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| **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 |  |
| 11 | Central Fan Ventilation Cooling System Status |  |

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

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

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| **C. Forced Air System Fan Efficacy Measurement – All Zones Calling**  *The procedures for System Fan Watt Verification are specified in Reference Residential Appendix RA3.3.* | | |
| 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: |  | |

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| **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  (Watts/cfm) | Zone Compliance Status |
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| 09 | Compliance Statement: | | |  | | |

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| **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. | |
|  | Verification Status: | * Pass - all applicable requirements are met; or * Fail - one or more applicable requirements are not met. Enter reason for failure in corrections notes field below; or * All N/A - This entire table is not applicable |
|  | 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.** | | |

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| **F. 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. | |
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| **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: |

**CF2R-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.
11. *Central Fan Ventilation Cooling System Status:* 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 and referenced from MCH-01. Values below are used unless higher efficacy values are listed on the CF1R for performance compliance.
   1. 0.62 watts/cfm for small duct high velocity HP or AC systems
   2. 0.45 watts/cfm for central gas furnace or packaged gas furnace systems
   3. 0.58 watts/cfm for all other systems
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.

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

1. *Number of Independently Controlled Zones: Enter the number of independently controlled zones.*
2. *Required Fan Efficacy (Watts/cfm):* This field is filled out automatically and referenced from MCH-01. Values below are used unless higher efficacy values are scheduled on the CF1R for performance compliance.
   1. 0.62 watts/cfm for small duct high velocity HP or AC systems
   2. 0.45 watts/cfm for central gas furnace or packaged gas furnace systems
   3. 0.58 watts/cfm for all other systems
3. *Zone Name*: Enter a unique name for each independent zone.
4. *Zone Description*: Enter a description of the zone (e.g. upstairs, downstairs).
5. *Measured Watt Draw with All Other Zones Off*: Enter the number of watts tested using the device specified in Section B and tested with all other zones off.
6. *Measured Airflow with All Other Zones Off*: This field is filled out automatically. It is referenced from the CF2R-MCH-23, which must be completed prior to this document.
7. *Calculated Fan Efficacy*: This field is filled out automatically. It is calculated by dividing the measured watt draw by the measured airflow.
8. *Zone Compliance Status*: This field is filled out automatically. The result is based on whether or not the actual fan efficacy meets the required fan efficacy for this zone.
9. *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 for all zones tested.

**Section E. 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. *Verification Status:* If this Section does not apply, then select “All N/A”. If the system meets the criteria for *Ducts Located in Conditioned Space* credit 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.
9. *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.

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| **A. Ducted Cooling System Information** | | |
| 01 | System Identification or Name | <<auto filled text: referenced from CF2R-MCH23>> |
| 02 | System Location or Area Served | <<auto filled text: referenced from CF2R-MCH23>> |
| 03 | System Installation Type | << auto filled text: referenced from CF2R-MCH23>> |
| 04 | Nominal Cooling Capacity (tons) of Condenser | << auto filled text: referenced from CF2R-MCH23>> |
| 05 | Condenser Speed Type | << auto filled text: referenced from CF2R-MCH23>> |
| 06 | Cooling System Zonal Control Type | << auto filled text: referenced from CF2R-MCH-23>> |
| 07 | Central Fan Integrated (CFI) Ventilation System Status | << auto filled text: referenced from CF2R-MCH-23>> |
| 08 | System Bypass Duct Status | << auto filled text: referenced from CF2R-MCH23>> |
| 09 | Date of System Airflow Rate Measurement | << auto filled text: referenced from CF2R-MCH23>> |
| 10 | Airflow Rate Protocol Utilized | << auto filled text: referenced from CF2R-MCH23>> |
| 11 | Central Fan Ventilation Cooling System Status | << auto filled text: referenced from CF2R-MCH23>> |

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| **B. Fan Watt Measurement Apparatus and Procedure Information**  *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 | << user select one from list:   * Portable watt meter * Analog Utility Revenue Meter (spinning wheel type) * Digital Utility Revenue Meter>> |
| 02 | Determination of MCH22 type (this field not visible to user) | <<calculated field:  If MCH23 variant = MCH23a or d and A11 = ‘Central Fan Ventilation Cooling System’, then display version MCH-22c;  Else display MCH-22a  If MCH23 variant = MCH23b and A11 = ‘Central Fan Ventilation Cooling System’, then display version MCH-22d;  Else display MCH-22b>> |

