INDOOR AIR QUALITY AND MECHANICAL VENTILATION

CERTIFICATE OF INSTALLATION		CF2R-MCH-27-H
Indoor Air Quality and Mechanical Ventilation		(Page 1 of 5)
Project Name:	Enforcement Agency:	Permit Number:
Dwelling Address:	City:	Zip Code:

Title 24, Part 6, Section 150.0(o) **Ventilation for Indoor Air Quality.** All dwelling units shall meet the requirements of ANSI/ASHRAE Standard62.2. Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings. ***Equation and table numbering on this form corresponds to the numbering for that information in the published ANSI/ASHRAE Standard 62.2-2010.***

A. Dwelling Mechanical Ventilation - General Information		
01	Dwelling Unit Name	
02	Building Type	
03	Project Scope	
04	Total Conditioned Floor Area of Dwelling Unit (For addition projects the conditioned floor area equals existing area plus addition area)	
05	Number of Bedrooms in Dwelling Unit (For addition projects the number of bedrooms equals the existing bedrooms plus addition bedrooms)	
06	Ventilation Operation Schedule	
07	Whole-Building Ventilation Rate Calculation Method.	
08	Whole-Building Ventilation System Type	

MCH-27c - Intermittent Ventilation Airflow - Fan Vent Rate Method

B. Whole-Building Continuous Ventilation - Fan Ventilation Rate Method

A mechanical supply system, exhaust system, or combination thereof shall provide whole-building ventilation with outdoor air each hour at no less than the rate in 62.2 equation 4.1a.

01	Required Continuous Whole-Building Ventilation Rate (Q_{fan})	

C. Intermittent Ventilation

The effective ventilation rate of an **intermittent** system is the combination of its delivered capacity, its fractional on-time, cycle time, and the ventilation effectiveness from Table 4.2.

01	In a single on off cycle, what is the ON time in hours?	
02	In a single on off cycle, what is the OFF time in hours?	
03	Fan Cycle Time Check	
04	Daily Fractional On Time (*f* used in Table 4.2).	
05	Daily Fractional On Time Check	
06	Turnover (N used in Table 4.2)	
07	Ventilation Effectiveness (e, from Table 4.2)	
08	Intermittent Ventilation Rate	
09	Installed Intermittent Ventilation Rate	
10	System Fan Efficacy Compliance Status	
11	System Fan Efficacy Compliance	

D. Compliance Statement	
01	

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E. Local Mechanical Exhaust System – Fan Selection and Duct Design Criteria for Compliance

Local mechanical exhaust fans shall be installed in each kitchen and bathroom. *Delivered local ventilation rates:*

- *All local ventilation rates have been measured using a flow hood, flow grid, or other airflow measuring device and meet the requirements of 62.2 Tables 5.1 or 5.2. OR*
- *The airflow rating at a pressure of 0.25 in. w.c. of a certified fan is assumed because the local ventilation system duct sizing meets the prescriptive requirements of 62.2 Table 5.3, or manufacturer's design criteria.*

Table 5.1
Intermittent Local Ventilation Exhaust Airflow Rates

Application	Airflow	Notes
Kitchen	100 cfm	Vented range hood (including appliance-range hood combinations) required if exhaust fan flow is less than 5 ACH.
Bathroom	50 cfm	

Table 5.2
Continuous Local Ventilation Exhaust Airflow Rates

Application	Airflow	Notes
Kitchen	5 ACH	Based on kitchen volume.
Bathroom	20 cfm	

Table 5.3
Prescriptive Duct Sizing Requirements

Duct Type	Flex Duct				Smooth Duct			
Fan Rating cfm @ 0.25 in. w.g.	50	80	100	125	50	80	100	125
	Maximum Allowable Duct Length (ft)							
Diameter, (in)	Flex Duct				Smooth Duct			
3	X	X	X	X	5	X	X	X
4	70	3	X	X	105	35	5	X
5	NL	70	35	20	NL	135	85	55
6	NL	NL	125	95	NL	NL	NL	145
7 and above	NL	NL	NL	NL	NL	NL	NL	NL

This table assumes no elbows. Deduct 15 ft of allowable duct length for each turn, elbow, or fitting. Interpolation and extrapolation in 62.2 Table 5.3 is not allowed. For airflow values not listed, use the next higher value. This table is not applicable for airflow > 125 cfm.
NL = no limit on duct length of this size.
X = not allowed, any length of duct of this size with assumed turns, elbows, fittings will exceed the rated pressure drop.

