DOCKETED		
Docket Number:	15-BSTD-02	
Project Title:	Residential Compliance Manual and Documents	
TN #:	232820-13	
Document Title:	2016-CF3R-ENV-20a-BuildingEnvelopeAirLeakage- SinglePointTest-Manual Meterpdf	
Description:	N/A	
Filer:	er: Corrine Fishman	
Organization:	California Energy Commission	
Submitter Role:	Public Agency	
Submission Date:	4/22/2020 9:54:01 AM	
Docketed Date:	4/22/2020	

BUILDING LEAKAGE DIAGNOSTIC TEST



-	_	-		••				-
\sim		CE3	D E	VIV. 2	0 H /D	ovico	4 00/46)	

020 0: 0: Cit 2: (1 (1:01:000 00; 10)	0.12.10	
CERTIFICATE OF VERIFICATION		CF3R-ENV-20-H
Building Leakage Diagnostic Test		(Page 1 of 3)
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City:	Zip Code:

A. Bu	ilding Air Leakage – General Information	
01	Test Procedure Used	
02	Building Air Leakage Target from CF1R	
03	Indoor Temperature During Test (°F)	
04	Outdoor Temperature During Test (°F)	
05	Blower Door Location	
06	Building Elevation (ft)	
07	Building Volume (ft³)	
08	Date of the Diagnostic Test for this Dwelling	

B. Dia	B. Diagnostic Equipment Information				_3;	10	2
01	Number of Manome	ters Used to Measure Home P	ressurization			0.	10
	02	03	0	4	05	7	06
	Manometer Make	Manometer Model	Mano Sei Nun	rial	Manometer Calibration Date	2	Manometer Calibration Status
07	Number of Fans Used	d to Pressurize Home	-	1	40	<u> </u>	
08 09			7.0	10		11	
Fan Make Fan Model		el	Fan S	erial Number	F	an Configuration (rings)	
					5		
			VA.	0			

ENV20a - Single Point Air Tightness Test With Manual Meter

C. Env	velope Leakage Diagnostic Test	
01	Time Average Period of Meter	
02	Test Methodology	*O
03	Baseline Building Pressure Reading #1	
04	Baseline Building Pressure Reading #2	O.
05	Baseline Building Pressure Reading #3	
06	Baseline Building Pressure Reading #4	
07	Baseline Building Pressure Reading #5	
08	Baseline Range	
09	Accuracy Level	
10	Average Baseline Building Pressure Reading (Pa)	
11	Pre-Test Baseline Building Pressure (Pa)	
12	Unadjusted Building Pressure Target (Pa)	
13	Unadjusted Building Pressure Measured (Pa)	
14	Induced Building Pressure Check	
15	Nominal Fan flow at Above Fan Pressure (cfm)	
16	Nominal CFM50	

D. Altitude and Temperature Correction		
01	Altitude Correction Factor	
02	Temperature Correction Factor	
03	Corrected CFM50	

E. Accuracy Adjustment		
01	Accuracy Adjustment Factor	
02	Adjusted CFM50 (measured air leakage rate)	

STATE OF CALIFORNIA

CALIFORNIA ENERGY COMMISSION

BUILDING LEAKAGE DIAGNOSTIC TEST	
CEC-CF3R-ENV-20-H (Revised 09/16)	

CERTIFICATE OF VERIFICATION		CF3R-ENV-20-H
Building Leakage Diagnostic Test		(Page 2 of 3)
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City:	Zip Code:

F. Com	npliance Statement
01	

G. Ad	ditional Requirements for Con	npliance	
01	Open all interior doors and access including those to closets and those between a conditioned basement and attic.		
02	HVAC Supply and return register	dampers shall be fully open.	
03	Temporarily sealing of combustion flues and intermittent exhaust fans are not allowed. Some examples are: combustion flues, fresh air intakes, dryer vents, bathroom and kitchen exhaust vents and fire place.		
04	Continuously operated ventilation devices like energy recovery ventilators may be sealed.		
05	Multifamily – Each dwelling unit must be tested individually and shown to meet the leakage requirements. Pressurization of the adjacent dwelling units while conducting this test is not allowed.		
06	Verification Status: Dass - 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		
07	Correction Notes:		
The re	snonsible nerson's signature on t	his compliance document affirms that all applicable requirements in this table have been met upless	

otherwise noted in the Verification Status and the Corrections Notes in this table.

