

# RESIDENTIAL HVAC CHANGEOUT REQUIREMENTS

New energy regulations that became effective on October 1, 2005 require additional documentation at permit application and at final inspection for new mechanical equipment and related components. These regulations apply to the following:

1. Complete Changeout
2. Coil Installation
3. Condenser Installation
4. Heat Exchanger Installation
5. The addition and/or replacement of 40' or more of duct work.

The following attachments are provided to assist you in understanding and complying with the new regulations. Please note that the City of Stockton is in Climate Zone 12 when reviewing the attached information.

The following are two common compliance methods, other compliance approaches are possible. Please contact the Energy Commission Efficiency Hotline at (800) 772-3300 or visit their website at [www.energy.ca.gov/title24/changeout](http://www.energy.ca.gov/title24/changeout) for additional information:


## 1. Duct Sealing and Refrigerant Charge Measurement\*\*\*:

- i. For installed ducts that form an entirely new duct system, the measured leakage must be less than 6% of fan flow.
- ii. For installations that involve the alteration of the existing duct system, the measured duct leakage must be less than 15% of fan flow; **or**
- iii. The measured duck leakage to outside must be less than 10% of fan flow; **or**
- iv. The measured duct leakage must be reduced by more than 60% relative to the measured leakage prior to the installation or replacement of equipment; **or**
- v. If it is not possible to meet the duct requirements above, all accessible leaks must be sealed by the contractor and verified by certified HERS rater.
- vi. When split system air conditioners are changed-out, refrigerant charge testing or installation of TXV (thermostatic expansion valve) is required.

## 2. Table 8-3, Option I (Heating Equipment Replacement):

Install a higher efficient furnace, 92 AFUE or 9.0 HSPF heat pump **and** air conditioning equipment with minimum SEER-13 efficiency rating\*\*\* (TXV requires HERS verification) **or** install 92 AFUE furnace or 9.0 HSPF heat pump only (furnace upgrade only).

- **\*\*\* HERS verification is required for duct testing, TXV installation and/or refrigerant charge measurement.**
- **2 copies of CF-1R required at permit application.**
- **CF-6R and CF-4R required to be provided to Inspector at final inspection of mechanical installation.**

 <p>CITY OF STOCKTON</p>	<i><b>Building Division</b></i>
	<b>Residential HVAC Change-out Compliance Options</b>
(209) 937-8561	345 N El Dorado St., Stockton CA 95202

**CERTIFICATE OF COMPLIANCE: RESIDENTIAL (Page 1 of 5) CF-1R**

Project Title	Date	Building Permit #
Project Address		
		Plan Check / Date
Documentation Author	Telephone	Field Check / Date
Compliance Method (Prescriptive)	Climate Zone	Enforcement Agency Use Only

Alternative Component Package Method: (check one)  C  D  D (Alternative)

- Package C and Package D choices require HERS rater field verification and/or diagnostic testing (see CF-1R page 3)
- For Package D Alternative see Appendix B Table 151-C Footnotes 8-14 in the Residential Compliance Manual (RCM)

**GENERAL INFORMATION**

Total Conditioned Floor Area (CFA) \_\_\_\_\_ ft<sup>2</sup>

Average Ceiling Height: \_\_\_\_\_ ft

Check Applicable Boxes

Building Type: (check one or more)  Single Family  Multifamily  Addition  Alteration  
 (If adding fenestration fill-out WS-4R, Fenestration Maximum Allowed Area Worksheet and see Section 8.3.2 for Additions and 8.3.3 for Alterations in the RCM.)

- Maximum Allowed Total Fenestration Area \_\_\_\_\_ ft<sup>2</sup> (from WS-4R)
- Maximum Allowed West Facing Fenestration Area \_\_\_\_\_ ft<sup>2</sup> (from WS-4R)
- Number of Stories: \_\_\_\_\_ Number of Dwelling Units: \_\_\_\_\_
- Floor Construction Type: \_\_\_\_\_ Slab/Raised Floor (circle one or both)
- Front Orientation: \_\_\_\_\_ North / South / East / West : All Orientations (input front orientation in degrees from True North and circle one).

