REFRIGERANT CHARGE VERIFICATION

CALIFORNIA ENERGY COMMISSION

CEC- LMCV-MCH-25-H

SAMPLE FORM – NOT VALID FOR SUBMISSION TO BUILDING DEPARTMENTS

CERTIFICATE OF VERIFICATION

Note: This table completed by HERS Registry.

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

A. System Information

HERS Rater to field-verify all system information, discrepancies to be noted by overwriting entry.

01	Space Conditioning System Identification or Name	
02	Space Conditioning System Location or Area Served	
03	Condenser (or package unit) Make or Brand	
04	Condenser (or package unit) Model Number	
05	Nominal Cooling Capacity (tons) of Condenser	
06	Condenser (or package unit) Serial Number	
07	Refrigerant Type	
08	Other Refrigerant Type (if applicable)	
09	Liquid Line Filter Driers Installed According to Manufacturer's Specifications (if applicable)	
10	System Installation Type	
11	Fault Indicator Display (FID) Status (Note: Even systems with a FID must have refrigerant charge verified by installer)	
12	Is the system of a type that the minimum airflow can be verified for all indoor units using an approved measurement procedure (RA3.3 or RA3.3.3)?	
13	Is the system of a type that approved refrigerant charge verification procedures can be used to verify compliance with the refrigerant charge verification requirements when temperatures are ≥ 55°F (RA3.2.2, or RA1)?	
14	Date of HERS Rater Refrigerant Charge Verification for this system	
15	Refrigerant Charge Verification Method Used by Installer	
16	Person Who Performed the Refrigerant Charge Verification Reported on the Certificate of Installation	
17	HERS Verification Compliance Requirement Status	
18	Refrigerant Charge Verification Method Used by HERS Rater	

MCH-25a - Refrigerant Charge Verification - Superheat Method

B. Metering Device Verification

HERS Rater is required to visually field verify all information from LMCI. Superheat Method can only be used on systems that do not have a variable metering device.

01	Refrigerant Metering Device	
02	Superheat Method Applicability Status	

C. Instrument Calibration

HERS Raters are required to calibrate their diagnostic tools. Procedures for instrument calibration are given in Reference Residential Appendix RA3.2.2 and RA3.2.2.2

01	Date of Digital Refrigerant Gauge Calibration	
02	Date of Digital Thermocouple Calibration	
03	Digital Refrigerant Gauge Calibration Status	
04	Digital Thermocouple Calibration Status	

D. Measurement Access Hole (MAH) Verification

HERS Raters are required to visually field verify MAH. Procedures for installing MAH are specified in Reference Residential Appendix RA3.2.2.3.

01	Method Used to Demonstrate Compliance with the Measurement Access Hole (MAH) Requirement	

E. Minimum System Airflow Rate Verification

Procedures for verifying minimum system airflow are specified in Reference Residential Appendix RA3.3.3.

01	02	03
Indoor Unit Name or Description of Area Served	Minimum Required System Airflow Rate (cfm)	System Airflow Rate Verification Status
04	Compliance Statement:	
Notes:		

F. Data Collection

HERS Rater must independently collect all data in this section. Procedures for determining Refrigerant Charge using the Standard Charge Verification Procedure are given in Reference Residential Appendix RA3.2.2 and RA3.2.2.2

01	Lowest Return Air Dry-bulb Temperature that Occurred During the Refrigerant Charge Verification Procedure (°F)	
02	Measured Condenser Air Entering Dry-bulb Temperature ($T_{condenser, db}$) (°F)	
03	Outdoor Temperature Qualification Status	
04	Measured Return (evaporator entering) Air Dry-bulb Temperature ($T_{return, db}$) (°F)	
05	Measured Return (evaporator entering) Air Wet-bulb Temperature ($T_{return, wb}$) (°F)	
06	Measured Suction Line Temperature ($T_{suction}$) (°F)	
07	Measured Suction Line Pressure ($P_{suction}$ - psig)	
08	Evaporator Saturation Temperature ($T_{evaporator, sat}$) from Digital Gauge or P-T Table using Line F07 (°F)	
09	Measured Superheat (Line F06 – Line F08) (°F)	
10	Target Superheat (from Table RA3.2-2, using F02 and F05) (°F)	
11	Compliance Statement:	

G. 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	

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CALIFORNIA ENERGY COMMISSION

CEC- LMCV-MCH-25-H

SAMPLE FORM – NOT VALID FOR SUBMISSION TO BUILDING DEPARTMENTS

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

1. I certify that this Certificate of Verification documentation is accurate and complete.

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

2. 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 (LMCI) signed and submitted by the person(s) responsible for the construction or installation conforms to the requirements specified on the Certificate(s) of Compliance (LMCC) approved by the enforcement agency.
    5. I understand 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, and I will take the necessary steps to ensure this requirement is accomplished.
    6. 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.