H. Determination of HERS Verification Compliance

verification pn All applicable sections of this document shall indicate compliance with the specified verification protocol requirements in order for this Certificate

BUILDING LEAKAGE DIAGNOSTIC TEST



	(29)
ALIFORNIA ENERGY COMMISSION	Tennique man

CEC-CF3R-ENV-20-H (Revised 09/16)	CALIFO	RNIA ENERGY COMMISSION
CERTIFICATE OF VERIFICATION		CF3R-ENV-20-H
Building Leakage Diagnostic Test		(Page 3 of 3)
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City:	Zip Code:

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT					
1. I certify that this Certificate of Verification documentation is accurat	e 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	30				
 The installed features, materials, components, manufactured device verification identified on this Certificate of Verification comply with requirements specified on the Certificate of Compliance for the buil. The information reported on applicable sections of the Certificate(s responsible for the construction or installation conforms to the requipe the enforcement agency. 	ied and reported on this Certificate of Verification (responsible rater). es, or system performance diagnostic results that require HERS the applicable requirements in Reference Appendices RA2, RA3, and the ding approved by the enforcement agency. b) of Installation (CF2R) signed and submitted by the person(s) uirements specified on the Certificate(s) of Compliance (CF1R) approved shall be posted, or made available with the building permit(s) issued for applicable inspections. I understand that a registered copy of this				
BUILDER OR INSTALLER INFORMATION AS SHOWN ON THE CERTIFICATE	E OF INSTALLATION				
Company Name (Installing Subcontractor, General Contractor, or Builder/Owner):	.0.0				
Responsible Builder or Installer Name: CSLB License:					
HERS PROVIDER DATA REGISTRY INFORMATION	, ,(0)				
Sample Group Number (if applicable):	Dwelling Test Status in Sample Group (if applicable)				
HERS RATER INFORMATION	~{~				
HERS Rater Company Name:	6,				
Responsible Rater Name:	Responsible Rater Signature:				

Date Signed:

Responsible Rater Certification Number $\mbox{w/}$ this HERS Provider:

FOL . MC

(Page 1 of 3)

CF3R-ENV20a-H User Instructions

Section A. Building Air Leakage - General Information

- 1. Select the appropriate test procedure. This selection will determine which version of this document will be used (a, b, c, d, or e) and therefore which data must be collected. Note that single-point tests can only be used under certain conditions. Note that newer manometers have automatic functions for compensating for baseline (automatic baseline) and compensating for house pressures other than the target (@50 Pa). It is preferable to use these, when available; however, if these automatic functions are to be used, they must be used for BOTH automatic baseline and pressure compensation.
- 2. This number is automatically pulled from the CF1R and is the target maximum that was entered by the documentation author. If this number cannot be achieved, the performance compliance calculations can be redone with a higher number or without the requirement for building air leakage.
- 3. Enter the indoor temperature measured at the time that the building air leakage test was performed.
- 4. Enter the outdoor temperature measured at the time that the building air leakage test was performed.
- 5. Provide a brief description of the location where the blower door was installed for the test. Examples: "front entry door on west side of house", "door between house and garage", "large window in family room".
- 6. Enter the building elevation use the value for the closest city found in Joint Appendix JA2.2. Only elevations higher than 5,000 feet require an adjustment to the calculations.
- 7. This number is automatically pulled from the CF1R. It is used to calculate air changes.
- 8. Enter the date that the building leakage test data was collected.