**Y** RADIANT BARRIER (check box if required in climate zones 2, 4, 8-15)

**OPAQUE SURFACES INCLUDING OPAQUE DOORS**

Component Type (Wall, Roof, Floor, Slab Edge, Doors)	Frame Type (Wood or Metal)	Cavity Insulation R-Value	Continuous Insulation R-Value	Assembly U-factor (for wood, metal frame and mass assemblies) <sup>1</sup>	Joint Appendix IV Reference	Roof Radiant Barrier Installed <sup>2</sup> Yes or No	Location Comments (attic, garage, typical, etc.)

1) See Joint Appendix IV in Section IV.2, IV.3, and IV.4, which is the basis for the U-factor criterion. U-factors can not exceed prescriptive value to show equivalence to R-values.  
 2) This column is for the Inspector to verify installation of roof radiant barrier.

<i>Project Title</i>	<i>Date</i>

**FENESTRATION PRODUCTS – U-FACTOR AND SHGC**

J  $\dot{Y}$  FENESTRATION MAXIMUM ALLOWED AREA WORKSHEET WS-4R – must be included for New Construction, Additions, and Alterations.

Fenestration #/Type/Pos. (Front, Left, Rear, Right, Skylight)	Orientation, N, S, E, W <sup>1</sup>	Area (ft <sup>2</sup> )	U-factor <sup>2</sup>	U-factor Source <sup>3</sup>	SHGC <sup>4</sup>	SHGC Source <sup>5</sup>	Exterior Shading/Overhangs <sup>6,7</sup> J box if WS-3R is included
							$\dot{Y}$
							$\dot{Y}$
							$\dot{Y}$
							$\dot{Y}$
							$\dot{Y}$
							$\dot{Y}$
							$\dot{Y}$

- 1) Skylights are now included in West-facing fenestration area if the skylights are tilted to the west or tilted in any direction when the pitch is less than 1:12. See §151(f)3C and in Section 3.2.3 of the Residential Manual.
- 2) Enter values in this column from either NFRC Certified Label or from Standards Default Table 116-A.
- 3) Indicate source either from NFRC or Table 116-A,
- 4) Enter values in this column from NFRC or from Standards Default Table 116B or adjusted SHGC from WS-3R.
- 5) Indicate source either from NFRC, Table 116B or WS-3R
- 6) Shading Devices are defined in Table 3-3 in the Residential Manual and see WS-3R to calculate Exterior Shading devices.
- 7) See Section 3.2.4 in the Residential Manual.

**HVAC SYSTEMS**

Heating Equipment Type and Capacity (furnace, heat pump, boiler, etc.)	Minimum Efficiency (AFUE or HSPF)	Distribution Type and Location (ducts, attic, etc.)	Duct or Piping R-Value	Thermostat Type	Configuration (split or package)

Cooling Equipment Type and Capacity (A/C, heat pump, evap. cooling)	Minimum Efficiency (SEER or EER)	Distribution Type and Location (ducts, attic, etc.)	Duct or Piping R-Value	Thermostat Type	Configuration (split or package)

**CERTIFICATE OF COMPLIANCE: RESIDENTIAL (Page 3 of 5) CF-1R**

<i>Project Title</i>	<i>Date</i>
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**SEALED DUCTS and TXVs (or Alternative Measures)**

A signed CF-4R Form must be provided to the building department for each home for which the following are required.

<b>J</b>	
ÿ	Sealed Ducts (all climate zones) (Installer testing and certification and HERS rater field verification required.)
ÿ	TXVs, readily accessible (climate zones 2 and 8-15 only) (Installer testing and certification and HERS Rater field verification required.)
ÿ	Refrigerant Charge (climate zones 2 and 8-15 only) (Installer testing and certification and HERS Rater field verification required.)

**OR**

ÿ	Alternative to Sealed Ducts and Refrigerant Charge /TXVs (See Package D Alternative Package Features for Project Climate Zone in the RM Appendix B Table 151-C, Footnotes 7-14.
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**OR**

ÿ	No ducts installed.
ÿ	New ducts from existing space conditioning equipment, not exceeding 40ft. in length.
ÿ	For additions and alterations, duct systems that are not documented to have been previously sealed as confirmed through field verification and diagnostic testing in accordance with procedures in the Residential ACM Manual. Duct systems with more than 40 linear feet in unconditioned spaces shall meet the requirements of Section 150(m) and duct insulation requirements of Package D.

