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| **Docket Number:** | 15-BSTD-02 |
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| **Document Title:** | 2016-CF3R-MCH-22b-FanEfficacy-EveryZonalControlModepdf |
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| **Docketed Date:** | 4/22/2020 |

STATE OF CALIFORNIA

# SPACE CONDITIONING SYSTEM FAN EFFICACY

CEC-CF3R-MCH-22-H (Revised 01/16) CALIFORNIA ENERGY COMMISSION

| CERTIFICATE OF VERIFICATION | | CF3R-MCH-22-H |
|---|---|---|
| Space Conditioning System Fan Efficacy | | (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. Fan Watt Measurement Apparatus and Procedure Information**<br>*Instrument Specifications are given in RA3.3.1, and system fan watt measurement apparatus information is given in RA3.3.2.2.* | | |
|---|---|---|
| 01 | Fan Watt Verification Device Used | |

**MCH-22b Forced Air System Fan Efficacy Measurement – Newly Installed Zoned Single-Speed Compressor Systems**

| **C. Forced Air System Fan Efficacy Measurement – All Zones Calling**<br>*The procedures for System Fan Watt Verification are specified in Reference Residential Appendix RA3.3.3.2* | | |
|---|---|---|
| 01 | Actual Tested Watts | |
| 02 | Actual Tested Airflow from MCH-23 (cfm) | |
| 03 | Required Fan Efficacy (Watts/cfm) | |
| 04 | Actual Fan Efficacy (Watts/cfm) | |
| 05 | Compliance Statement: | |

**D. Forced Air System Fan Efficacy Measurement – All Zonal Control Modes**

*The procedures for System Fan Efficacy Verification are specified in Reference Residential Appendix RA3.3.*

Note: For compliance with verification in all zonal control modes, it is sufficient to verify fan efficacy for operation of each individual zone when the individual zone is the sole zone calling for conditioning. It is not necessary to verify fan efficacy 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 (i.e., number of thermostats or temperature sensors that independently control one or more dampers.) | |
| 02 | Required Fan Efficacy in all Zonal Control Modes(Watt/cfm) | |

| 03 | 04 | 05 | 06 | 07 | 08 |
|---|---|---|---|---|---|
| Zone Name | Zone Description | Measured Watt Draw with All Other Zones Off | Measured Airflow with All Other Zones Off (cfm) | Calculated Fan Efficacy (W/cfm) | Zone Compliance Status |
| | | | | | |
| | | | | | |

| 09 | Compliance Statement: | |
|---|---|---|

| CERTIFICATE OF VERIFICATION | | CF3R-MCH-22-H |
|---|---|---|
| Space Conditioning System Fan Efficacy | | (Page 2 of 3) |
| Project Name: | Enforcement Agency: | Permit Number: |
| Dwelling Address: | City: | Zip Code: |

| **E. Additional Requirements** | | |
|---|---|---|
| 01 | All registers were fully open during the diagnostic test. | |
| 02 | System fan was set at maximum speed during the diagnostic test. | |
| 03 | If fresh air duct is part of the HVAC system it was not closed during the diagnostic test. | |
| 04 | Airflow rate and fan watt draw shall be simultaneous measurements when used to calculate the fan efficacy tested value. | |
| 05 | 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. | |
| 06 | Zoned cooling air distribution systems with single speed compressors shall meet both the airflow (cfm/ton) and fan efficacy (Watt/cfm) criteria in every zonal control mode. | |
| 07 | Portable Watt meters used for measurements of air handler Watt draws shall be true power measurement systems (i.e., sensor plus data acquisition system) having an accuracy of ± 2% of reading or ± 10 Watts whichever is greater. | |
| 08 | 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 |
| 09 | 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.** | | |

| **F. 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 | |

| CERTIFICATE OF VERIFICATION | | CF3R-MCH-22-H |
|---|---|---|
| Space Conditioning System Fan Efficacy | | (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-22b-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-23, 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-23, which must be completed prior to this document.
3 *System Installation Type:* This field is filled out automatically. It is referenced from the CF2R-MCH-23, which must be completed prior to this document.
4 *Nominal Cooling Capacity (tons) of Condenser:* This field is filled out automatically. It is referenced from the CF2R-MCH-23, 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-23, 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-23, which must be completed prior to this document.
7 *Central Fan Integrated (CFI) Ventilation System Status:* This field is filled out automatically. It is referenced from the CF2R-MCH-23, which must be completed prior to this document.
8 *System Bypass Duct Status:* This field is filled out automatically. It is referenced from the CF2R-MCH-23, which must be completed prior to this document.
9 *Date of System Airflow Rate Measurement:* This field is filled out automatically. It is referenced from the CF2R-MCH-23, which must be completed prior to this document.
10 *Airflow Rate Protocol utilized:* This field is filled out automatically. It is referenced from the CF2R-MCH-23, which must be completed prior to this document.

**Section B. Fan Watt Measurement Apparatus and Procedure Information**

1 *Fan Watt Verification Device Used:* If the device used to measure fan watts was a portable watt meter then select "Portable Watt Meter". This can include plug-in devices such as a "Watts-Up" meter, or a "Kill-a-Watt" meter, or a clamp-on type meter that reads true power watts directly (must account for power factor – multiplying amps x volts is not adequate).

**Section C. Forced Air System Fan Efficacy Measurement – All Zones Calling**

1 *Actual Tested Watts:* Enter the number of Watts tested using the device specified in Section B and tested with all zones calling for cooling simultaneously.
2 *Actual Tested Airflow from MCH-23 (cfm):* This field is filled out automatically. It is referenced from the CF2R-MCH-23, which must be completed prior to this document.
3 *Required Fan Efficacy (Watts/cfm):* This field is filled out automatically. If a value other than 0.58 Watts/cfm was claimed in the performance calculations, it will be referenced from the CF1R, otherwise the target is 0.58 Watts/cfm.
4 *Actual Fan Efficacy (Watts/cfm):* This field is filled out automatically. It is calculated by dividing the actual tested Watts by the actual tested airflow.
5 *Compliance Statement:* This field is filled out automatically. The result is based on whether or not the actual fan efficacy meets the required fan efficacy.