Section B. Diagnostic Equipment Information

- 1. Enter the number of manometers used to measure the home pressurization. If more than one system is used, the fan flow numbers need to be manually added together, unless blower door software is used that will accommodate multiple fan systems running simultaneously.
- 2. Enter the make (brand) of the manometer used to collect the building air leakage data. Examples: Retrotec, Energy Conservatory.
- 3. Enter the model of the manometer used to collect the building air leakage data. Examples: DM-2 Mark II, DG700.
- 4. Enter the serial number of the manometer used to collect the building air leakage data.
- 5. Enter the most recent date that the manometer was calibrated by following manufacturer's calibration specifications.
- 6. This field is automatically filled. If the calibration date was more than 12 months prior to the test date entered in A08, above, an error will appear.
- 7. Enter the number of blower door fan systems required to run simultaneously to pressurize the home for the building air leakage test. If more than one system is used, the fan flow numbers need to be manually added together, unless blower door software is used that will accommodate multiple fan systems running simultaneously.
- 8. Enter the make (brand) of the fan used to collect the building air leakage data. Examples: Retrotec, Energy Conservatory.
- 9. Enter the model of the fan used to collect the building air leakage data. Examples: US1000, Q46, BD3, BD4.
- 10. Enter the serial number of the fan used to collect the building air leakage data.
- 11. Enter the fan configuration shown on the meter. This is sometimes referred to as "range configuration", "CONFIG" or "rings". Examples: Open, A, B, C8.

Section C. Envelope Leakage Test (ENV20a)

- 1. Enter the Time Average Period used on the manometer during the test. Must be at least 10 seconds.
- 2. Select the type of test being performed: Pressurization (air blowing into house) or Depressurization (air blowing out of house).
- 3. Enter the first of five baseline building pressure readings (Resolution of 0.1 Pa).
- 4. Enter the second of five baseline building pressure readings (Resolution of 0.1 Pa).
- 5. Enter the third of five baseline building pressure readings (Resolution of 0.1 Pa).
- 6. Enter the fourth of five baseline building pressure readings (Resolution of 0.1 Pa).
- 7. Enter the fifth of five baseline building pressure readings (Resolution of 0.1 Pa).
- 8. This field is automatically calculated. The Baseline Range is the largest value of the five baseline readings minus the smallest value of the five baseline readings.
- 9. This field is automatically calculated. "Standard" is when the baseline range is less than 5 Pa; "Reduced" is when the baseline range is between 5 and 10 Pa (inclusive). If the baseline range is greater than 10 you must use a multi-point procedure.
- 10. This field is automatically calculated. Average Baseline Building Pressure Reading is simply the average of the five baseline readings.
- 11. Enter the Pre-Test Baseline Building Pressure. The protocols allow the average to be used or a newly measured number can be used.
- 12. This field is automatically calculated. The Unadjusted Building Pressure Target is the Pre-Test Baseline Building Pressure plus the target building pressure (-50 Pa).
- 13. Enter the Measured Unadjusted Building Pressure straight from the manometer. It should be as close to the Unadjusted Building Pressure Target as possible.
- 14. This field is automatically calculated. A check is performed to make sure that a pressure of at least -15 pa was achieved. If not, the Single Point Test may not be used.
- 15. Enter the fan flow from the manometer that corresponds to the Measured Unadjusted Building Pressure.
- 16. This field is automatically calculated. The Measured Unadjusted Building Pressure is automatically adjusted for a target pressure of -50 Pa.

(Page 2 of 3)

Section D. Altitude and Temperature Correction

- 1. This field is automatically calculated. The equation used to calculate this value in the field equals:
 - a. If the elevation is less than or equal to 5,000 ft, the Altitude Correction Factor is 1 (no adjustment).
 - b. If the elevation is greater than 5,000 ft, the Altitude Correction equals 1 + (0.000006 * elevation in feet)
- 2. Enter the Temperature Correction Factor from Table RA3.8-2 or RA3.8-3 using the indoor and outdoor temperatures entered in Section A.

Table RA3.8-2 Temperature Correction Factors for Pressurization Testing- Calculated according to ASTM E779-10