**WATER HEATING SYSTEMS**

<b>J</b>	
ÿ	Check box if system meets criteria of a “Standard” system. Standard system is one gas-fired water heater per dwelling unit. If the water heater is a storage type, 50 gallons is the maximum capacity and recirculation system is not allowed.
ÿ	Check box when using Preapproved Alternative Water Heating table, Table 5-4 in Chapter 5 in the Residential Manual. No water heating calculations are required, and the system complies automatically.
ÿ	Check box if system does not meet criteria of “Standard” system, and does not comply with the Preapproved Alternative Water Heating table. In this case, the Performance Method must be used and must be included in the submittal.
ÿ	Check box to verify that a time control is required for a recirculating system pump for a system serving multiple units

**Systems serving single dwelling units** (See RM Table 5-4, Alternative Water Heating Systems for recirculation requirements)

Water Heater Type/Fuel Type	Distribution Type	Number in System	Rated Input <sup>1</sup> (kW or Btu/hr)	Tank Capacity (gallons)	Energy Factor <sup>1</sup> or Thermal Efficiency	Standby <sup>1</sup> Loss (%)	Tank External Insulation R-Value

**System serving multiple dwelling units** (See Residential Manual Section 5.3.3)

Water Heater Type	Distribution Type	Number in System	Rated Input <sup>1</sup> (kW or Btu/hr)	Tank Capacity (gallons)	Energy Factor <sup>1</sup> or Thermal Efficiency	Standby <sup>1</sup> Loss (%)	Tank External Insulation R-Value

1) For small gas storage water heaters (rated inputs of less than or equal to 75,000 Btu/hr), electric resistance, and heat pump water heaters, list Energy Factor. For large gas storage water heaters (rated input of greater than 75,000 Btu/hr), list Rated Input, Recovery Efficiency, Thermal Efficiency and Standby Loss. For instantaneous gas water heaters, list Rated Input and Thermal Efficiencies.

**Pipe Insulation** (kitchen lines  $\geq 3/4$  inches) All hot water pipes from the heating source to the kitchen fixtures that are  $3/4$  inches or greater in diameter shall be thermally insulated as specified by Section 150 (j) 2 A or 150 (j) 2 B.

**CERTIFICATE OF FIELD VERIFICATION & DIAGNOSTIC TESTING (Page 1 of 8) CF-4R**

Project Address		Builder or Installer Name
Builder or Installer Contact	Telephone	Plan/Permit (Additions or Alterations) Number
HERS Rater	Telephone	Sample Group Number
Compliance Method (Prescriptive)		Climate Zone
Certifying Signature	Date	Sample House Number
Firm	HERS Provider	
Street Address:	City/State/Zip:	

**Copies to: BUILDER, HERS PROVIDER AND BUILDING DEPARTMENT**

**HERS RATER COMPLIANCE STATEMENT**

The house was:  Tested  Approved as part of sample testing, but was not tested

As the HERS rater providing diagnostic testing and field verification, I certify that the house identified on this form complies with the diagnostic tested compliance requirements as checked  on this form. The HERS rater must check and verify that the new distribution system is fully ducted and correct tape is used before a CF-4R may be released on every tested building. The HERS rater must not release the CF-4R until a properly completed and signed CF-6R has been received for the sample and tested buildings.

The installer has provided a copy of CF-6R (Installation Certificate).

New ducts are fully ducted (i.e., does not use building cavities as plenums or platform returns in lieu of ducts).

New ducts with cloth backed, rubber adhesive duct tape is installed, mastic and draw bands are used in combination with cloth backed, rubber adhesive duct tape to seal leaks at duct connections.).

**J  MINIMUM REQUIREMENTS FOR DUCT LEAKAGE REDUCTION COMPLIANCE CREDIT**

Procedures for field verification and diagnostic testing of air distribution systems are available in RACM, Appendix RC4.3.