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F. Other Requirements

The items listed below (6.1 through 6.8) correspond to the information given in ASHRAE 62.2 Section 6 "Other Requirements". Refer also to Chapter 4.6 of the Residential Compliance Manual (Section 4.6.5) for information describing these "Other Requirements". The signature of the Responsible Person in the declaration statement below certifies that the building complies with these requirements specified in ASHRAE 62.2 Section 6.1 through 6.9 if applicable.

01	**6.1 Transfer Air.** Measures shall be taken to minimize air movement across envelope components to occupiable spaces from garages, unconditioned crawl spaces, and unconditioned attics. Supply and balanced ventilation systems shall be designed and constructed to provide ventilation air directly from the outdoors.
02	**6.2 Instructions and Labeling.** Information on the ventilation design and/or ventilation systems installed, instructions on their proper operation to meet the requirements of this standard, and instructions detailing any required maintenance (similar to that provided for HVAC systems) shall be provided to the owner and the occupant of the dwelling unit. Controls shall be labeled as to their function (unless that function is obvious, such as toilet exhaust fan switches). See Chapter 13 of Guideline 24[2] for information on instructions and labeling.
03	**6.3 Clothes Dryers.** Clothes dryers shall be exhausted directly to the outdoors.
04	**6.4 Combustion and Solid-Fuel Burning Appliances.** Combustion and solid-fuel burning appliances must be provided with adequate combustion and ventilation air and vented in accordance with manufacturer's installation instructions, NFPA 54/ANSI Z223.1, National Fuel Gas Code, NFPA 31, Standard for the Installation of Oil-Burning Equipment, or NFPA 211, Standard for Chimneys, Fireplaces, Vents, and Solid-Fuel Burning Appliances, or other equivalent code acceptable to the building official. Where atmospherically vented combustion appliances or solid-fuel burning appliances are located inside the pressure boundary, the total net exhaust flow of the two largest exhaust fans (not including a summer cooling fan intended to be operated only when windows or other air inlets are open) shall not exceed 15 cfm/100 ft² (75 Lps/100 m^2) of occupiable space when in operation at full capacity. If the designed total net flow exceeds this limit, the net exhaust flow must be reduced by reducing the exhaust flow or providing compensating outdoor airflow. Atmospherically vented combustion appliances do not include direct-vent appliances.
05	**6.5 Garages.** When an occupiable space adjoins a garage, the design must prevent migration of contaminants to the adjoining occupiable space. Air seal the walls, ceilings, and floors that separate garages from occupiable space. To be considered air sealed, all joints, seams, penetrations, openings between door assemblies and their respective jambs and framing, and other sources of air leakage through wall and ceiling assemblies separating the garage from the residence and its attic area shall be caulked, gasketed, weather stripped, wrapped, or otherwise sealed to limit air movement. Doors between garages and occupiable spaces shall be gasketed or made substantially airtight with weather stripping.
06	**6.6 Ventilation Opening Area.** Spaces shall have ventilation openings as listed below. Such openings shall meet the requirements of Section 6.8.
07	**6.7 Minimum Filtration.** Mechanical systems that supply air to an occupiable space through ductwork exceeding 10 ft (3 m) in length and through a thermal conditioning component, except evaporative coolers, shall be provided with a filter having a designated minimum efficiency of MERV 6, or better, when tested in accordance with ANSI/ASHRAE Standard 52.2, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size, or a minimum Particle Size Efficiency of 50% in the 3.0-10 µm range in accordance with AHRI Standard 680, Performance Rating of Residential Air Filter Equipment. The system shall be designed such that all recirculated and mechanically supplied outdoor air is filtered before passing through the thermal conditioning components. The filter shall be located and installed in such a manner as to facilitate access and regular service by the owner.
08	**6.8 Air Inlets.** Air inlets that are part of the ventilation design shall be located a minimum of 10 ft (3 m) from known sources of contamination such as a stack, vent, exhaust hood, or vehicle exhaust. The intake shall be placed so that entering air is not obstructed by snow, plantings, or other material. Forced air inlets shall be provided with rodent/insect screens (mesh not larger than 1/2 inch).
09	**6.9 Carbon Monoxide Detectors.** A carbon monoxide alarm shall be installed in each dwelling unit in accordance with NFPA 720, *Standard for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment*14, and shall be consistent with requirements of applicable laws, codes, and standards.