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

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| **C. Forced Air System Fan Efficacy Measurement – All Zones Calling**  *The procedures for System Fan Watt Verification are specified in Reference Residential Appendix RA3.3.* | | |
| 01 | Actual Tested Watts | <<user input, numeric value xx.xx>> | |
| 02 | Actual Tested Airflow from MCH-23 (cfm) | <<referenced from MCH-23 (make sure to reference tested airflow value and not target airflow value)>> | |
| 03 | Required Fan Efficacy (watts/cfm) | <<calculated field:  if parent is MCH-01a, then reference value from MCH-01a Section C Row *C09 – MaximumCoolingWperCFM*;  else if parent is MCH-01d, then reference value from MCH-01d Section C *Row C09 – MaximumCoolingWperCFM*;  else if parent is MCH-01b then calculate:  if MCH-01b Section C *Row C06 – ResidentialCoolingSystemType* = Small duct high velocity HP or Small duct high velocity AC then use value 0.62,  else if MCH-01b Section C *Row C02 – ResidentialHeatingSystemType = Central Gas Furnace or Package Gas Furnace then use value 0.45, else use value 0.58*;  if parent is MCH-01c then calculate:  if MCH-01c Section B *Row B05 – ResidentialCoolingSystemType* = Small duct high velocity HP or Small duct high velocity AC then use value 0.62,  else if MCH-01c Section B *Row B02 – ResidentialHeatingSystemType = Central Gas Furnace or Package Gas Furnace then use value 0.45, else use value 0.58*  >> | |
| 04 | Actual Fan Efficacy (watts/cfm) | <<calculated field, row C01/row C02>> | |
| 05 | Compliance Statement: | <<If C03≥C04, then display text: system fan efficacy complies;  else display text: system does not comply with fan efficacy requirement>> | |

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| **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.) | | | <<user input, integer>> | | |
| 02 | Required Fan Efficacy in all Zonal Control Modes(watts/cfm) | | | <<calculated field:  if parent is MCH-01a, then reference value from MCH-01a Section C Row *C09 – MaximumCoolingWperCFM*;  else if parent is MCH-01d, then reference value from MCH-01d Section C *Row C09 – MaximumCoolingWperCFM*;  else if parent is MCH-01b then calculate:  if MCH-01b Section C *Row C06 – ResidentialCoolingSystemType* = Small duct high velocity HP or Small duct high velocity AC then use value 0.62,  else if MCH-01b Section C *Row C02 – ResidentialHeatingSystemType = Central Gas Furnace or Package Gas Furnace then use value 0.45, else use value 0.58*;  if parent is MCH-01c then calculate:  if MCH-01c Section B *Row B05 – ResidentialCoolingSystemType* = Small duct high velocity HP or Small duct high velocity AC then use value 0.62,  else if MCH-01c Section B *Row B02 – ResidentialHeatingSystemType = Central Gas Furnace or Package Gas Furnace then use value 0.45, else use value 0.58*  >> | | |
| <<create 1 row of data for each of the number of independently controlled zones identified in D01>> | | | | | | |
| 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  (Watts/cfm) | Zone Compliance Status |
| <<user entry, text field 20 characters>> | | <<user entry, text field 50 characters>> | <<user input numeric value: xxxx>> | <<from MCH23>> | <<calculated value, D05divided byD06>> | <<if D07 <= D02, then display text: Pass, else display text: Fail>> |
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| 09 | Compliance Statement: | | | <<If all values in D08 = pass, then display text: system fan efficacy complies, else display text: system does not comply with fan efficacy requirement>> | | |

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| **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: | <<user pick from list:  \*\*\* Pass - all applicable requirements are met; or  \*\*\* Fail - one or more applicable requirements are not met. Enter reason for failure in corrections notes field below; or  \*\*\* All n/a - This entire table is not applicable |
| 09 | Correction Notes: | <<if Verification Status= Fail, then text entry in this Corrections Notes field is required;  user input text>> |
| **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** | | |

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| **F. 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 | << If C05 result is “system fan efficacy complies” and D09 result is “system fan efficacy complies” and E08 result is Pass or All n/a then display: Complies: All specified verification protocol requirements on this document are met; else display: Does not comply: One or more specified verification protocol requirements on this document are not met>> |