**Duct Diagnostic Leakage Testing Results**

<b>NEW CONSTRUCTION:</b>			
	Duct Pressurization Test Results (CFM @ 25 Pa)	Measured Values	
1	Enter Tested Leakage Flow in CFM:		
2	Fan Flow: Calculated (Nominal: <input type="checkbox"/> Cooling <input type="checkbox"/> Heating) or <input type="checkbox"/> Measured Enter Total Fan Flow in CFM:		<b>J J</b>
3	Pass if Leakage Percentage < 6% [ 100 x [ _____(Line # 1) / _____(Line # 2)]]		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<b>ALTERATIONS: Duct System and/or HVAC Equipment Change-Out</b>			
4	Enter Tested Leakage Flow in CFM from CF-6R: <b>Pre-Test</b> of Existing Duct System Prior to Duct System Alteration and/or Equipment Change-Out.		
5	Enter Tested Leakage Flow in CFM: <b>Final Test</b> of New Duct System or Altered Duct System for Duct System Alteration and/or Equipment Change-Out.		
6	Enter Reduction in Leakage for Altered Duct System [ _____(Line # 4) Minus _____(Line # 5)] (Only if Applicable)		
7	Enter Tested Leakage Flow in CFM to Outside (Only if Applicable)		<b>J J</b>
8	Entire New Duct System - Pass if Leakage Percentage < 6% [100 x [ _____(Line # 5) / _____(Line # 2)]]		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<b>TEST OR VERIFICATION STANDARDS: For Altered Duct System and/or HVAC Equipment Change-Out</b>			<b>J J</b>
<b>Use one of the following four Test or Verification Standards for compliance:</b>			
9	Pass if Leakage Percentage < 15% [100 x [ _____(Line # 5) / _____(Line # 2)]]		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
10	Pass if Leakage to Outside Percentage < 10% [100 x [ _____(Line # 7) / _____(Line # 2)]]		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
11	Pass if Leakage Reduction Percentage > 60% [100 x [ _____(Line # 6) / _____(Line # 4)]] and Verification by Smoke Test and Visual Inspection		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
	Pass if Sealing of all Accessible Leaks and Verification by Smoke Test and Visual Inspection		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
	<b>Pass if One of Lines # 9 through # 12 pass</b>		<input type="checkbox"/> Pass <input type="checkbox"/> Fail

Project Address	Builders Name
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**Copies to: BUILDER, HERS PROVIDER AND BUILDING DEPARTMENT**

**J   DIAGNOSTIC SUPPLY DUCT LOCATION, SURFACE AREA AND R-VALUE**

*Procedures for field verification and diagnostic testing for this group compliance credits are available in RACM, Appendix RC, RE & RH.*

**J   LESS THAN 12 LINEAL FEET OF SUPPLY DUCT OUTSIDE OF CONDITIONED SPACE COMPLIANCE CREDIT**

<b>J</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Less than 12 lineal feet of supply duct outside of conditioned space.		
Yes to this compliance credit is a pass				<b>J</b>	<input type="checkbox"/> Pass
				<b>J</b>	<input type="checkbox"/> Fail

**J   SUPPLY DUCTS LOCATED IN CONDITIONED SPACE COMPLIANCE CREDIT**

<b>J</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Ducts are located within the conditioned volume of building.		
Yes to this compliance credit is a pass				<b>J</b>	<input type="checkbox"/> Pass
				<b>J</b>	<input type="checkbox"/> Fail

**Duct System Design verification is required for a compliance credit for the following:**

1. Supply duct surface area reduction
2. Buried supply ducts on the ceiling
3. Deeply buried supply ducts

**J   DUCT SYSTEM DESIGN VERIFICATION**

<b>J</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Adequate airflow verified		
<b>J</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The duct system design plan meets the requirements specified in RACM, Appendix RE, Section RE.4.2		
<b>J</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	The duct system design plan exists on building plans		
<b>J</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Duct sizes, duct system layout and locations of supply & return registers match the duct system design plan		
Yes to all is a pass				<b>J</b>	<input type="checkbox"/> Pass
				<b>J</b>	<input type="checkbox"/> Fail

**J   SUPPLY DUCTS SURFACE AREA REDUCTION COMPLIANCE CREDIT**

	Attic	Crawl Space	Basement	Covered	Deeply Covered	Other	Duct Diameter	R-4.2 Surface Area	R-6.0 Surface Area	R-8.0 Surface Area
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
Total Surface Area for Each R-Value =										
<b>J</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Duct Surface Area matches Performance's CF-1R?						<b>J</b>	<b>J</b>
Yes to all is a pass								<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	

**J   BURIED DUCTS ON THE CEILING COMPLIANCE CREDIT**

<b>J</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Buried Ducts on the Ceiling		
<b>J</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Verified High Insulation Installation Quality	<b>J</b>	<b>J</b>
Yes to duct system design, supply duct surface area reduction and this compliance credit is a pass				<input type="checkbox"/> Pass	<input type="checkbox"/> Fail