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

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G. Air Moving Equipment

The items listed below (7.1 through 7.3) correspond to the information given in ASHRAE 62.2 Section 7 "Air-Moving Equipment". Refer also to Chapter 4.6 of the Residential Compliance Manual (Section 4.6.6) for information describing these requirements in more detail. The signature of the Responsible Person in the declaration statement below certifies that the building complies with these requirements specified in ASHRAE 62.2 Section 7.1 through 7.3 if applicable.

01	**7.1 Selection and Installation.** Ventilation devices and equipment shall be tested and listed in accordance with specific standards. Installations of systems or equipment shall be carried out in accordance with manufacturers' design requirements and installation instructions.
02	**7.2 Sound Ratings for Fans.** Ventilation fans shall be rated for sound at no less than the minimum airflow rate required by this standard, as noted below. These sound ratings shall be at a minimum of 0.1 in. w.c. (25 Pa) static pressure. 7.2.1 **Whole-Building or Continuous Ventilation Fans.** These fans shall be rated for sound at a maximum of 1.0 sone. 7.2.2 **Intermittent Local Exhaust Fans.** Fans used to comply with Section 5.2 shall be rated for sound at a maximum of 3 sone, unless their maximum rated airflow exceeds 400 cfm (200 L/s). (Some exceptions may apply)
03	**7.3 Multibranch Exhaust Ducting.** If more than one of the exhaust fans in a dwelling unit shares a common exhaust duct, each fan shall be equipped with a back-draft damper to prevent the recirculation of exhaust air from one room to another through the exhaust ducting system.

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

H. Multifamily Buildings - Other Requirements

The items listed below correspond to the information given in ASHRAE 62.2 Section 8 "Multifamily Buildings". Refer also to Chapter 4.6 of the Residential Compliance Manual (Section 4.6.5) for information describing these requirements in more detail. The signature of the Responsible Person in the declaration statement below certifies that the building complies with these requirements specified in ASHRAE 62.2 Section 8, if applicable.

01	**8.2 Whole-Building Mechanical Ventilation.** For multifamily buildings, the term "building" in Section 4 refers to a single dwelling unit. **8.4.1 Transfer Air.** Measures shall be taken to minimize air movement across envelope components separating dwelling units, including sealing penetrations in the common walls, ceilings, and floors of each unit and by sealing vertical chases adjacent to the units. All doors between dwelling units and common hallways shall be gasketed or made substantially airtight. **8.4.1.1 Compliance.** One method of demonstrating compliance with Section 8.4.1 shall be to verify a leakage rate below a maximum of 0.2 cfm per ft^2 (100 L/s per 100 m^2) of the dwelling unit envelope area (i.e., the sum of the area of the walls between dwelling units, exterior walls, ceiling and floor) at a test pressure of 50 Pa by a blower door test. The test shall be conducted with the dwelling unit as if it were exposed to outdoor air on all sides, top, and bottom by opening doors and windows of adjacent dwelling units. **8.5.1 Exhaust Ducts.** Exhaust fans in separate dwelling units shall not share a common exhaust duct. Exhaust inlets from more than one dwelling unit may be served by a single exhaust fan downstream of all the exhaust inlets if the fan is designated and intended to run continuously or if each inlet is equipped with a back-draft damper to prevent cross-contamination when the fan is not running. **8.5.2 Supply Ducts.** Supply outlets to more than one dwelling unit may be served by a single fan upstream of all the supply outlets if the fan is designed and intended to run continuously or if each supply outlet is equipped with a back-draft damper to prevent cross-contamination when the fan is not running.

