CF-6R (Installation Certificate) Requirements for Alterations/Additions (Change-Outs)

1. **The HVAC contractor must complete the following pages (as applicable) of the CF-6R (Installation Certificate) for alterations/additions (Change-Outs)**:

   The HVAC installing contractors is required to test or verify compliance standards for new or replacement HVAC equipment and/or duct system alterations that meet the requirements of Section 8.4.2 of Chapter 8 of the "2005 Residential Compliance Manual". The HVAC installing contractor must test or verify the installation and complete the appropriate sections of the CF-6R. Also see Section 2.3.2 of Chapter 2 of the "2005 Residential Compliance Manual". Either the homeowner or the HVAC installing contractor must arrange for test or verification by a HERS rater. Also see Section 7.7 of Chapter 7 of the "2005 Residential ACM Manual". A copy of the CF-6R must be provided to the HERS rater prior to their test or verification and completion of the CF-4R (Certificate of Field Verification & Diagnostic Testing) indicating compliance with requirements. Also see Section 2.3.3 of Chapter 2 of the "2005 Residential Compliance Manual".

   a. *HVAC Systems page (Page 3 of 12) of the CF-6R*:

      This page must be completed when any HVAC equipment is installed.

      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).

   b. *Installer Compliance Statement for Duct Leakage page (Page 4 of 12) of the CF-6R*:

      This page must be completed when T-24 Standards require diagnostic duct testing. Duct testing for alterations/additions (change-outs) applies to climate zones 2 and 9 through 16.

   c. *Thermostatic Expansion Valve (TXV) or Refrigerant Charge Measurement page (Pages 5 and 6 of 12) of the CF-6R*:

      These pages must be completed when T-24 Standards require Refrigerant Charge Measurement or TXV as an alternative to the Refrigerant Charge Measurement. Refrigerant Charge Measurement (or TXV) for alterations/additions (change-outs) applies to climate zones 2 and 8 through 15.

   d. *High EER Air Conditioner page (Page 8 of 12) of the CF-6R*:

      If the alternatives (Table 8-3 of Chapter 8 of the 2005 Residential Compliance Manual) to duct testing are used, this page must be completed to verify the EER requirement.

2. **HVAC Systems**: The following is a copy of the HVAC Systems section of the CF-6R.

HVAC SYSTEMS:
Heating Equipment

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

3. **Duct Leakage**: Completed examples of CF-6R for field verification and diagnostic duct testing for alterations/additions (change-outs).

   a. *Duct leakage percentage ≤15% of fan flow*:

   This duct leakage test procedure is specified in Section RC.4.3.1 of Appendix RC to the "2005 Residential ACM Manual". The following is a completed example of the CF-6R indicating compliance with this duct testing procedure.

✓ ☐ **DUCT LEAKAGE REDUCTION**

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

NEW CONSTRUCTION:			
	Duct Pressurization Test Results (CFM @ 25 Pa)	Measured Values	
1	Enter Tested Leakage Flow in CFM:		
2	Fan Flow: Calculated (Nominal: ✓ ☒ Cooling ✓ ☐ Heating) or ✓ ☐ 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 output, enter total calculated or measured fan flow in CFM here:	**1,000**	✓ ✓
3	Pass if Leakage Percentage≤ 6% for Final or ≤ 4% at Rough-in: [100 x [_____(Line # 1) / _____(Line # 2)]]		☐ Pass ☐ Fail
ALTERATIONS: Duct System and/or HVAC Equipment Change-Out			
4	Enter Tested Leakage Flow in CFM from **Pre-Test** of Existing Duct System Prior to Duct System Alteration and/or Equipment Change-Out.	**600**	
5	Enter Tested Leakage Flow in CFM from **Final Test** of New Duct System or Altered Duct System for Duct System Alteration and/or Equipment Change-Out.	**150**	
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)		✓ ✓
8	Entire New Duct System - Pass if Leakage Percentage ≤ 6% for Final [100 x [_____(Line # 5) / _____Line # 2)]]		☐ Pass ☐ Fail
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:			✓ ✓
9	Pass if Leakage Percentage ≤ 15% [100 x [**150** (Line # 5) / **1,000** (Line # 2)]]	**15 %**	☒ Pass ☐ Fail
10	Pass if Leakage to Outside Percentage ≤ 10% [100 x [_____(Line # 7) / _____ (Line # 2)]]		☐ Pass ☐ Fail
11	Pass if Leakage Reduction Percentage ≥ 60% [100 x [_____(Line # 6) / _____ (Line # 4)]] and Verification by Smoke Test and Visual Inspection		☐ Pass ☐ Fail
12	Pass if Sealing of all Accessible Leaks and Verification by Smoke Test and Visual Inspection		☐ Pass ☐ Fail
	Pass if One of Lines # 9 through # 12 pass		☒ Pass ☐ Fail

b. *Leakage reduction percentage ≥ 60% and verification by smoke test and visual inspection*:

This duct leakage test procedure is specified in Section RC.4.3.4 of Appendix RC to the "2005 Residential ACM Manual".