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:

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

LMCV-MCH-25a-H User Instructions

Section A. System Information

1. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25). If installed system does not match this entry, it can be overwritten by rater but it will be flagged as a possible fail.
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6. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25) If installed system does not match this entry, it can be overwritten by rater but it will be flagged as a possible fail.
7. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25) If installed system does not match this entry, it can be overwritten by rater but it will be flagged as a possible fail. Choose the type of refrigerant used by the system being verified. R-22 and R-410A are the most common, but other types may occasionally be encountered.
8. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25). If "Other" is chosen in A07, then installer will indicate the type of refrigerant being used. If R-22 or R-410A is being used (regardless of trade name, Puron, Genetron, etc.) it should be indicated in A07, not here. This row is only for refrigerants other than R-22 and R-410a. Documentation of other refrigerants should be requested. If installed system does not match this entry, it can be overwritten by rater but it will be flagged as a possible fail.
9. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25). If applicable, a liquid line filter drier shall be installed according to the manufacturer's specifications.
10. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25). These are defined in detail the Residential Compliance Manual. If installed system does not match this entry, it can be overwritten by rater but it will be flagged as a possible fail. Indicate whether the HVAC system is Completely New, Replacement or an Alteration.
11. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25). Installer is to select the appropriate choice regarding whether this system has a Fault Indicator Display (FID). Qualifying FID's may exempt a system from HERS refrigerant charge verification. FID's are described in Joint Appendix JA6.1. Qualifying FID's must appear on a list of approved devices kept by the Commission. If installed system does not match the description here, it fails. Note: Installation of a FID does not exempt the installer from proper refrigerant charge verification. It may only exempt the need for third party refrigerant charge verification. Third party verification of the FID is required. Other requirements may also be triggered.
12. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25). Most ducted split systems and package systems are of the type that minimum airflow can be verified using an approved measurement procedure. Examples of systems that do not meet this description are ductless systems. Selecting "No" here may subject the project to additional scrutiny by enforcement personnel.
13. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25) Most ducted split systems and package systems are of the type that approved refrigerant charge verification procedures

detailed in Residential Appendix RA3.2.2 or RA1 can be used (i.e., Standard Charge Verification or Winter Setup Verification procedures). Examples of systems that may not meet this description are "mini splits" or variable refrigerant flow systems that may only be charged using weigh-in procedures. Selecting "No" here may subject the project to additional scrutiny.

14. HERS rater to input date of their refrigerant charge verification.
15. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25). The installer is to have selected the refrigerant charge verification method used from the choices provided:
    - Superheat (outdoor temperature must be ≥ 55°F); this verification method can only be used when the outdoor temperature is at or above 55°F. It is only used on systems with fixed orifice refrigerant metering devices (non-variable metering devices). This method is detailed in Reference Appendix RA3.2.2.6.1. Systems verified using this method may be eligible for HERS verification compliance using Group Sampling. Choosing this option will generate a LMCI-MCH-25a.
    - Subcooling (outdoor temperature must be ≥ 55°F); this verification method can only be used when the outdoor temperature is at or above 55°F. It is only used on systems with variable metering devices (TXV or EXV). This method is detailed in Reference Appendix RA3.2.2.6.2. Systems verified using this method may be eligible for HERS verification compliance using Group Sampling. Choosing this option will generate a LMCI-MCH-25b.
    - Weigh-in; this verification method can be used by the installer at any outdoor temperature allowed by the equipment manufacturer. This method is detailed in Reference Appendix RA3.2.3. Systems verified using this method are NOT eligible for HERS verification compliance using Group Sampling. Choosing this option will generate a LMCI-MCH-25c.
    - Winter Setup (applicable when outdoor temperature is < 55°F); the Winter Setup verification method is a special version of the Subcooling method. It can be used when the outdoor temperature is between 37°F and 55°F. It can only be used on equipment where the manufacturer has specifically approved it for the equipment being tested. The Winter Setup procedure is details in Residential Appendix RA1.2. Choosing this option will generate a LMCI-MCH-25e.
    - New Package Unit Factory Charge; the installer should choose this option when a new package unit is being installed that has an AHRI rating. This helps ensure that the unit was properly charged at the factory. HERS verification of refrigerant charge may not be required in this case. Choosing this option will generate a LMCI-MCH-25f.
16. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25). The installer (or rater) is to have identified who performed the verification that is documented on the Certificate of Installation. Note that HERS verification compliance by Group Sampling requires that the installer perform their own refrigerant charge verification as part of the installation of the equipment prior to the system being put into a sample group for possible selection by a HERS rater for verification. If Group Sampling is not intended, the HERS Rater may perform the refrigerant charge verification on behalf of the Installing Contractor (applies to any method but Weigh-In) and the Rater will enter same results on both the LMCI and LMCV.
17. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25). The Group Sampling status is automatically displayed based on the input results of A15 and A16 on the LMCI. Group Sampling procedures are detailed in Residential Appendix RA2.3.
18. Specify the refrigerant charge verification used by the HERS rater. Choices vary depending on what method was specified in Row A11, A12, and A15.