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

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DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

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

Documentation Author Name:	Documentation Author Signature:
Documentation Author Company Name:	Date Signed:
Address:	CEA/HERS Certification Identification (if applicable):
City/State/Zip:	Phone:

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Installation is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code in the applicable classification to accept responsibility for the system design, construction, or installation of features, materials, components, or manufactured devices for the scope of work identified on this Certificate of Installation and attest to the declarations in this statement (responsible builder/installer), otherwise I am an authorized representative of the responsible builder/installer.
3. The constructed or installed features, materials, components or manufactured devices (the installation) identified on this Certificate of Installation conforms to all applicable codes and regulations, and the installation conforms to the requirements given on the plans and specifications approved by the enforcement agency.
4. I understand that a HERS rater will check the installation to verify compliance, and that if such checking identifies defects; I am required to take corrective action at my expense. I understand that Energy Commission and HERS Provider representatives will also perform quality assurance checking of installations, including those approved as part of a sample group but not checked by a HERS rater, and if those installations fail to meet the requirements of such quality assurance checking, the required corrective action and additional checking/testing of other installations in that HERS sample group will be performed at my expense.
5. I reviewed a copy of the Certificate of Compliance approved by the enforcement agency that identifies the specific requirements for the scope of construction or installation identified on this Certificate of Installation, and I have ensured that the requirements that apply to the construction or installation have been met.
6. I will ensure that a registered copy of this Certificate of Installation shall be posted, or made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a registered copy of this Certificate of Installation is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Builder/Installer Name:	Responsible Builder/Installer Signature:	
Company Name: (Installing Subcontractor or General Contractor or Builder/Owner)	Position With Company (Title):	
Address:	CSLB License:	
City/State/Zip:	Phone:	Date Signed:
Third Party Quality Control Program (TPQCP) Status:	Name of TPQCP (if applicable):	

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CF2R-MCH-27c-H User Instructions

Section A. General Information

1 This information is automatically pulled from the CF1R. This is the unique identifier for this dwelling unit. Needed mostly for multifamily dwelling units. Ventilation is calculated and provided for each dwelling unit individually.

2 This information is automatically pulled from the CF1R. Choices are "single family" and "low-rise multifamily".

3 This information is automatically pulled from the CF1R. Choices are "New Construction" and "Addition greater than 1,000 sqft".

4 Value to be entered in the field equals the conditioned floor area of the space for which the ventilation is being calculated, in square feet. For additions over 1,000 sqft, this will be the floor area of the existing home plus the addition.

5 Value to be entered in the field equals the number of bedrooms in the home. For additions over 1,000 sqft, this will be the number of bedrooms in the existing home plus the number of bedrooms in the addition.

6 Select the Ventilation Operation Schedule method used from the choices provided:
- Continuous (the fan that provides ventilation will run 24/7)
- Intermittent (the fan that provides ventilation will be on some of the time and off some of the time)

7 Select the Whole Building Ventilation Rate Calculation Method from the choices provided:
- Fan Ventilation Rate Method (only assumes ventilation from the ventilation fan)
- Total Ventilation Rate Method (assumes that some ventilation is provided by infiltration)

8 Select the Whole Building Ventilation System Type from the choices provided:
- Standalone – Exhaust (ventilation fan[s] push air out of the house)
- Standalone – Supply (ventilation fan[s] push air into house)
- Standalone - Balanced (ventilation fan[s] push air into AND out of the house in equal amounts)
- Central Fan Integrated – CFI (central space condition system fan is used to pull air into the house) Note: these may not run continuously. If "Continuous" is chosen in A06 an error message will be shown. These types of ventilation systems will trigger extra field verification and scrutiny by inspection personnel.

Section B. Whole Building Continuous Ventilation – Fan Ventilation Rate Method

1 This value is automatically calculated using equation 4.1a. The equation used to calculate this value in the field equals:
   a. If A02= Single Family then [(0.01 x conditioned floor area A04) + 7.5(Number of bedrooms A05 + 1)] = Continuous Whole-Building Ventilation Rate
   b. If A02= Multifamily then [(0.03 x conditioned floor area A04) + 7.5(Number of bedrooms A05 + 1)] = Continuous Whole-Building Ventilation Rate

Section C. Intermittent Ventilation

1 Intermittent ventilation requires controls that ensure a regular operating schedule every 24 hours. Within a 24 hour period there will be one or more regular on off cycles. For a single on off cycle, enter the ON time in hours. This value will be verified by a HERS rater.

2 Intermittent ventilation requires controls that ensure a regular operating schedule every 24 hours. Within a 24 hour period there will be one or more regular on off cycles. For a single on off cycle, enter the OFF time in hours. This value will be verified by a HERS rater.

