This entire table is not applicable |
| 10 | 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.** | | |

| **G. Determination of HERS Verification Compliance**<br>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 | |

# SPACE CONDITIONING SYSTEM AIRFLOW RATE



| CERTIFICATE OF VERIFICATION | CF3R-MCH-23-H |
|---|---|
| Space Conditioning System Airflow Rate | (Page 3 of 3) |

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

| **DOCUMENTATION AUTHOR'S DECLARATION STATEMENT** | |
|---|---|
| 1. I certify that this Certificate of Verification documentation is accurate and complete. | |
| Documentation Author Name: | Documentation Author Signature: |
| Company: | Date Signed: |
| Address: | CEA/HERS Certification Information (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 Verification is true and correct.
2. I am the certified HERS Rater who performed the verification identified and reported on this Certificate of Verification (responsible rater).
3. The installed features, materials, components, manufactured devices, or system performance diagnostic results that require HERS verification identified on this Certificate of Verification comply with the applicable requirements in Reference Appendices RA2, RA3, and the requirements specified on the Certificate of Compliance for the building approved by the enforcement agency.
4. The information reported on applicable sections of the Certificate(s) of Installation (CF2R) signed and submitted by the person(s) responsible for the construction or installation conforms to the requirements specified on the Certificate(s) of Compliance (CF1R) approved by the enforcement agency.
5. I will ensure that a registered copy of this Certificate of Verification 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 Verification is required to be included with the documentation the builder provides to the building owner at occupancy.

| **BUILDER OR INSTALLER INFORMATION AS SHOWN ON THE CERTIFICATE OF INSTALLATION** | |
|---|---|
| Company Name (Installing Subcontractor, General Contractor, or Builder/Owner): | |
| Responsible Builder or Installer Name: | CSLB License: |
| **HERS PROVIDER DATA REGISTRY INFORMATION** | |
| Sample Group Number (if applicable): | Dwelling Test Status in Sample Group (if applicable): |
| **HERS RATER INFORMATION** | |
| HERS Rater Company Name: | |
| Responsible Rater Name: | Responsible Rater Signature: |
| Responsible Rater Certification Number w/ this HERS Provider: | Date Signed: |

**CF3R-MCH-23b-H User Instructions**

**Section A. Ducted Cooling System Information**

1 *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 *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 *System Installation Type:* Select the appropriate System Installation Type from the following choices:
   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 and ducts are all newly installed (aka, "Cut-in").
   b. Replacement: Use this choice if the system is a complete replacement space-conditioning system installed as part of an alteration, and includes all the system heating or cooling equipment plus a replacement duct system (150.2(b)1Diia) where the ducts are at least 75% or more newly installed duct material (up to 25% 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); plus a replacement air handler.
   c. Alteration: Use this choice 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 above:
      i. 40 feet or more 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)

4 *Nominal Cooling Capacity (tons) of Condenser:* This field is filled out automatically. It is referenced from the CF2R-MCH-01, which must be completed prior to this document.

5 *Condenser Speed Type:* This field is filled out automatically. It is referenced from the CF2R-MCH-01, which must be completed prior to this document.

6 *Cooling System Zonal Control Type:* This field is filled out automatically. It is referenced from the CF2R-MCH-01, which must be completed prior to this document.

7 *Central Fan Integrated (CFI) Ventilation System Status:* If the system has Central Fan Integrated System, then select "CFI System", otherwise select "Not a CFI system".

8 *System Bypass Duct Status:* This field is filled out automatically. It is referenced from the CF2R-MCH-01, which must be completed prior to this document.

9 *Date of System Airflow Rate Measurement:* Enter the date that the airflow test was performed.

10 *Airflow Rate Protocol Utilized:* If the system installation type is "New" or "Replacement" then only the RA3.3 airflow methods may be used. If the system installation type is "Alteration", the RA3.3 airflow methods may be used, but the Alternative to Compliance with Minimum System Airflow Requirements ("Best I Can Do" Airflow) is an option for existing systems that may require substantial modification to improve the airflow.

**Section B. Hole for the Placement of a Static Pressure Probe (HSPP), and Permanently Installed Static Pressure Probe (PSPP) in the Supply Plenum**

1 A hole for a static pressure probe (HSPP) or a permanent static pressure probe (PSPP) is required when system airflow verification is required, whether the airflow test method used requires one or not. Select the appropriate choice from the following options using a dropdown box, the Static Pressure Measurement Method:
   a. If an Hole Static Pressure Probe is installed then select "HSPP Installed"
   b. If a Permanent Static Pressure Probe is installed then select "PSPP Installed"
   c. If the system is configured such that an HSPP nor PSPP can be installed, an alternate location that provides access for making supply plenum pressure measurements may be used. Select "An alternative location has been provided and clearly labeled."
   d. If the system is such that an HSPP or PSPP is not applicable, select "HSPP/PSPP are not applicable to this system".