				Inside 7	Tempera	ture (F)			
	50	55	60	65	70	75	80	85	90
-20	1.062	1.072	1.081	1.090	1.099	1.108	1.117	1.127	1.136
		1.066			1.093		1.111	1.120	1.129
-10	1.051	1.060	1.069	1.078	1.087	1.096	1.105	1.114	1.123
-5	1.045	1.054	1.063	1.072	1.081	1.090	1.099	1.108	1.117
		1.048	1.057	1.066	1.075	1.084	1.093	1.102	1.111
5	1.033	1.042	1.051			1.078		1.096	1.105
10	1.028	1.037	1.046			1.072		1.090	1.099
									1.093
	1.017	1.026	1.035	1.044	1.052	1.061	1.070	1.079	1.087
	1.012	1.021	1.029	1.038	1.047	1.056	1.064	1.073	1.082
									1.076
									1.071
									1.065
	0.992	1.000	1.009	1.017	1.026	1.035	1.043		1.060
									1.055
								1	1.050
								1	1.045
									1.040
									1.035
75									1.030
80	0.959	0.967	0.976	0.984					1.025
85	0.955	0.963	0.971	0.979					1.020
90	0.950	0.958	0.967	0.975					1.016
95	0.946	0.954	0.962	0.970					1.011
100	0.942	0.950	0.958	0.966	0.970	0.982	0.990	0.998	1.007
105	0.938	0.946	0.954	0.962					1.002
110	0.933	0.942	0.950	0.952					0.998
al	10	ER	S ^v	5,					
	-5 0 5 10 15 20 25 30 35 40 45 50 55 60 65	-20 1.062 -15 1.056 -10 1.051 -5 1.045 0 1.039 5 1.033 10 1.028 15 1.023 20 1.017 25 1.012 30 1.007 35 1.002 40 0.997 45 0.992 50 0.987 55 0.982 60 0.997 65 0.973 70 0.968	-20 1.062 1.072 -15 1.056 1.066 -10 1.051 1.060 -5 1.045 1.054 0 1.039 1.048 5 1.033 1.042 10 1.028 1.037 15 1.023 1.031 20 1.017 1.026 25 1.012 1.021 30 1.007 1.015 35 1.002 1.010 40 0.997 1.005 45 0.992 1.000 50 0.987 0.995 55 0.982 0.990 60 0.997 0.986 65 0.973 0.981 70 0.968 0.976	-20 1.062 1.072 1.081 -15 1.056 1.066 1.075 -10 1.051 1.060 1.069 -5 1.045 1.054 1.063 0 1.039 1.048 1.057 5 1.033 1.042 1.051 10 1.028 1.037 1.046 15 1.023 1.031 1.040 20 1.017 1.026 1.035 25 1.012 1.021 1.029 30 1.007 1.015 1.024 35 1.002 1.010 1.019 40 0.997 1.005 1.014 45 0.992 1.000 1.009 50 0.987 0.995 1.004 55 0.982 0.990 0.999 60 0.997 0.986 0.994 65 0.973 0.981 0.985 70 0.968 0.976 0.985	50 55 60 65 -20 1.062 1.072 1.081 1.090 -15 1.056 1.066 1.075 1.084 -10 1.051 1.060 1.069 1.078 -5 1.045 1.054 1.063 1.072 0 1.039 1.048 1.057 1.066 5 1.033 1.042 1.051 1.060 10 1.028 1.037 1.046 1.055 15 1.023 1.031 1.040 1.049 20 1.017 1.026 1.035 1.044 25 1.012 1.021 1.029 1.038 30 1.007 1.015 1.024 1.033 35 1.002 1.010 1.019 1.028 40 0.997 1.005 1.014 1.023 45 0.992 1.000 1.009 1.017 50 0.987 0.995 1.004	50 55 60 65 70 -20 1.062 1.072 1.081 1.090 1.099 -15 1.056 1.066 1.075 1.084 1.093 -10 1.051 1.060 1.069 1.078 1.087 -5 1.045 1.054 1.063 1.072 1.081 0 1.039 1.048 1.057 1.066 