**J   DEEPLY BURIED DUCTS COMPLIANCE CREDIT**

<b>J</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Deeply Buried Ducts		
<b>J</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Verified High Insulation Installation Quality	<b>J</b>	<b>J</b>
Yes to duct system design, supply duct surface area reduction and this compliance credit is a pass				<input type="checkbox"/> Pass	<input type="checkbox"/> Fail



**INSTALLATION CERTIFICATE**

Site Address

Permit Number

An installation certificate is required to be posted at the building site or made available for all appropriate inspections. (The information provided on this form is required) After completion of final inspection, a copy must be provided to the building department (upon request) and the building owner at occupancy, per Section 10-103(a).

**HVAC SYSTEMS:**

***Heating Equipment***

Equip Type (pkg. heat pump)	CEC Certified Mfr. Name and Model Number	# of Identical Systems	Efficiency (AFUE, etc.) <sup>1</sup> (≥CF-1R value)	Duct Location (attic, etc.)	Duct or Piping R-value	Heating Load (Btu/hr)	Heating Capacity (Btu/hr)

***Cooling Equipment***

Equip Type (pkg. heat pump)	CEC Certified Mfr. Name and Model Number	# of Identical Systems	Efficiency (SEER or EER) <sup>1</sup> (≥CF-1R value)	Duct Location (attic, etc.)	Duct R-value	Cooling Load (Btu/hr)	Cooling Capacity (Btu/hr)

1. ≥ symbol reads *greater than or equal to what is indicated on the CF-1R value.*  
 Include both SEER and EER if compliance credit for high EER air conditioner is claimed.

J Ý II, the undersigned, verify that equipment listed above is: 1) is the actual equipment installed, 2) equivalent to or more efficient than that specified in the certificate of compliance (Form CF-1R) submitted for compliance with the *Energy Efficiency Standards* for residential buildings, and 3) equipment that meets or exceeds the appropriate requirements for manufactured devices (from the *Appliance Efficiency Regulations* or Part 6), where applicable.

Installing Subcontractor (Co. Name) OR General Contractor (Co. Name) OR Owner	
Signature:	Date:

**Copies to: BUILDING DEPARTMENT, HERS RATER (IF APPLICABLE) BUILDING OWNER AT OCCUPANCY**

Site Address

Permit Number

**INSTALLER COMPLIANCE STATEMENT FOR DUCT LEAKAGE**

**INSTALLER COMPLIANCE STATEMENT**

The building was: J  Tested at Final      J  Tested at Rough-in

**INSTALLER VISUAL INSPECTION AT FINAL CONSTRUCTION STAGE FOR NEW DUCTS:**

- Remove at least one supply and one return register, and verify that the spaces between the register boot and the interior finishing wall are properly sealed.
- If the house rough-in duct leakage test was conducted without an air handler installed, inspect the connection points between the air handler and the supply and return plenums to verify that the connection points are properly sealed.
- Inspect all joints to ensure that no cloth backed rubber adhesive duct tape is used *on new ducts*.

**J  DUCT LEAKAGE REDUCTION**

*Procedures for field verification and diagnostic testing of air distribution systems are available in RACM, Appendix RC4.3*

