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| **A. Ducted Cooling System Information** | | |
| 01 | System Identification or Name |  |
| 02 | System Location or Area Served |  |
| 03 | Indoor Unit Name or Description of Area Served |  |
| 04 | System Installation Type |  |
| 05 | Nominal Cooling Capacity (tons) of Condenser |  |
| 06 | Condenser Speed Type |  |
| 07 | Cooling System Zonal Control Type |  |
| 08 | Central Fan Integrated (CFI) Ventilation System Status |  |
| 09 | System Bypass Duct Status |  |
| 10 | Date of System Airflow Rate Measurement |  |
| 11 | Airflow Rate Protocol Utilized |  |
| 12 | 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-22d Forced Air System Fan Efficacy Measurement – Newly Installed Zoned Single-Speed Compressor Systems with Central Fan Ventilation Cooling** |

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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. Central Fan Ventilation Cooling System Fan Efficacy Measurement**  The procedures for Central Fan Ventilation Cooling System Fan Watt Verification are specified in Reference Residential Appendix RA3.3.4. | | |
| 01 | Actual Tested Watts |  | |
| 02 | Actual Tested Ventilation Airflow from MCH-23 (cfm) |  | |
| 03 | Required Fan Efficacy (watts/cfm) |  | |
| 04 | Actual Fan Efficacy (watts/cfm) |  | |
| 05 | Compliance Statement: |  | |

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| **F. 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. |
| **The responsible person’s signature on this compliance document affirms that all applicable requirements in this table have been met.** | |

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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/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: The information provided on this Certificate of Installation is true and correct.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.  1. 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. 2. I understand that a HERS 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. 3. 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): | | |

**CF2R-MCH-22d-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. *Indoor Unit Name:* This field is filled out automatically. It is referenced from the CF2R-MCH-23, which must be completed prior to this document.
4. *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.
5. *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.
6. *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.
7. *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.
8. *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.
9. *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.
10. *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.
11. *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.
12. *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 listed on the CF1R for performance compliance.
   1. 0.62 watt/cfm for small duct high velocity HP or AC systems
   2. 0.45 watt/cfm for central gas furnace or packaged gas furnace systems
   3. 0.58 watt/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. Central Fan Ventilation Cooling System Fan Efficacy Measurement**

1. *Actual Tested Watts:* Enter the number of watts tested using the device specified in Section B and tested at ventilation cooling airflow rate.
2. *Actual Tested Ventilation Airflow from MCH-23:* 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:* 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 watt/cfm for small duct high velocity HP or AC systems
   2. 0.45 watt/cfm for central gas furnace or packaged gas furnace systems
   3. 0.58 watt/cfm for all other systems
4. *Actual Fan Efficacy:* This field is filled out automatically. This is calculated by dividing the measured watt draw by the measured 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 for all zones tested.

**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.

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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 | Indoor Unit Name or Description of Area Served | <<auto filled text: referenced from CF2R-MCH23>> |
| 04 | System Installation Type | << auto filled text: referenced from CF2R-MCH23>> |
| 05 | Nominal Cooling Capacity (tons) of Condenser | << auto filled text: referenced from CF2R-MCH23>> |
| 06 | Condenser Speed Type | << auto filled text: referenced from CF2R-MCH23>> |
| 07 | Cooling System Zonal Control Type | << auto filled text: referenced from CF2R-MCH-23>> |
| 08 | Central Fan Integrated (CFI) Ventilation System Status | << auto filled text: referenced from CF2R-MCH-23>> |
| 09 | System Bypass Duct Status | << auto filled text: referenced from CF2R-MCH23>> |
| 10 | Date of System Airflow Rate Measurement | << auto filled text: referenced from CF2R-MCH23>> |
| 11 | Airflow Rate Protocol Utilized | << auto filled text: referenced from CF2R-MCH23>> |
| 12 | 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 MCH-23 variant = MCH-23a, then display version MCH-22a;  If MCH-23 variant = MCH-23b, then display version MCH-22b;  If MCH-23 variant = MCH-23e, then display version MCH-22c;  If MCH-23 variant = MCH-23f, then display version MCH-22d;  If MCH-23 variant = MCH-23c and A07 = ZonallyControlled and A06 = SingleSpeed, then display MCH-22b; Else display version MCH-22a;  If MCH-23 variant = MCH-23d and A12 = ‘Variable CFVCS’ or ‘Fixed CFVCS’, then display version MCH-22c; Else display version MCH-22a  >> |

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| **MCH-22d Forced Air System Fan Efficacy Measurement – Newly Installed Zoned Single-Speed Compressor Systems with Central Fan Ventilation Cooling** |

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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, D05 divided byD06>> | <<if D07 <= D02, then display text: Pass, else display text: Fail>> |
|  | |  |  |  |  |  |
|  | |  |  |  |  |  |
| 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. Central Fan Ventilation Cooling System Fan Efficacy Measurement**  The procedures for Central Fan Ventilation Cooling System Fan Watt Verification are specified in Reference Residential Appendix RA3.3.4. | | |
| 01 | Actual Tested Watts | <<user input, numeric value xx.xx>> | |
| 02 | Actual Tested Ventilation Airflow from MCH-23 (cfm) | <<Referenced from CF2R-MCH-23f F02, ‘Actual System Ventilation Airflow Rate Measurement (cfm)’>> | |
| 03 | Required Fan Efficacy (watts/cfm) | <<calculated field:  if parent is MCH-01a, then reference value from MCH-01a C11  else if parent is MCH-01d, then reference value from MCH-01d C11 >> | |
| 04 | Actual Fan Efficacy (watts/cfm) | <<calculated field, row E01 divided by row E02>> | |
| 05 | Compliance Statement: | <<If E03≥E04, the display text: system fan efficacy complies;  else display text: system does not comply with fan efficacy requirement>> | |

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| **F. 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 |
| **The responsible person’s signature on this compliance document affirms that all applicable requirements in this table have been met.** | |