The leakage target of ≥ 60% is a minimum target. The duct system must also pass the smoke test and the visual inspection test. If the smoke test indicates that there are still opportunities for sealing accessible ducts, then duct sealing of accessible ducts will continue until there is compliance with the smoke test.

The following is a completed example of the CF-6R indicating compliance with this duct testing procedure.

✓ ☐ **DUCT LEAKAGE REDUCTION**

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

NEW CONSTRUCTION:			
	Duct Pressurization Test Results (CFM @ 25 Pa)	Measured Values	
1	Enter Tested Leakage Flow in CFM:		
2	Fan Flow: Calculated (Nominal: ✓ ☐ Cooling ✓ ☐ Heating) or ✓ ☐ 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 output, enter total calculated or measured fan flow in CFM here:		✓ ✓
3	Pass if Leakage Percentage≤ 6% for Final or ≤ 4% at Rough-in: [100 x [_____(Line # 1) / _____(Line # 2)]]		☐ Pass ☐ Fail
ALTERATIONS: Duct System and/or HVAC Equipment Change-Out			
4	Enter Tested Leakage Flow in CFM from **Pre-Test** of Existing Duct System Prior to Duct System Alteration and/or Equipment Change-Out.	**600**	
5	Enter Tested Leakage Flow in CFM from **Final Test** of New Duct System or Altered Duct System for Duct System Alteration and/or Equipment Change-Out.	**228**	
6	Enter Reduction in Leakage for Altered Duct System [**600** (Line # 4) Minus **228** (Line # 5)] – (Only if Applicable)	**372**	
7	Enter Tested Leakage Flow in CFM to Outside (Only if Applicable)		✓ ✓
8	Entire New Duct System - Pass if Leakage Percentage ≤ 6% for Final [100 x [_____(Line # 5) / _____Line # 2)]]		☐ Pass ☐ Fail
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:			✓ ✓
9	Pass if Leakage Percentage ≤ 15% [100 x [_____(Line # 5) / _____ (Line # 2)]]		☐ Pass ☐ Fail
10	Pass if Leakage to Outside Percentage ≤ 10% [100 x [_____(Line # 7) / _____ (Line # 2)]]		☐ Pass ☐ Fail
11	Pass if Leakage Reduction Percentage ≥ 60% [100 x [**372** (Line # 6) / **600** (Line # 4)]] and Verification by Smoke Test and Visual Inspection	**62 %**	☒ Pass ☐ Fail
12	Pass if Sealing of all Accessible Leaks and Verification by Smoke Test and Visual Inspection		☐ Pass ☐ Fail
	Pass if One of Lines # 9 through # 12 pass		☒ Pass ☐ Fail

c. *Sealing of all accessible leaks and verification by smoke test and visual inspection*:

This duct leakage test procedure is specified in Sections RC.4.3.5, RC.4.3.6 and RC.4.3.7 of Appendix RC to the "2005 Residential ACM Manual".

Prior to using the "Sealing of all Accessible Leaks and Verification by Smoke Test and Visual Inspection" verification standard, the installing HVAC contractor must show duct testing failure using one of the three duct testing options. The three duct testing options are lines # 9, 10 and 11 of the duct testing and verification section of the CF-6R. When the "Sealing of all Accessible Leaks and Verification by Smoke Test and Visual Inspection" option is used for verification of the standards, the HERS rater must also verify the compliance standard.

The following is a completed example of the CF-6R indicating compliance with this duct verification procedure.