1.075 5 1.033 1.042 1.051 1.060 1.069 10 1.028 1.037 1.046 1.055 1.064 15 1.023 1.031 1.040 1.049 1.058 20 1.017 1.026 1.035 1.044 1.052 25 1.012 1.021 1.029 1.038 1.047 30 1.007 1.015 1.024 1.033 1.041 35 1.002 1.010 1.019 1.028 1.036 40 0.997 1.005	-20 1.062 1.072 1.081 1.090 1.099 1.108 -15 1.056 1.066 1.075 1.084 1.093 1.102 -10 1.051 1.060 1.069 1.078 1.087 1.096 -5 1.045 1.054 1.063 1.072 1.081 1.090 0 1.039 1.048 1.057 1.066 1.075 1.084 5 1.033 1.042 1.051 1.060 1.069 1.078 10 1.028 1.037 1.046 1.055 1.064 1.072 15 1.023 1.031 1.040 1.049 1.058 1.067 20 1.017 1.026 1.035 1.044 1.052 1.061 25 1.012 1.021 1.029 1.038 1.047 1.056 30 1.007 1.015 1.024 1.033 1.041 1.050 35 1.002 1.010 1.019 <td>50 55 60 65 70 75 80 -20 1.062 1.072 1.081 1.090 1.099 1.108 1.117 -15 1.056 1.066 1.075 1.084 1.093 1.102 1.111 -10 1.051 1.060 1.069 1.078 1.087 1.096 1.105 -5 1.045 1.054 1.063 1.072 1.081 1.090 1.099 0 1.039 1.048 1.057 1.066 1.075 1.084 1.093 5 1.033 1.042 1.051 1.060 1.069 1.078 1.081 10 1.028 1.037 1.046 1.055 1.064 1.072 1.081 15 1.023 1.031 1.040 1.049 1.058 1.067 1.076 20 1.017 1.026 1.035 1.044 1.052 1.061 1.070 25 1.012 1.021 <</td> <td>50 55 60 65 70 75 80 85 -20 1.062 1.072 1.081 1.090 1.099 1.108 1.117 1.127 -15 1.056 1.066 1.075 1.084 1.093 1.102 1.111 1.120 -10 1.051 1.060 1.069 1.078 1.087 1.096 1.105 1.114 -5 1.045 1.054 1.063 1.072 1.081 1.090 1.099 1.108 0 1.039 1.048 1.057 1.066 1.075 1.084 1.090 1.099 1.108 5 1.033 1.042 1.051 1.060 1.069 1.078 1.087 1.096 10 1.028 1.037 1.046 1.055 1.064 1.072 1.081 1.090 15 1.023 1.031 1.040 1.049 1.058 1.064 1.070 1.076 1.084 20</td>	50 55 60 65 70 75 80 -20 1.062 1.072 1.081 1.090 1.099 1.108 1.117 -15 1.056 1.066 1.075 1.084 1.093 1.102 1.111 -10 1.051 1.060 1.069 1.078 1.087 1.096 1.105 -5 1.045 1.054 1.063 1.072 1.081 1.090 1.099 0 1.039 1.048 1.057 1.066 1.075 1.084 1.093 5 1.033 1.042 1.051 1.060 1.069 1.078 1.081 10 1.028 1.037 1.046 1.055 1.064 1.072 1.081 15 1.023 1.031 1.040 1.049 1.058 1.067 1.076 20 1.017 1.026 1.035 1.044 1.052 1.061 1.070 25 1.012 1.021 <	50 55 60 65 70 75 80 85 -20 1.062 1.072 1.081 1.090 1.099 1.108 1.117 1.127 -15 1.056 1.066 1.075 1.084 1.093 1.102 1.111 1.120 -10 1.051 1.060 1.069 1.078 1.087 1.096 1.105 1.114 -5 1.045 1.054 1.063 1.072 1.081 1.090 1.099 1.108 0 1.039 1.048 1.057 1.066 1.075 1.084 1.090 1.099 1.108 5 1.033 1.042 1.051 1.060 1.069 1.078 1.087 1.096 10 1.028 1.037 1.046 1.055 1.064 1.072 1.081 1.090 15 1.023 1.031 1.040 1.049 1.058 1.064 1.070 1.076 1.084 20