Section B. Metering Device Verification

1. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25). Installer is to have selected the correct metering device used on the system being verified. This will check against the refrigerant charge verification method selected in A15. An error message will appear in B02 if the wrong verification method may have been selected. Superheat verification can only be used on systems with fixed orifice and Subcool verification can only be used on systems with variable metering devices (TXV or EXV). This entry must match installed system to pass.
2. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25). Superheat verification can only be used on systems with fixed orifice and Subcool verification can only be used on systems with variable metering devices (TXV or EXV).

Section C. Instrument Calibration

1. Enter the date of most recent Digital Refrigerant Gauge Calibration Field Check by rater. Analog gauges are not allowed for verification purposes under the 2022 Standards. Specification for pressure gauges is found in Residential Appendix RA3.2.2.2.3. Procedures for the field check procedure are detailed in RA3.2.2.4.2. Calibration field check must happen at least once every 30 days.
2. Enter the date of the most recent Digital Thermocouple Calibration by rater. Specifications for thermocouples and temperature sensors can be found in Residential Appendix RA3.2.2.2.2. Procedures for calibration are detailed in RA3.2.2.4.1. Calibration must happen at least once every 30 days.
3. Digital Refrigerant Gauge Calibration status will appear automatically. If the date entered in C01 is more than 30 days prior to date of verification this row will indicate that calibration is required and you will not be allowed to continue filling out this document until calibration is performed.
4. Digital Thermocouple Calibration status will appear automatically. If the date entered in C02 is more than 30 days prior to date of verification this row will indicate that calibration is required and you will not be allowed to continue filling out this document until calibration is performed.

Section D. Measurement Access Hole (MAH) Verification

1. This information is automatically pulled from the Certificate of Installation (LMCI-MCH-25). Installer is to have indicated the method used to demonstrate compliance with the MAH requirement by selecting the appropriate method from the drop down list. Procedures for installing MAH's are detailed in RA3.2.2.3. Selecting that the MAH cannot be installed consistent with Figure 3.2-1 may result in additional scrutiny by enforcement personnel.) If installed system does not match this entry, it can be overwritten by rater but it will be flagged as a possible fail.

Section E. Minimum System Airflow Rate Verification

1. This information is automatically calculated based on the information given in line A10. This is the target minimum system airflow required for the system being verified.
2. This information is automatically calculated based on either the LMCV-MCH-23, or LMCV-MCH-28, which documents the rater's measured airflow of the system being verified (or alternative method). If the measured airflow is not adequate it will not comply with the airflow requirements and refrigerant charge verification cannot be performed.

Section F. Superheat Charge Verification Method – Data Collection

1. The Rater must independently collect this data. Measure and record the lowest return air dry-bulb temperature that occurred during the refrigerant charge procedure in °F. This temperature must remain

above 70°F during the verification procedure. This requirement is detailed in Residential Appendix RA3.2.2.5.

2. The Rater must independently collect this data. Measure and record the condenser air dry-bulb temperature ($T_{condenser}$) in °F. This value is used to determine the target superheat from table RA3.2-2. This value must be at least 55°F and no more than 115°F to use the Superheat Charge Verification Method.
3. If a value less than 55°F or greater than 115°F is entered in F02 the Superheat Method cannot be used.
4. The Rater must independently collect this data. Measure and record the return air dry-bulb temperature ($T_{return,db}$) in °F. This measurement is taken at the MAH (or alternate location specified in F01. This procedure is detailed in RA3.2.2.5.
5. The Rater must independently collect this data. Measure and record the return air wet-bulb temperature ($T_{return,wb}$) in ° F. This measurement is taken at the MAH (or alternate location specified in F01. This procedure is detailed in RA3.2.2.5. This value is used to determine the target superheat from table RA3.2-2.
6. The Rater must independently collect this data. Measure and record the suction line temperature ($T_{suction}$) in °F. This procedure is detailed in RA3.2.2.5. This value is used to calculate the measured superheat.
7. The Rater must independently report this data. This procedure is detailed in RA3.2.2.5. This value is used to determine the evaporator saturation temperature ($T_{evaporator,sat}$) from a pressure temperature chart for the appropriate refrigerant (can be internal to a digital gauge), which is entered into F08.
8. The Rater must independently collect this data. Enter the evaporator saturation temperature ($T_{evaporator,sat}$) from the digital gauge or a separate pressure-temperature chart that corresponds to the suction line pressure entered in F07, in °F.
9. Measured superheat is automatically calculated as the difference between the suction line temperature (F06) and the evaporator saturation temperature (F08)
10. The Rater must independently report this data. Enter target superheat from Table RA3.2-2. This table requires values for the condenser air dry bulb temperature (F02) and the return air wet bulb temperature (F05)
11. System passes superheat method when F10 is within plus or minus 8°F of F09. Note that the target for the installer, on the LMCI-MCH-25a is plus or minus 5°F.

Section G. Determination of HERS Verification Compliance

1. This field is filled out automatically based on all verification protocol requirements in this document showing compliance..

Documentation Declaration Statements

1. The person who prepared the LMCV 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 (if applicable) for their company, responsible builder or installer name, CSLB license number, sample group number, dwelling test status in sample group, HERS Rater company name, HERS Rater name, HERS Rater signature, HERS Rater certification number and date signed.