✓ ☐ **DUCT LEAKAGE REDUCTION**

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

NEW CONSTRUCTION:			
	Duct Pressurization Test Results (CFM @ 25 Pa)	Measured Values	
1	Enter Tested Leakage Flow in CFM:		
2	Fan Flow: Calculated (Nominal: ✓ ☐ Cooling ✓ ☐ Heating) or ✓ ☐ 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 output, enter total calculated or measured fan flow in CFM here:		✓ ✓
3	Pass if Leakage Percentage≤ 6% for Final or ≤ 4% at Rough-in: [100 x [_____(Line # 1) / _____(Line # 2)]]		☐ Pass ☐ Fail
ALTERATIONS: Duct System and/or HVAC Equipment Change-Out			
4	Enter Tested Leakage Flow in CFM from **Pre-Test** of Existing Duct System Prior to Duct System Alteration and/or Equipment Change-Out.	**600**	
5	Enter Tested Leakage Flow in CFM from **Final Test** of New Duct System or Altered Duct System for Duct System Alteration and/or Equipment Change-Out.	**300**	
6	Enter Reduction in Leakage for Altered Duct System [**600** (Line # 4) Minus **300** (Line # 5)] – (Only if Applicable)	**300**	
7	Enter Tested Leakage Flow in CFM to Outside (Only if Applicable)		✓ ✓
8	Entire New Duct System - Pass if Leakage Percentage ≤ 6% for Final [100 x [_____(Line # 5) / _____Line # 2)]]		☐ Pass ☐ Fail
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:			✓ ✓
9	Pass if Leakage Percentage ≤ 15% [100 x [_____(Line # 5) / _____ (Line # 2)]]		☐ Pass ☐ Fail
10	Pass if Leakage to Outside Percentage ≤ 10% [100 x [_____(Line # 7) / _____ (Line # 2)]]		☐ Pass ☐ Fail
11	Pass if Leakage Reduction Percentage ≥ 60% [100 x [**300** (Line # 6) / **600** (Line # 4)]] and Verification by Smoke Test and Visual Inspection	**50 %**	☐ Pass ☒ Fail
12	Pass if Sealing of all Accessible Leaks and Verification by Smoke Test and Visual Inspection		☒ Pass ☐ Fail
	Pass if One of Lines # 9 through # 12 pass		☒ Pass ☐ Fail

4. **Refrigerant Charge Measure (or TXV)**:

   The requirement for either a refrigerant charge measurement or a TXV is specified in Section 8.4.2 of Chapter 8 of the "2005 Residential Compliance Manual". This requirement applies not only when a completely new split system air conditioner or heat pump is installed but also when components of an existing split system air conditioner or heat pump are installed. Refrigerant Charge Measurement (or TXV) for alterations/additions (change-outs) applies to climate zones 2 and 8 through 15.

   The TXV verification procedure is specified in Section RI.2 of Appendix RI to the "2005 Residential ACM Manual". Additional TXV verification procedures are also specified in Section 4.3.2 of Chapter 4 of the "2005 Residential Compliance Manual".

   The following are completed examples of the CF-6R indicating compliance with the TXV verification procedure.

Page 5 of 12 of the CF-6R –

✓ ☒ **THERMOSTATIC EXPANSION VALVE (TXV)**

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

				✓	✓
✓	☒ Yes	☐ 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.	☒	☐
			Yes is a pass	Pass	Fail

Page 6 of 12 of the CF-6R –

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

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

5. **Alternatives to Duct Testing**:

Table 8-3 of Section 8.4.2 of Chapter 8 of the "2005 Residential Compliance Manual" specify increased equipment efficiency, TXV and duct insulation improvement alternatives to duct testing for compliance. HERS rater verification of the EER and TXV are still required.

The EER verification procedure is specified in Section RI.3 and RI.4 of Appendix RI to the "2005 Residential ACM Manual".

The following are completed examples of the CF-6R indicating compliance with the EER and the TXV verification procedures.

a. *High EER Air Conditioner –*

✓ ☒ **HIGH EER AIR CONDITIONER**

Procedures for verification are available in RACM, Appendix RI.

1	✓	☒ Yes	☐ No	EER values of installed systems match the CF-1R		
2	✓	☒ Yes	☐ No	For split system, indoor coil is matched to outdoor coil	✓	✓
3	✓	☒ Yes	☐ No	Time Delay Relay Verified (If Required)	☒	☐
				Yes to 1 and 2; and 3 (If Required) is a pass	Pass	Fail

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

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

b. *TXV –*

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✓ ☒ **THERMOSTATIC EXPANSION VALVE (TXV)**

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

				✓	✓
✓	☒ Yes	☐ 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.	☒	☐
			Yes is a pass	Pass	Fail

Page 6 of 12 of the CF-6R -

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

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