Table RA3.8-3 Temperature Correction Factors for Depressurization Testing- Calculated according to ASTM E779-10

		Inside Temperature (F)								
		50	55	60	65	70	75	80	85	90
	-20	0.865	0.861	0.857	0.853	0.849	0.845	0.841	0.837	0.833
	-15	0.874	0.870	0.866	0.862	0.858	0.854	0.850	0.846	0.842
	-10	0.883	0.879	0.874	0.870	0.866	0.862	0.858	0.854	0.850
	-5	0.892	0.887	0.883	0.879	0.875	0.871	0.867	0.863	0.859
	0	0.900	0.896	0.892	0.887	0.883	0.879	0.875	0.871	0.867
	5	0.909	0.905	0.900	0.896	0.892	0.888	0.883	0.879	0.875
	10	0.918	0.913	0.909	0.905	0.900	0.896	0.892	0.888	0.884
	15	0.927	0.922	0.918	0.913	0.909	0.905	0.900	0.896	0.892
	20	0.935	0.931	0.926	0.922	09.17	0.913	0.909	0.905	0.900
	25	0.944	0.939	0.935	0.930	0.926	0.922	0.917	0.913	0.909
	30	0.952	0.948	0.943	0.939	0.934	0.930	0.926	0.921	0.917
	35	0.961	0.956	0.952	0.947	0.943	0.938	0.934	0.930	0.926
	40	0.970	0.965	0.960	0.956	0.951	0.947	0.942	0.938	0.934
Outside Temp (F)	45	0.978	0.974	0.961	0.964	0.960	0.955	0.951	0.946	0.942
	50	0.987	0.982	0.977	0.973	0.968	0.963	0.959	0.955	0.950
	55	0.995	0.990	0.986	0.981	0.976	0.972	0.967	0.963	0.958
	60	1.004	0.999	0.994	0.998	0.985	0.980	0.976	0.971	0.967
	65	1.012	1.008	1.003	0.998	0.993	0.988	0.984	0.979	0.975
	70	1.021	1.016	1.011	1.006	1.001	0.997	0.992	0.988	0.983
	75	1.029	1.024	1.019	1.015	1.010	1.005	1.000	0.996	0.991
	80	1.038	1.033	1.028	1.023	1.018	1.013	1.009	1.004	0.999
	85	1.046	1.041	1.036	1.031	1.026	1.022	1.017	1.012	1.008
	90	1.055	1.050	1.045	1.040	1.035	1.030	1.025	1.020	1.016
	95	1.063	1.058	1.053	1.048	1.043	1.038	1.033	1.028	1.024
	100	1.072	1.066	1.061	1.056	1.051	1.046	1.041	1.037	1.032
	105	1.080	1.075	1.070	1.064	1.059	1.054	1.050	1.045	1.040
	110	1.088	1.083	1.078	1.073	1.068	1.063	1.058	1.053	1.048

3. This field is automatically calculated. The Corrected CFM50 is the Nominal CFM50 from Section C multiplied by the Altitude and Temperature Correction Factors.

Section E. Accuracy Adjustment

- 1. This field is automatically calculated:
 - a. If the Accuracy Level from Section C is "Standard", the Accuracy Adjustment will be 1 (no adjustment)
 - b. If the Accuracy Level from Section C is "Reduced", Accuracy Adjustment equation equals 1+[0.1+(50/Nominal CFM50)]
- 2. This field is automatically calculated. The Adjusted CFM50 is the Corrected CFM50 multiplied by the Accuracy Adjustment. Note This is the number that must be less than or equal to the target building air leakage from the CF1R, shown in A02.

Section F. Compliance Statement

1. This field is automatically calculated. A check is performed to make sure that the meter has been properly calibrated and that the measured infiltration is less than the target infiltration.

Section G. Additional Requirements for Compliance

- 1. This statement must be true (or not applicable) for the test to conform to the protocols.
- 2. This statement must be true (or not applicable) for the test to conform to the protocols.
- 3. This statement must be true (or not applicable) for the test to conform to the protocols.
- 4. This statement must be true (or not applicable) for the test to conform to the protocols.
- 5. This statement must be true (or not applicable) for the test to conform to the protocols.

CERTIFICATE OF VERIFICATION - DATA FIELD DEFINITIONS AND CALCULATIONS	CF3R-ENV-20-H
Building Leakage Diagnostic Test ENV-20a	(Page 1 of 3)

A. Bu	A. Building Air Leakage – General Information					
01	Test Procedure Used	< <user down="" input,="" list:<="" p="" pull=""> Single-Point Test with Manual Meter – Display ENV-20a below; Single-Point Test with Automatic Meter – Display ENV-20b below; Multi-Point Test – Display ENV-20c below; Repeated Single Point with Manual Meter – Display ENV-20d below; Repeated Single Point with Automatic Meter – Display ENV-20e below</user>				
02	Building Air Leakage Target from CF1R	< <number cf1r="" from="" pulled="">></number>				
03	Indoor Temperature During Test (°F)	< <user degf="" input,="">></user>				
04	Outdoor Temperature During Test (°F)	< <user degf="" input,="">></user>				
05	Blower Door Location	< <user 50="" characters="" input,="" maximum="" text,="">></user>				
06	Building Elevation (ft)	< <user ft="" input,="">></user>				
07	Building Volume (ft ³)	< <pul><<pull cf-1r="" from="">></pull></pul>				
08	Date of the Diagnostic Test for this Dwelling	< <user (use="" control)="" date="" format="" input:="" validation="">></user>				
	·	-0. 10				