3 This row performs an automatic check. The intermittent ventilation system must operate at least once every 24 hours. For this to occur, the on time plus the off time in a single on off cycle must be less than 24 hours. If this is true, "OK" will appear. If this is not true, an error will appear here and correct values will need to be entered into Rows C01 and C02. The equation used to calculate this value in the field equals: Time on in hours row C01 + Time off in hours row C02.

4 This value is automatically calculated. It is the daily fractional on time (*f*) used in 62.2 Table 4.2. A value of 0.60 means that in a 24 hour period the fan will run 60% of the time. The equation used to calculate this value in the field equals: On time in Hours row C01/(On time in Hours row C01 + Off time in Hours row C02)= Daily fractional on time (decimal)

5 This row performs an automatic check. The ventilation system must operate at least 10% of the time. Row C04 must be greater than or equal to 0.10. If this is true, "OK" will appear. If this is not true, an error message will appear here and correct values will need to be entered into Rows C01 and C02.

6 This value is automatically calculated. It is the turnover (N) used in 62.2 Table 4.2. The equation used to calculate this value in the field equals: [12.8 x Continuous Whole-Building Ventilation Rate row B01 x (On time in Hours row C01 + Off time in Hours row C02)]/ Conditioned floor area of dwelling unit row A04= Turnover N

7 User entered value from table 4.2. Use the daily fractional time (*f*) from Row C04 and the turnover (N) from Row C06 to determine the ventilation effectiveness value (e) from 62.2 ~~t~~Table 4.2.

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TABLE 4.2

Mechanical Ventilation Effectiveness for Intermittent Fans

Fractional On-Time, f	Turnover, N 0	1	1.5	2	2.5	3	3.5	4	5	6	8	12	20	40	100+
0.00	1.00	0.95	0.88	0.78	0.60	0.00									
0.05	1.00	0.96	0.90	0.81	0.67	0.41	0.00								
0.10	1.00	0.96	0.91	0.83	0.72	0.55	0.21	0.00							
0.15	1.00	0.96	0.92	0.85	0.76	0.63	0.44	0.18	0.00						
0.20	1.00	0.97	0.93	0.87	0.79	0.69	0.56	0.40	0.03	0.00					
0.25	1.00	0.97	0.94	0.89	0.82	0.74	0.64	0.53	0.26	0.02	0.00				
0.30	1.00	0.98	0.95	0.90	0.85	0.78	0.71	0.62	0.42	0.24	0.00				
0.35	1.00	0.98	0.95	0.92	0.87	0.82	0.76	0.69	0.54	0.39	0.14	0.00			
0.40	1.00	0.98	0.96	0.93	0.89	0.85	0.80	0.75	0.63	0.52	0.32	0.02	0.00		
0.45	1.00	0.99	0.97	0.94	0.91	0.88	0.84	0.79	0.70	0.61	0.45	0.21	0.00		
0.50	1.00	0.99	0.97	0.95	0.93	0.90	0.87	0.83	0.76	0.69	0.57	0.37	0.13	0.00	0.00
0.60	1.00	0.99	0.98	0.97	0.96	0.94	0.92	0.90	0.86	0.81	0.74	0.61	0.45	0.27	0.14
0.70	1.00	1.00	0.99	0.98	0.98	0.97	0.96	0.94	0.92	0.90	0.85	0.78	0.68	0.55	0.46
0.80	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.97	0.96	0.94	0.90	0.85	0.77	0.70
0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.97	0.96	0.93	0.88
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

8 This value is automatically calculated using 62.2 equation 4.8. It represents the required airflow in cfm that must be delivered during the ventilation system ON times. This value will be verified by a HERS rater. The equation used to calculate this value in the field equals: Continuous Whole-Building Ventilation Rate row B01/(Daily fractional on time row C04 x ventilation effectiveness value row C07= required Intermittent ventilation rate (CFM)

9 User entered value equals the installed intermittent ventilation rate in (CFM). This value will be field verified by a HERS Rater.

10 This information is automatically pulled from the registered MCH-22. Note: this line only visible if CFI System selected in A08

11 This information is automatically calculated based on C10. Note: this line only visible if CFI System selected in A08

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