**Section C. Airflow Rate Measurement Apparatus and Procedure Information**

1. *Airflow Rate Measurement Type Used for this Airflow Rate Verification:* Select the appropriate airflow test procedure from the following options for the method used to determine actual fan air flow*:*
    a. Diagnostic Fan Flow Using Fan Flow Meter (aka Plenum Pressure Matching) according to the procedures in RA3.3.3.1.1
    b. Diagnostic Fan Flow Using Flow Grid Measurement according to the procedures in RA3.3.3.1.2
    c. Diagnostic Fan Flow Using Powered Flow Capture Hood according to the procedures in RA3.3.3.1.3
    d. Diagnostic Fan Flow Using Traditional Flow Capture Hood according to the procedures in RA3.3.3.1.4
2. *Manufacturer of Airflow Measurement Apparatus:* Enter the name of the manufacturer of the airflow measurement tool used to measure the airflow for this test.
3. *Model number of Airflow Measurement Apparatus:* Enter the model number of the airflow measurement tool used to measure the airflow for this test.
4. *Certification Status of the Airflow Measurement Apparatus Accuracy:* The measurement apparatus used to perform airflow verification measurements must appear on the CEC list of approved devices found at http://www.energy.ca.gov/title24/equipment_cert/ama_fas/index.html, if this is true, select "Certified", otherwise select "Not Certified". The latter choice will not allow the system to pass until a certified device is used.

**Section D. Forced Air System Airflow Rate Measurement – All Zones Calling**

1. *Required All Zones Calling Minimum System Airflow Rate (cfm/ton):* This field is filled automatically. The target is based on whether the system is new or altered and whether a value was specified on the CF2R-MCH-01.
2. *Required All Zones Calling Minimum System Airflow target (cfm):* This field is calculated automatically. It is the product of the minimum airflow rate per ton and the tonnage of the system condenser.
3. *Actual System Airflow Rate Measurement (cfm):* Enter the actual tested value of the airflow measured using the apparatus specified above.
4. *Compliance Statement:* This field is filled automatically. Compliance requires that the measures airflow meets the minimum airflow target.

**Section E. Forced Air System Airflow Rate Measurement – All Other Zonal Control Modes**

1. *Number of Independently Controlled Zones:* Enter the number of zones in this system that are independently controlled, i.e., that can call for cooling while other zones can be fully or mostly shut off from system airflow. This usually corresponds to the number of thermostats or zone sensors.
2. *Required Minimum Airflow in all Zonal Control Modes (cfm):* This field is filled out automatically. If a value other than 350 cfm was claimed in the performance calculations, it will be referenced from the CF1R, otherwise the target is 350 cfm.
3. *Zone Name:* Enter a unique name for each zone on this system. Examples: Zone 1, Z1, Zone A, etc.
4. *Zone Description:* Enter a brief description of each zone that is detailed enough to allow someone to distinguish it from the others in the field. Examples: upstairs, first floor, east wing, bedrooms only, (list rooms served), etc.
5. *Measured Airflow with All Other Zones Off:* This test must be performed with only one independently controlled zone calling for cooling (Note: if fan watt verification is required, it must be performed simultaneously to the corresponding airflow from this test). All other zones must not be calling during this test. The zone dampers for the other zones must be in their normal closed position. Enter the airflow value measured for the zone that is calling. This test must be performed for each and every independently controlled zone.
6. *Zone Compliance Status:* This field is filled out automatically. The result is based on whether or not the actual airflow meets the required airflow for this zone.
7. *Compliance Statement:* This field is filled out automatically. The result is based on whether or not the actual airflow meets the required airflow for all zones

**Section F. Additional Requirements**

1 This field must be a true statement (or not applicable) for the system to comply.
2 This field must be a true statement (or not applicable) for the system to comply.
3 This field must be a true statement (or not applicable) for the system to comply.
4 This field must be a true statement (or not applicable) for the system to comply.
5 This field must be a true statement (or not applicable) for the system to comply.
6 This field must be a true statement (or not applicable) for the system to comply.
7 This field must be a true statement (or not applicable) for the system to comply.
8 This field must be a true statement (or not applicable) for the system to comply.
9 *Verification Status:* If this Section does not apply, then select "All N/A". If the system meets the airflow criteria then select "Pass", otherwise select "Fail". The latter selection means that the system does not meet the requirements and the CF1R will have to be revised, or the system will need to be modified to meet the requirements.
10 *Correction Notes:* If one or more applicable requirements are not met "Fail" will appear in the row above. When this occurs the rater is required to enter detailed notes here that describe what failed and why.