B. Diagnostic Equipment Information										
01 Number of Manome	01 Number of Manometers Used to Measure Home Pressurization < <user input,="" integer="">> For entries >1, duplicate lines B. 2-6</user>									
02	03	0	4	05	7	06				
Manometer Make	Manometer Model	Manometer Serial Number		Serial		Serial		Serial Calibration		Manometer Calibration Status
< <user input,="" text,<br="">maximum 50 characters>></user>	< <user input,="" text,<br="">maximum 50 characters>></user>	< <user in<br="">maximum 50</user>		< <user (e<br="" input,="" text="">maximum 50 charact</user>		<calculated "warning="" -="" 12="" 5="" 8,="" a="" a.="" b.="" building="" calibration="" comply="" current="" date="" diagnostic="" display="" else="" expired.="" field:="" if="" in="" is="" leakage="" manometer="" message:="" months="" of="" order="" required="" test="" test"="" the="" then="" this="" to="" valid";="" with="" within="">></calculated>				
07 Number of Fans Used to Pressurize Home			< <user input,<="" td=""><td>integer>> For entries ></td><td>1, dupli</td><td>cate lines B. 8-11</td></user>	integer>> For entries >	1, dupli	cate lines B. 8-11				
08	09	09		10		11				
Fan Make	Fan Mod	el	Fan S	Serial Number		Fan Configuration (rings)				
< <user input,="" maximum<br="" text,="">characters>></user>	n 50 < <user input,="" r<br="" text,="">characters</user>		50 < <user 50="" characters="" input,="" maximum="" text,="">></user>		< <user 50="" characters="" input,="" maximum="" text,="">></user>					

ENV20a - Single Point Air Tightness Test With Manual Meter

CERTIFICATE OF VERIFICATION - DATA FIELD DEFINITIONS AND CALCULATIONS	CF3R-ENV-20-H
Building Leakage Diagnostic Test ENV-20a	(Page 2 of 3)

C. Env	relope Leakage Diagnostic Test	
01	Time Average Period of Meter	< <user 10,="" be="" but="" entry="" in="" less="" must="" no="" second="" than="">></user>
02	Test Methodology	< <user down="" input,="" list:<="" pull="" td=""></user>
UZ	Test Methodology	Pressurization; Depressurization
03	Baseline Building Pressure Reading #1	< <user entry,="" pa="">> (Resolution of 0.1 Pa)</user>
04	Baseline Building Pressure Reading #2	< <user entry,="" pa="">> (Resolution of 0.1 Pa)</user>
05	Baseline Building Pressure Reading #3	< <user entry,="" pa="">> (Resolution of 0.1 Pa)</user>
06	Baseline Building Pressure Reading #4	< <user entry,="" pa="">> (Resolution of 0.1 Pa)</user>
07	Baseline Building Pressure Reading #5	< <user entry,="" pa="">> (Resolution of 0.1 Pa)</user>
08	Baseline Range	<ccalculated, 3-7="" c.="" from="" highest="" lowest="" of="" rows="" subtract="" the="">></ccalculated,>
09	Accuracy Level	<pre></pre> <pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre><pre></pre><pre></pre><pre></pre><pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre><pre></pre></pre></pre></pre>
10	Average Baseline Building Pressure Reading (Pa)	<< calculated average rows C. 3-7>>
11	Pre-Test Baseline Building Pressure (Pa)	< <user 10,="" c.="" input="" or="" pa="" row="">></user>
12	Unadjusted Building Pressure Target (Pa)	<ccalculated +="" -50="" .="" 11="" 11;="" 2="" 50="" c="" c.="" depressurization="" equal="" equation,="" if="" pressurization="" row="" to="" use="" value:="">> (Resolution of 0.1 Pa)</ccalculated>
13	Unadjusted Building Pressure Measured (Pa)	< <user be="" co2="depressurization" entered="" if="" must="" pa;="" then="" value="" value,=""> - 75; elseif CO2 = pressurization then value must be < 75; else report "Measured building pressure greatly exceeds target – Do Not Proceed">>></user>
14	Induced Building Pressure Check	< <calculated (row="" <math="" [absolute="" c.="" value="" value,="">13 - \text{row C. } 11)], if equal to or greater than ([absolute value (C.$11*4$)] + 15 Pa), report "Induced pressure within range for single point test; else report "Induced pressure too low for single point test - Do Not Proceed">>></calculated>
15	Nominal Fan Flow at Above Fan Pressure (cfm)	< <user (cfm)="" entered="" value,="">> (Resolution of 1 CFM)</user>
16	Nominal CFM50	< <calculated (50="" (row="" 11)]]^0.65="" 13="" 15="" [absolute="" c.="" row="" value="" value,="" x="" –="">></calculated>