<b>NEW CONSTRUCTION:</b>			
	Duct Pressurization Test Results (CFM @ 25 Pa)	Measured Values	
1	Enter Tested Leakage Flow in CFM:		
2	Fan Flow: Calculated (Nominal: J <input type="checkbox"/> Cooling J <input type="checkbox"/> Heating) or J <input type="checkbox"/> Measured If Fan Flow is Calculated as 400 cfm/ton x number of tons or as 21.7 cfm/(kBtu/hr) x Heating Capacity in Thousands of Btu/hr, enter total calculated or measured fan flow in CFM here:		<b>J      J</b>
3	Pass if Leakage Percentage < 6% for Final or < 4% at Rough-in without air handle: [100 x [ _____ (Line # 1) / _____ (Line # 2)]]		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<b>ALTERATIONS: Duct System and/or HVAC Equipment Change-Out</b>			
4	Enter Tested Leakage Flow in CFM from <b>Pre-Test</b> of Existing Duct System Prior to Duct System Alteration and/or Equipment Change-Out.		
5	Enter Tested Leakage Flow in CFM from <b>Final Test</b> of New Duct System or Altered Duct System for Duct System Alteration and/or Equipment Change-Out.		
6	Enter Reduction in Leakage for Altered Duct System [ _____ (Line # 4) Minus _____ (Line # 5)] – (Only if Applicable)		
7	Enter Tested Leakage Flow in CFM to Outside (Only if Applicable)		<b>J      J</b>
8	Entire New Duct System - Pass if Leakage Percentage < 6% for Final. [100 x [ _____ (Line # 5) / _____ Line # 2)]]		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<b>TEST OR VERIFICATION STANDARDS: For Altered Duct System and/or HVAC Equipment Change-Out Use one of the following four Test or Verification Standards for compliance:</b>			<b>J      J</b>
9	Pass if Leakage Percentage < 15% [100 x [ _____ (Line # 5) / _____ (Line # 2)]]		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
10	Pass if Leakage to Outside Percentage < 10% [100 x [ _____ (Line # 7) / _____ (Line # 2)]]		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
11	Pass if Leakage Reduction Percentage > 60% [100 x [ _____ (Line # 6) / _____ (Line # 4)]] and Verification by Smoke Test and Visual Inspection		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
12	Pass if Sealing of all Accessible Leaks and Verification by Smoke Test and Visual Inspection		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<b>Pass if One of Lines # 9 through # 12 pass</b>			<input type="checkbox"/> Pass <input type="checkbox"/> Fail

J  I, the undersigned, verify that the above diagnostic test results were performed in conformance with the requirements for compliance credit. I, the undersigned, also certify that the newly installed or retrofit Air-Distribution System Ducts, Plenums and Fans comply with Mandatory requirements specified in Section 150 (m) of the 2005 Building Energy Efficiency standards.

Installing Subcontractor (Co. Name) OR General Contractor (Co. Name) OR Owner	
Signature:	Date:

**Copies to: BUILDING DEPARTMENT, HERS RATER (IF APPLICABLE) BUILDING OWNER AT OCCUPANCY**

**INSTALLATION CERTIFICATE**

Site Address

Permit Number

**J Y THERMOSTATIC EXPANSION VALVE (TXV)**

*Procedures for field verification of thermostatic expansion valves are available in RACM, Appendix RI.*

J J

J	Y Yes	Y No	Access is provided for inspection. The procedure shall consist of visual verification that the TXV is installed on the system and installation of the specific equipment shall be verified.	Y	Y
			Yes is a pass	Pass	Fail

**J Y REFRIGERANT CHARGE MEASUREMENT**

Verification for Required Refrigerant Charge and Adequate Airflow for Split System Space Cooling Systems without Thermostatic Expansion Valves

Outdoor Unit Serial #		
Location		
Outdoor Unit Make		
Outdoor Unit Model		
Cooling Capacity		Btu/hr
Date of Verification		
Date of Refrigerant Gauge Calibration		(must be checked monthly)
Date of Thermocouple Calibration		(must be checked monthly)

**Standard Charge Measurement Procedure (outdoor air dry-bulb 55°F and above):**

*Procedures for Determining Refrigerant Charge using the Standard Method are available in RACM, Appendix RD2.*

Note: The system should be installed and charged in accordance with the manufacturer's specifications before starting this procedure.

Measured Temperatures

Supply (evaporator leaving) air dry-bulb temperature (Tsupply, db)		°F
Return (evaporator entering) air dry-bulb temperature (Treturn, db)		°F
Return (evaporator entering) air wet-bulb temperature (Treturn, wb)		°F
Evaporator saturation temperature (Tevaporator, sat)		°F
Suction line temperature (Tsuction, db)		°F
Condenser (entering) air dry-bulb temperature (Tcondenser, db)		°F

Superheat Charge Method Calculations for Refrigerant Charge

Actual Superheat = Tsuction, db – Tevaporator, sat		°F
Target Superheat (from Table RD-2)		°F
Actual Superheat – Target Superheat (System passes if between -5 and +5°F)		°F

Temperature Split Method Calculations for Adequate Airflow

*Split Method Calculation is not necessary if Adequate Airflow credit is taken*

Actual Temperature Split = T return, db Tsupply, db		°F
Target Temperature Split (from Table RD3)		°F
Actual Temperature Split Target Temperature Split (System passes if between -3°F and +3°F or, upon remeasurement, if between -3°F and -100°F)		°F