D. Alti	D. Altitude and Temperature Correction				
	Altitude Correction Factor	< <calculated if<="" td="" value,=""></calculated>			
01	VO. 7 A.	row A. 6 ≤ 5000 Ft = 1;			
		row A. 6 > 5000 = 1 + .000006 * row A. 6>>			
02	Temperature Correction Factor	< <fr><from and="" ra3.8-2="" ra3.8-3="" tables="">></from></fr>			
03	Corrected CFM50	<calculated *="" 1="" 16*altitude="" c.="" correction="" d.="" row="" td="" temperature<="" value,=""></calculated>			
03	7/0 //0 ///	correction D. 2>>			

E. Acc	uracy Adjustment	
. 0	Accuracy Adjustment Factor	< <calculated if<="" th="" value,=""></calculated>
01		row C. 9 is "Standard" = 1; row C. 9 is "Reduced" = 1+0.1*{50/[absolute value (row C. 13 – row C. 11)]}>>
02	Adjusted CFM50 (measured air leakage rate)	< <calculated, 1="" 3*="" d.="" e.="" row="">></calculated,>

F. Compliance Statement << if manometer Calibration Date in B. 5 is within 12 months of the date of the diagnostic test A. 8 and if Adjusted CFM50 Leakage in E. 2 is less than or equal to the Building Air Leakage Rate Target in A. 2 then display text: "Building Passes Envelope Leakage Test"; if manometer Calibration Date in B. 5 is more than 12 months from the date of the diagnostic test A. 8 or if Adjusted CFM50 Leakage in E. 2 is more than the Building Air Leakage Rate Target in A. 2 then display text: "Building Fails Envelope Leakage Test">>>

CERTIFICATE OF VERIFICATION - DATA FIELD DEFINITIONS AND CALCULATIONS	CF3R-ENV-20-H
Building Leakage Diagnostic Test ENV-20a	(Page 3 of 3)

G. Additional Requirements for Compliance			
01	Open all interior doors and access including those to closets and those between a conditioned basement and attic.		
02	HVAC Supply and return register dampers shall be fully open.		
03	Temporarily sealing of combustion flues and intermittent exhaust fans are not allowed. Some examples are: combustion flues, fresh air intakes, dryer vents, bathroom and kitchen exhaust vents and fire place.		
04	Continuously operated ventilation devices like energy recovery ventilators may be sealed.		
05	Multifamily – Each dwelling unit must be tested individually and shown to meet the leakage requirements. Pressurization of the adjacent dwelling units while conducting this test is not allowed.		
06	Verification Status:	< <user from="" list:<="" p="" pick=""> *** 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</user>	
07	Correction Notes:	< <if <u="">Verification Status= Fail, then text entry in this Corrections Notes field is required; user input text>></if>	

H. Determination of HERS Verification Compliance

otherwise noted in the Verification Status and the Corrections Notes in this table.

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.

The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met unless

01

<<iif B. 6 = Manometer Calibration is valid; and C. 9 = Standard or Reduced; and C. 14 = Induced pressure within range for single point test; ay: Coñr.ر. or more specifiec. and F. 1 = Building Passes Envelope Leakage Test; and G. 6 = 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